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Teachers' Perspectives on the Obstacles to Implementing Inquiry-Based Learning in Secondary Science Classrooms

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Walden University

College of Education and Human Sciences

This is to certify that the doctoral study by

Gabrielle Gonzales

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2025

Abstract

Teachers' Perspectives on the Obstacles to Implementing Inquiry-Based Learning in

Secondary Science Classrooms

by

Gabrielle Gonzales

MA, University of the Incarnate Word, 2018

BS, St. Mary's University, 2012

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

May 2025

Abstract

The research problem for this study was that teachers are inconsistent in using inquiry-based instruction in secondary science classrooms. Guided by Vygotsky's theory of constructivism, the purpose of this basic qualitative study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe will be needed to allow them to overcome these obstacles. Semistructured interviews were conducted with 10 certified, current Grade 8 to 12 teachers within the United States who had experience and familiarity with inquiry-based instruction. The data were analyzed through thematic analysis with open coding. The five themes that emerged from participant responses centered on structural barriers, resistance from traditional teaching methods, student empowerment through inquiry-based approaches, benefits of collaborative learning environments, and the necessity for comprehensive professional development with implementation support. The findings revealed a tension between traditional teaching approaches and scientific learning demands, highlighting systemic structural barriers. These findings also identified inadequate resources, ineffective professional development, and standardized testing pressures that create a resistance to change. The recommendations for future study included clarifying stakeholder roles, increasing mandatory professional development, and integrating weekly inquiry-based lessons into secondary science curricula. This study promotes positive social change by empowering educational stakeholders to transform science education through improved curricula and implementation strategies that foster student ownership, develop real-world skills, and prepare students for future success.

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Dedication

I dedicate this dissertation to my family, my friends, and my colleagues and students. To my mother, there are not enough words to express my gratitude. Your unconditional love and support have guided me through this journey, and I thank you for always teaching me the value of an education. To my father, thank you for always putting a smile on my face and for teaching me how to enjoy life to the fullest. To my brother, thank you for always being by my side at home and providing me support. To my stepfather, thank you for always being by my side regardless of the challenges we have faced. To my friends who became my lifelong brothers and sisters. Your friendship provides me strength in everything I do, and I know with you all by my side, there is nothing I can't achieve. To all my Collegiate High School colleagues, I thank you for all the love and support you have provided me in shaping my career as an educator. I have learned so much from every one of you and I will always appreciate your words of motivation. To Dr. Penny, thank you for always pushing me to become a better student and for reminding me that my goals are achievable. I could not have asked for a greater mentor during this journey. Finally, to my students past and present, you are my greatest motivation to continue my career in the educational profession. I hope that my journey will continue to inspire you to reach for stars and learn the blessings of an education.

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Chapter 1: Introduction to the Study

In secondary science education, there was a necessity for teachers to implement inquiry-based instruction in their classrooms. Inquiry-based instruction provides an investigative approach for teachers to instruct their students on investigating a problem, proposing a solution, and making observations from the environment around them. For secondary science teachers to implement this method successfully, they need to ensure their instruction enabled their students to answer questions and obtain necessary experiences for the basis of the teacher's lesson (Warner, 2020). There have also been findings demonstrating that inquiry-based instruction allows students to collaborate and investigate real-world problems (Eltanahy, 2019). Inquiry-based instruction in science is a detailed process that engages students in critical thinking tasks and creates a social environment for them to learn on a higher level (Baroudi, 2021). However, teachers are reluctant to implement inquiry-based instruction in their curriculums to allow their students to think on a higher level. There needs to be more insight into the preconditions of inquiry-based instruction in terms of student-centered approaches (Carpenter, 2019). Some teachers believed they are implementing inquiry because they are directing the process or demonstrating how it should be conducted; however, this does not motivate students to conduct the investigation themselves or work with their peers (Isik-Ercan, 2020). By increasing collaboration and higher-level thinking, there is the potential for students to be more successful both in higher education and in their career prospects.

In this study, I focused on exploring teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they

believed was needed to allow them to overcome these obstacles. The sections of this chapter include a background of the study, explanation of the current problem, the purpose for conducting this study, the research questions addressed, an overview of the conceptual framework, explanation of the nature of the study, list of definitions, discussion of assumptions, identification of the scope, delimitations, and limitations, description of the significance, and a final summary of the chapter.

Background

There was a need to discover the obstacles secondary science teachers face that prevent them from implementing inquiry-based instruction in their secondary science classrooms. Although national science education standards in the 1990s promoted inquiry into science curriculums, standardized testing has become a bigger focus and has constrained these efforts (Anderson, 2017). The No Child Left Behind Act has also focused on testing accountability and this has limited instruction time and flexibility needed for inquiry-based instruction (Marshall, 2022). Teachers had been accustomed to following a specific district-wide curriculum and some of their resources do not support inquiry-based instruction. It is unclear whether teachers understand how inquiry-based instruction will support students' success and if they have difficulty implementing it to support collaboration and critical thinking (Saleh, 2020). Teachers are also not meeting the standards of appropriate rigor for inquiry-based instruction and not executing the right amount of collaboration and reflection. Teachers stated that they prefer the more traditional teaching strategies, such as lecturing and assigning formative and summative assessments (Effendi-Hasibuan, 2019). There was also the concern of whether science

teachers are gaining enough professional development that catered to inquiry-based instruction instead of them focusing on testing standards. Mohammed (2021) concluded that such misconceptions stem from teachers' lack of exposure to inquiry-based instruction as previous students and beginning teachers. As a result, secondary science teachers needed to reteach prior skills to their students and lose instruction time before they can consider higher-level instruction.

This qualitative study is significant in that it addresses the gap in practice of teachers who do not implement inquiry-based instruction in secondary science classrooms given the obstacles that they encounter. By examining and studying the challenges teachers may be facing, this investigation suggests solutions to help teachers improve instruction. It also has the potential to create social change by allowing students to take control of their own learning and use essential skills for the classroom and the real world. Teachers could help students build comprehension, critical thinking, and communication skills. The findings from the study could also provide teachers with reassurance that their students are gaining a deep understanding of their instruction rather than memorizing and recalling facts. Since inquiry-based learning provides opportunities for teachers to differentiate their instruction, students may have the opportunity take control of their own learning and be more engaged and successful in the classroom. By increasing positive academic outcomes, students may be more knowledgeable in higher education and career prospects.

Problem Statement

The problem that was addressed through this study was that teachers are inconsistent in using inquiry-based instruction in secondary science classrooms. Research indicated there were several challenges teachers face with this method. First, teachers were accustomed to following a specific district-wide curriculum and some of their resources did not support the inquiry method (Kang, 2022). It was unclear whether they understood how the method supported the success of students and if they had difficulty implementing it to support collaboration and critical thinking (Saleh, 2020). Teachers were also not meeting the standards of appropriate rigor for inquiry-based instruction and not using the right amount of collaboration and reflection (Zambak, 2017). They believed they were implementing inquiry-based strategies when they applied highly structured step-by-step procedures and hands-on activities; however, there were still misconceptions about the inquiry that tensed the way they designed their curriculum and conducted instruction (McLaughlin, 2014). The biggest concern was that teachers were more focused on mastering testing standards for their students rather than gaining enough professional development that catered to the inquiry-based method. Mohammed (2021) concluded that these misconceptions stemmed from teachers' lack of exposure to inquiry-based science instruction as past students and as beginning teachers. As a result, they needed to reteach prior skills to their students and lose instruction time before they could consider higher-level instruction.

Purpose of the Study

The purpose of this basic qualitative study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe was needed to allow them to overcome these obstacles. The study also provides suggestions for effective teaching practices and strategies that incorporated inquiry-based instruction in science classrooms. Teachers could also benefit from this study by understanding how inquiry-based instruction should be implemented to increase high-quality collaboration and critical thinking.

Research Questions

The following research questions were designed to address the problem statement and address the gap in literature regarding the reasoning on why teachers are not implementing inquiry-based instruction consistently in secondary science education. These research questions also allowed teachers to share their perspectives of inquiry-based instruction, along with the insights they must help them overcome their obstacles with implementing the method.

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

Conceptual Framework

The conceptual framework for this study was based on Vygotsky's theory of constructivism (see Liu, 2005). Vygotsky's theory involves the teacher influencing their

students to learn from personal experience and construct their own knowledge (Liu, 2005). Constructivism includes elements like higher-level thinking, collaboration, and reflection. Sewell (2003) discussed how teachers could apply teaching strategies that presented their students with the conflict between the knowledge they possess, and the new content taught through the theory. Constructivism provides a framework for how teachers could use communication tools and strategies to help develop individual learning methods and implement inquiry-based interactive activities.

This framework provided insight to observe the obstacles with implementing inquiry-based instruction in secondary science curriculums. The framework also provided suggestions on what practices needed to be implemented, what improvements needed to be made, and how teachers could perform better in the classrooms. Constructivism related to my study by helping me observe whether teachers were implementing verbal communication and reflection to help them acquire conceptual knowledge. I could also observe whether teachers were having obstacles with encouraging their students to form their own knowledge and foster essential skills, including judgement and organization (Bruning, 1995). The more comfortable teachers felt with inquiry-based instruction; the more they could help their students' become masters at thinking and communicating (Powell, 2009). Students were also challenged to become effective critical thinkers while teachers took on the role of mentor or coach (Sasson, 2022). Exploring all levels of inquiry-based teaching and learning could help guide what the issues were with inconsistency, reiterate the purpose of discovering the issues, and use a qualitative method to gather more information from secondary science teachers.

Nature of the Study

The purpose of this study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe was needed to allow them to overcome these obstacles. The study involved a basic qualitative research design consisting of semistructured interviews with a minimum of eight and a maximum of 10 secondary science teachers (Jennings, 2005). Basic qualitative research was motivated by the researcher's interest and was used to extend their knowledge by exploring social issues in a natural environment (Merriam & Tisdell, 2015). Researchers use this method to interpret meaning from their participants' observations and their own interpretations (Merriam & Tisdell, 2015). Basic qualitative research was necessary to help focus on understanding the issues of their study through words or visuals rather than numerical values (Creswell & Poth, 2016).

Interviews with teachers contributed to the purpose of the study because their responses provided details about the obstacles they faced and the support they felt they needed to implement it in their science classrooms. After the individual interviews were conducted, I engaged in qualitative data analysis by adopting the approach of Braun and Clarke (2006). If there were any reoccurring themes and details, they were categorized based on general themes and more specific themes for further analysis.

Definitions

Inquiry-based instruction: "A science teaching practice designed and implemented by a science teacher with the goal of involving students in investigative

learning activities and developing their critical thinking skills” (Effendi-Hasibuan, 2019, p.1.

Professional development: Gaining new skills through continuing education and training after entering the career of education. This can include classes, workshops, conferences, and earning certifications (Parsons, 2022).

Secondary science teachers: Qualified education professionals who work with middle or high school students and are expected to teach students to collect, analyze, and make conclusions from data and observations (Boesdorfer, 2022).

Assumptions

There were several assumptions that supported my study for inquiry-based instruction in secondary science curriculums. First, I assumed my interview questions were efficient regarding understanding teachers’ perspectives, challenges, and experiences with the implementation of inquiry-based instruction in secondary science classrooms. Second, I assumed my participants would understand the questions I provided and therefore would provide accurate responses to their experiences of inquiry-based instruction. This assumption provides credibility to my study based on my participants’ honest reflections on the inquiry-based method. Finally, I assumed that all my participants’ interview responses would reflect most secondary science teachers’ experiences with inquiry-based instruction.

Scope and Delimitations

The scope of this study addresses the purpose of exploring teachers’ perspectives of the obstacles to implementing inquiry-based instruction in secondary science

classrooms and what they believed was needed to allow them to overcome these obstacles. For example, teachers lacked exposure to inquiry-based instruction as previous students and beginning teachers (Mohammed, 2021). Teachers did not have the proper knowledge and skills to implement the method and there was a disconnect between why this obstacle could not be solved.

There were several delimitations that were included in this study. First, the study only focused on inquiry-based instruction with science curricula instead of specific inquiry-based instruction strategies such as problem-based learning, project-based learning, and field-based learning separately. Second, the study only included secondary science teachers and excluded administrators, students, paraprofessionals, and coaches. Third, the study only included public schools from across the United States. Finally, the location of the teachers' interviews was limited to an online platform using Zoom video conferencing. All participants needed to have access to technology to ensure their interviews can take place.

Limitations

Some limitations and challenges addressed in this study include the sample size, personal bias, and the environment for the interviews. The plan was to conduct a maximum of 10 interviews with secondary science teachers on an online platform. I am also a firm advocator for inquiry-based instruction in secondary science classrooms, and my beliefs might have influenced the questions stated in the interviews and the credibility of the study. As a personal secondary science teacher, biases were addressed by

reviewing all the overall findings with the participants, verifying the findings with more data sources, and keeping a reflective journal.

Significance

This study was significant because it addresses the gap in practice with teachers not implementing inquiry-based instruction in secondary science classrooms. Most importantly, this study may have had the potential to contribute to social change by helping teachers demonstrate to their students how to take control of their own learning and use essential skills for the classroom and the real world. Although teachers facilitate, students can still make connections about what they are learning. Teachers could also have the reassurance that their students are gaining a deep understanding of their instruction, rather than memorizing and recalling facts. There is the potential for teachers to feel more confident that their teaching strategies are helping their students become more successful both in higher education and in their career prospects.

Summary

The problem that was addressed through this study was that teachers were inconsistent in using inquiry-based instruction in secondary science classrooms. The purpose of this study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction and what they believed was needed to allow them to overcome these obstacles. A basic qualitative research design consisting of semistructured interviews was conducted to gather more information about teachers' perspectives and experiences with these obstacles where the participants taught secondary science and had a basic understanding of the inquiry-based method. The research

questions and problem statement determined the final decision of the research design.

The research questions were:

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

In Chapter 2, the literature review introduces the conceptual framework for this study: Vygotsky's theory of constructivism. Chapter 2 also discusses the literature research strategy, such as databases, search terms, and the research process. The literature review begins with an introduction to the definition of inquiry-based instruction and how it supported the needs of secondary science classrooms. It proceeds to explain various qualitative, quantitative, and mixed-method studies that helped identify and explain the challenges and benefits to implementing inquiry-based instruction in secondary schools. Finally, Chapter 2 summarizes all the major themes from previous studies and demonstrated how the study contributes to the gap in literature to expand the understanding of inquiry-based instruction in secondary science classrooms.

Chapter 2: Literature Review

In this study, I explore and discuss the obstacles secondary science teachers had with implementing inquiry-based instruction in their classrooms. The purpose of this study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believed was needed to allow them to overcome these obstacles. The results from this study could help curriculum developers discover new practices to help secondary science teachers and how they could implement inquiry-based instruction to improve academic and higher learning for all students.

This chapter contains a literature review of similar studies regarding inquiry-based instruction in secondary science classrooms. I discuss inquiry-based instruction in relation to prior implementations, connections with science curriculums, constructivism, practice, and empirical studies. I also review the supports secondary science teachers needed to successfully implement inquiry-based instruction and what specific obstacles were preventing them.

Literature Search Strategy

The literature review includes research-based sources and studies from peer-reviewed journal articles. The databases chosen for this literature included Academic Search Complete, EBSCO eBooks, Education Research Starters, Education Source, Educational Resources Information Center (ERIC), and SAGE Journals. The search was limited to articles published from 2019 to 2023. All the articles were obtained by using search terms such as *inquiry-based learning*, *inquiry-based instruction*, *secondary*

science, teacher obstacles, teacher perspectives, constructivism, middle-school, high-school, and teacher challenges. All gathered research articles were analyzed by reading the abstract and the entire document to determine similar connections between the problem statement, purpose statement, and findings to my own study.

Conceptual Framework

Vygotsky's (1936) theory of constructivism served as the conceptual framework to contribute to the purpose of this study. Based on the theory of constructivism, individuals actively construct their own knowledge through the processes of assimilation and accommodation as they progress through the four stages of cognitive development. Assimilation occurs when students incorporate new information into their existing conceptions, while accommodation involves changing their misconceptions to fit with newly gathered data (Duncan, 1995). In secondary science classrooms, teachers expect students to demonstrate these processes to improve higher-order thinking and actively solve problems (Kang, 2022).

Inquiry-based instruction reflects the constructivist theory because learning results from what students do with presented information (Sewell, 2003). As active learners, students choose to build knowledge by applying critical thinking to develop evidence-based perspectives (Brookfield, 2017). By facilitating student investigations and interpretations, teachers also provide opportunities for learners to construct new conceptions (Tseng, 2022). This conceptual framework supported exploring teacher perspectives of inquiry-based instruction barriers. Connections between the framework and study informed the research problem, purpose, and methodology by showing how

teachers should structure instruction. To evaluate consistency with constructivism, I assessed whether teachers actively guided inquiry activities, assisted students in explaining findings, made them responsible for acquiring knowledge, and enabled them to communicate ideas. For example, applying Vygotsky's ideas promote collaborative dialogue and joint inquiry for enhanced learning (Deiglmayr, 2015). Vygotsky's theory also highlights using cultural experiences to improve comprehension (Meacham, 2001). By incorporating culture and inquiry, teachers could boost engagement and outcomes. Challenging students to grow critical thinking skills while coaching them facilitate construction of knowledge. Examining inquiry teaching and learning levels directed the investigation of implementation issues, reaffirmed the research purpose, and supported a qualitative methodology to gather teacher insights.

Literature Review Related to Key Concepts and Variables

Inquiry-based instruction has demonstrated to be a promising practice in science curriculums by encouraging students to apply critical thinking skills and perform scientific investigations (Isik, 2020). It is considered a viable approach in science education based on constructivist theories that emphasize the importance of student-led activities (Baroudi & Rodjan Helder, 2021). Although inquiry-based instruction has been shown to be successful, secondary science teachers continue to face obstacles with implementing the method effectively (Capps, 2013). The following literature review examines and discusses the key concepts and variables that contributed to these obstacles from recent studies that studied inquiry-based instruction in secondary science classrooms.

Definition of Inquiry-Based Instruction

For this study, inquiry-based instruction was defined as an investigative approach where teachers guide students to explore a problem, propose solutions, and make observations from their surrounding environment. Azizoglu (2022) showcased this definition by comparing chemistry lessons on subatomic particles using inquiry-based 5E instruction versus traditional methods. The findings demonstrated that the inquiry-based 5E approach had a positive impact on academic achievement, highlighting the value of providing students opportunities to interpret evidence and discuss their own ideas. Additionally, Nicol (2021) described inquiry-based classrooms as spaces for engaged, open-ended, student-centered hands-on activities. However, Guzman (2021) suggested that even as students recognize the active role required in inquiry-based learning, they still expect support from their teachers throughout the investigative process. Evaluating these perspectives, there needs to be a balance where teachers facilitated and guided students while allowing them autonomy to analyze data and solve scientific problems independently.

Benefits for Student Success

Inquiry-based instruction has potential to yield numerous advantages that promote student success in science learning. To illustrate, Chen and Wang (2020) implemented a collaborative web-based inquiry science environment that enabled teachers to design inquiry learning activities, and their findings revealed positive correlations between the time spent on learning activities and students' learning performance. Building on Chen and Wang's study, Loizou (2020) provided an example of how the benefits of inquiry-

based approaches can be amplified with the use of a flipped classroom model.

Additionally, Loizou suggested that inquiry-learning through a flipped classroom could attract students' attention and increase their motivation and participation, but there were no significant differences between the traditional and flipped classroom methods. At the same time, Baldock's (2020) qualitative investigation offered additional evidence of the inquiry-based learning's potential. Using student interviews, the author found that students directly recognized and discovered the value of inquiry-based learning in helping them develop their critical thinking skills and obtaining hands-on experiences with science investigations. Based on these studies' findings, inquiry-based instruction seems to cultivate a mixture of conceptual knowledge, critical thinking, and scientific engagement. By incorporating technology, collaboration, and investigative learning like those examined in these research studies, these factors could allow students to seek their full scientific potential.

Teacher Self-Efficacy

Although inquiry-based instruction may foster scientific reasoning and engagement in secondary science students, many teachers have reported low self-efficacy in effectively facilitating open-ended investigations. Namely, Dilekli (2020) pointed out that teachers of hard science courses, such as physics or chemistry, tend to have lower self-efficacy beliefs because these subjects often focus on learning rules or formulas to deal with well-defined problems, leaving little room for critical thinking and open-ended investigations. Building on Dilekli's work, Duarte (2019) discovered resistance to problem-based learning among teachers accustomed to a lecture format. The author

reported that teachers found inquiry activities time-consuming and worried that their students might miss important concepts from the course syllabus. Despite the hesitation identified by Dileki and Duarte, Kreifels (2021) demonstrated that science teachers felt confident in facilitating inquiry-based instruction when provided with professional development opportunities to enhance their knowledge and skills. The author found that the integration of inquiry-based teaching gave teachers the opportunity to critically examine their students' learning outcomes, thus improving their attitudes and beliefs toward the inquiry-based method. These studies explained the connection between teachers' self-efficacy, science subject challenges, and the need for additional professional development in inquiry-based instruction. Some subjects like physics or chemistry may have initially exhibited low self-efficacy because of complex problems and procedures, but it seems teachers still had a resistance to change due to time constraints and content coverage. To improve teacher self-efficacy, it may be necessary to have professional developments that cater to inquiry-based instruction, therefore improving attitudes and a greater willingness to critically examine student learning outcomes.

Student Obstacles

Inquiry-based instruction requires a high level of student motivation, which poses issues for teachers to foster accountability and self-directed learning for their students. For instance, Belen and Caballes (2020) showed that students faced challenges in sustaining their engagement and the perseverance needed to question, experiment, and construct evidence-based explanation. Like Belen and Caballes's study, Brady (2021)

used a qualitative approach to explore the distractions students faced when they were assigned to complete academic tasks. Brady's findings corroborated Belen and Caballes's interpretations, indicating that students' distractions stemmed from factors related to cognition, motivation, behavior, and context. The inquiry process seems to require focused attention, self-regulation, and the development of skills like careful observation and precise data collection. If students have cognitive distractions and behavioral disruptions, this can potentially affect their ability to fully engage in the key components of inquiry learning, such as questioning, experimentation, and reasoning. Brady's, Belen's, and Caballes's studies suggested the need for explicit instruction and support to help students build the disciplined mindset that is required to navigate an inquiry-based learning environment. Furthermore, teachers need to develop strategies for managing cognitive and behavioral distractions to facilitate more productive inquiry experiences for their students. However, the specific nature and extent of the support and strategies required was not fully clear from the evidence at that time. Further research is needed to identify the key skills, mindsets, and classroom management techniques that enable students to engage effectively in open-ended, investigative learning processes.

Developing strong teacher-student relationships is a key factor for effective implementation of inquiry-based instruction. To illustrate, Kang (2022) implemented student assessments and discovered that students need to have a healthy relationship with their teachers before they can perform in the classroom, as otherwise they become stressed and nervous during the inquiry process. In a similar study, Penuel (2019) assigned proximal transfer tasks for high school biology classrooms where teachers were

implementing a problem-based curriculum. Penuel pointed to the potential of developing a three-dimensional assessment design for phenomenon-based science learning, but teachers needed to be sufficiently connected to their students' everyday lives for it to be culturally relevant for their students. Both Kang's and Penuel's studies suggested teacher-student relationships may allow students to feel more comfortable with investigating scientific problems, as they likely feel reassured and supported in their learning process. However, further investigation needed to be conducted to determine how factors like gaps in teachers' understanding of student backgrounds and the relevance of instruction to students' lives contribute to obstacles with inquiry-based instruction.

Lack of academic depth in student communication posed another issue for inquiry-based instruction. Particularly, Isik (2020) found that teachers faced difficulties in planning for inquiry-based learning due to students' lack of academic depth in communication, as most students argued over the content being taught and felt uncomfortable articulating it in front of the class. Similarly, Saleh (2020) discovered students struggled with questioning their peers and needed consistent guidance from their teachers. Both the Isik-Ercan and Saleh studies suggested that if students struggle to articulate their thinking, it may hinder their ability to engage in scientific investigation. However, if teachers implemented appropriate scaffolds, students could develop communication skills needed to collaborate more effectively during inquiry activities.

Classroom and Behavior Management

Inquiry-based instruction offers numerous benefits for promoting student engagement and developing scientific reasoning skills, but it also presents unique

challenges, related to effectively managing student behavior and maintaining a productive classroom environment. To demonstrate, Zur (2021) implemented inquiry-based learning during a professional development program and discovered students' inability to remain fully engaged throughout inquiry activities—especially in the context of outdoor, experiential lessons where concerns over safety and behavioral disruptions were anticipated greatly. Reinforcing these findings, Tawfik (2021) conducted semistructured interviews to examine teacher perspectives on the usage of problem-based learning. Additionally, the author revealed similar classroom management issues where teachers needed comprehensive planning and upfront scaffolding to mitigate the risk of disengagement inherent in open-ended, inquiry-driven experiences. Moreover, the challenges teachers face in implementing inquiry-based science instruction extend beyond just classroom management. Research by Zur and Tawfik showed that the most significant benefits arose when students involved themselves in the scientific process. This involvement, paired with self-regulation skills, allows learners to navigate through the inquiry-based learning environment. However, the success of this approach seems not only to be dependent on student capabilities. Educators need to be equipped with the necessary skills to facilitate these learning experiences. By focusing on both student and teacher development, inquiry-based instruction has the potential to transform science education across various educational settings.

Lack of Administrative Support

There were many extrinsic obstacles that prevented science teachers from implementing inquiry-based instruction, but there seems to also be a lack of

administrative support to overcome these barriers. Specifically, Mohammed (2021) discovered a lack of district-level administrative support along with a failure to pay teachers' professional development stipends. The author emphasized that the lack of stipends may have prevented the implementation of reforms in certain schools.

Furthermore, the author concluded that many administrators had never experienced inquiry teaching and therefore never provided their teachers with in-service trainings.

Based on these findings, it could be assumed that administrators may be relying on traditional conceptions of teaching, constraining the success of science education reform.

In other circumstances, Chen (2020) stressed that some socio-scientific issues linked to the development of science are important to address to improve scientific literacy for students. However, the author elaborated that teachers felt pressured with time to meet curriculum requirements, such covering content knowledge and preparing students for state examinations, as the highest priority to be met by their administration. Teachers seemed to make great efforts in improving science literacy needed for inquiry-based instruction, yet there is a bigger need for explicit guidance and support from school leaders.

Teachers Willingness with Inquiry Methods

Inquiry-based instruction seems like a daunting process for secondary science teachers, but their willingness to adopt the approach can be influenced by various factors. In particular, Smalley's (2024) focus group revealed a veteran teacher who believed that her traditional teaching methods were appropriate due to familiarity and habit. The author also found that teachers' willingness to adopt inquiry-based instruction varied based on

the age group they taught, with some finding it more challenging to implement with seniors who preferred a catered approach compared to middle school students who enjoyed new learning styles. Nonetheless, Breda (2023) revealed that traditional direct instruction remains the most preferred teaching approach among teachers. The author indicated that teachers' unfamiliarity with inquiry-based methods, perceived difficulty in implementing them, and lack of confidence in learning the approach contributed to their reluctance to adopt them. However, Contreras (2024) provided a different perspective, demonstrating that teachers could be more willing to adopt inquiry-based instruction if they have the collaboration and supervision of their peers. The author's insights highlighted the importance of constant dialogue and support in promoting inquiring teachers. These studies showcased the various factors that influence teachers' willingness to adopt inquiry-based instruction. Although some teachers are hesitant due to familiarity with traditional methods or perceived difficulties, others are more open to embracing new approaches, particularly when supported by collaborative efforts and peer supervision. Ultimately, there needs to be a culture of continuous learning, dialogue, and support for teachers if they are to be willing to adopt inquiry-based instruction in their secondary science classrooms.

Confidence in Designing and Scaffolding Inquiry Practices

Inquiry-based instruction is a method that teachers were willing to implement in their secondary science classrooms; however, teachers lacked the confidence to design and scaffold inquiry practices successfully. For example, Mohammed (2021) discovered teachers in many situations who had minimal knowledge about the activities and thinking

processes that were required to help students explain scientific investigations. The author also demonstrated that teachers' conceptions of inquiry reflected their conceptions of science teaching and learning. Although Mohammed's investigation discovered teachers having minimal knowledge to inquiry-based instruction, Yalyn (2022) concluded that teachers could use student worksheets on problem-based learning to improve their students' critical thinking skills and have a better idea of where to begin implementing inquiry-based instruction. Similarly, Bae (2021) also investigated patterns in successfully scaffolding problem-based learning. The results showed that teachers could take turns across class discussions, allow extended silence during discussions to foster transfer of responsibility, and extend discussions with different examples of the problem being investigated. Although teachers can lack the confidence to still implement inquiry-based instruction, these studies showed there were some strategies that could help teachers feel more at ease with attempting the method on their own.

Lack of Instructional Funds and Supplies

Many secondary science teachers seem willing to implement inquiry-based instruction; however, the successful implementation of this method faces challenges due to the lack of resources and funding. To elaborate, inquiry-based instruction requires many of the qualities of STEM (science, technology, engineering, and mathematics) education, but Brenda (2023) discovered that there was a shortage of equipment, inadequate school infrastructure, and high deficiency in various professional development programs for teachers. Illuminating Brenda's (2023) findings, Karakaya (2020) also determined that students often struggled to complete STEM activities related to inquiry-

based instruction due to the lack of time, materials, and knowledge. Both Brenda and Karakaya emphasized the lack of adequate support and resources as a significant barrier to the implementation of these practices. Although these studies underlined the importance of resources and funding, Kotuláková (2021) uncovered a contrasting perspective among teachers. The author found that teachers expressed disagreement with the notion that the effectiveness of inquiry-based learning was directly tied to the amount of funding available. Instead, teachers in the author's study believed that creating a meaningful learning environment does not solely depend on financial resources. These sources of research highlighted the complex interaction between teachers' willingness to adopt inquiry-based instruction, the challenges posed by resource constraints, and the diverse beliefs about the role of funding in ensuring successful implementation. Although some researchers found the need for instructional funds and resources, others suggested that teachers can have an important role in creating meaningful learning experiences, regardless of financial issues.

Insufficient Professional Development

Although school districts advocated for various professional development opportunities for teachers, the available options may not have catered to the needs of student and teacher motivation. For example, Chiu (2021) discovered it was beneficial for teachers to apply what they learned from workshops and that the self-determination theory-based design thinking benefited their students. Similarly, Levy's (2022) 3-year qualitative investigation examined how physics teachers' growth was cultivated through participation in a professional learning community. Related to the self-determination

theory highlighted by Chiu, Levy's findings indicated that providing teachers opportunities to collaborate could promote the acceptance of more learner-centered instruction. Levy also demonstrated the principle that professional development should occur over an extended period to support students' evolving needs. Interestingly, the self-determination theory and professional learning communities shared an emphasis on improving teachers' motivation and self-reflective abilities. These ideas for professional development can provide teachers with the skills necessary to help keep their students engaged and motivated throughout the learning process.

Although some professional development administrators advocated for the use of teacher mentors to support the implementation of inquiry-based instruction, research suggested teachers were hesitant to embrace this collaborative approach. For instance, Cisel (2021) discovered some mentors' programs did not cater to the required curriculum of teachers and the suggested activities were too time consuming for teachers to implement successfully. Obstacles towards mentor-supported learning stand in contrast to the benefits of workshop-based programs. For instance, Hong (2023) implemented a community problem-based learning project within a workshop setting, aiming to assist teachers with the tools and strategies for problem-based learning. However, similar to the mentor-based challenges, the teachers in this study reported struggling to find the time required to fully learn and integrate the new strategies on their own. Both Hong and Cisel's investigations suggested that although school districts have made efforts to provide various professional development opportunities, there remained a need for options that catered to teachers' schedules, interests, and learning needs. Consolidating

the preferences and constraints of experienced and novice teachers was also necessary, as Hong and Cisel's work indicated, teachers at different stages of their careers possessed different goals and perspectives with implementing inquiry-based instruction.

Curriculum Priorities and Time Management

Although some secondary science teachers are eager to implement inquiry-based instruction, they often faced pressures related to adhering to required curriculum and managing limited time constraints. For instance, Botella (2022) illustrated the difficulty of developing project-based curricula with the confines of a typical school schedule. Similarly, Munawaroh (2021) compared motivation gains for students taught via technology-based versus traditional problem-based learning methods. The results illustrated, that although technology contributed to better time management for teachers, problem-based learning provided a higher level of science comprehension for students. To improve the time investments demanded by the inquiry process, teachers need to implement a range of presentation styles and scaffolding techniques. By varying instructional delivery to align with learning materials while maintaining rigor, educators can increase student interest and motivation within unavoidable scheduling constraints. However, this balance remains an ongoing struggle, as inquiry-based instruction often requires quality instructional time that can be difficult to accommodate in traditional school structures.

Testing Culture

Although inquiry-based instruction in science classrooms promotes active learning and critical thinking skills, the demands of standardized testing create barriers

for teachers to effectively implement this approach in their classrooms. To instantiate, Fitzgerald (2019) conducted semistructured interviews and revealed teachers' concerns about standardized testing, which they believed threatened inquiry-based methods due to the pressure to cover content that students needed to recall for tests. The author emphasized the pressures teachers felt from their administrations regarding the national testing regime that structured the school curriculum and the use of scheduled class time. Additionally, Hofer (2019) identified a tension between teachers' beliefs in favor of inquiry-based instruction and their concerns regarding the requirements for final exams and the time needed to prepare for these assessments. Sprott (2019) further highlighted this tension by discussing a teacher who struggled to balance core values with the demands of testing from school leaders. The author emphasized that teachers often lack the autonomy to blend their own objectives with the needs of the students, feeling confined by systems that hinder collaborative reflection. Although instructional coaches could assist teachers in implementing inquiry-based methods, Kane (2019) revealed that these coaches also faced pressure to meet the state's increasing testing accountability, mainly focusing their efforts on ensuring students meet learning goals measured by student achievement on state assessments. Based on these collective works, there is a complex interplay between inquiry-based instruction and standardized testing. Secondary science teachers and auxiliary staff face pressures to meet the demands of testing and can lose focus on how to implement inquiry-based instruction successfully. Kane recommended that teachers discover strategies to overcome these barriers of testing and focus on effectively implementing various inquiry practices.

Summary and Conclusions

The literature highlighted themes regarding inquiry-based instruction and the obstacles secondary science teachers have with implementing the method in their classrooms. These themes included benefits for student success, teacher self-efficacy, student obstacles, classroom management, teachers' willingness, lack of instructional funds, insufficient professional development, curriculum priorities, and testing. Researchers also defined inquiry-based instruction and how it benefits students and teachers practice for enhancing their scientific knowledge. The literature drew on teacher, student, and administration perspectives. Inquiry-based instruction not only engages students in scientific practices, but it enhances teacher training programs, curriculum development, and educational policies. Although there are obstacles and concerns regarding inquiry-based instruction, the literature provided potential solutions for overcoming these issues. The present study filled the gap surrounding inconsistency in using inquiry-based instruction and teachers' perspectives of the obstacles to implementing the method in secondary science classrooms. These results can extend knowledge in scientific practices for teachers and provide more information used by schools and districts. In Chapter 3, I discuss the research method used for this study to successfully fill the gap in the research literature.

Chapter 3: Research Method

In Chapter 3, I discuss the research design and rationale, the role of the researcher, methodology, strategies to maintain trustworthiness, ethical procedures, and a conclusion to the chapter by summarizing all main points. This chapter also demonstrates how the problem within the study will be described, explained, reported, and tested (see Cohen, 2002). The research problem, purpose statement, and research questions align with the methodology by focusing on understanding teachers' perspectives and insights on the obstacles and potential solutions to implementing inquiry-based instruction in secondary science classrooms. These sections address interviews with secondary science teachers about their experiences and perspectives of inquiry-based instruction. Teachers were interviewed in their school settings to gain a deeper understanding of the environmental factors that influenced their inquiry-based teaching.

Research Design and Rationale

The purpose of this qualitative study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe was needed to allow them to overcome these obstacles. I also implemented a basic qualitative research design as the study approach. The research questions were:

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

Qualitative research was used to explore social issues in a natural environment with special attention to certain individuals and the environment being observed (see Creswell & Poth, 2016). Researchers use this pattern so they could interpret meaning from their participants' perspectives (Lincoln, 2005). It was also necessary for me to focus on whether certain programs or interventions were working and if they needed to be improved from the perspectives of specific stakeholders (Ford, 2021). The research design chosen for this study was a basic qualitative approach to get a better understanding of science teachers' perspectives of inquiry-based instruction through their experiences and face-to-face conversations. A basic qualitative design provided me the opportunity to use open codes, categories, and thematic analysis (Kahlke, 2014). Therefore, this design was best suited because it allowed me to examine teachers' everyday experiences and practices with the inquiry-based method. As the researcher, I had background knowledge about inquiry-based instruction and the basic qualitative design allowed me to gain more information from the participant's perspective (see Percy, 2015). The basic qualitative design also contributed to the purpose of the study because their responses provided details about the obstacles they faced and the support they believed they needed to implement inquiry-based instruction in their science classrooms.

Role of the Researcher

My role as a researcher was a major component of this basic qualitative study. The role of the researcher is to explore the participants' patterns, behaviors, and tone of language during the chosen setting (Danford, 2023). I am currently a secondary science teacher at a high school in Corpus Christi, Texas. I have been teaching science for 6

years, and I practice inquiry-based instruction consistently with my students. Even though I am a secondary science teacher, I only included participants who were not within my school campus. Most importantly, I prioritized maintaining a private and professional relationship with my participants during the interview process.

I attempted to decrease the amount of researcher bias by showing empathy and avoiding judgment. I attempted to channel my participants' thoughts as if they were my own, and I learned how to accept their ideas despite my own disagreements. I also used open-ended questions to avoid making suggestions about inquiry-based instruction. Most importantly, I made sure to summarize their statements to check I understood them accurately and effectively. Although it was difficult to not showcase my own opinions, it helped me remind myself of the importance of the study.

Methodology

Participant Selection

I used the purposeful sampling strategy to identify and select participants who were knowledgeable about inquiry-based instruction in science classrooms. Purposeful sampling involved me selecting participants who were especially knowledgeable about inquiry-based instruction in secondary science classrooms (see Creswell, 2016). This strategy allowed me to capture major perspectives rather than seek a common idea (see Patton, 2007). I also contacted participants through their email addresses to finalize recruitment. The participants for this study consisted of secondary science teachers from across the United States. To meet the selection criteria, they needed to be a current employee with Grade 8 to 12 science teacher certification at a public middle school or

high school within the United States. Teacher experience and familiarity with inquiry-based instruction was also a criterion for participant selection.

Instrumentation

For this study, I conducted semistructured interviews guided by an interview protocol. I designed the interview to maintain alignment between the research questions and the purpose and problem statement for the study. The interview protocol for this study is included in the appendix. It consisted of a brief introduction to the study, open-ended interview questions, and probing follow-up questions. The introduction explained the purpose of the interview and the process to record the participant and assure confidentiality. The open-ended interview questions allowed me to obtain the information I needed to understand the obstacles teachers have with implementing inquiry-based instruction. To successfully obtain data, I included a list of questions that reflected their experiences with inquiry-based instruction and what they felt had been successful or unsuccessful. I also asked questions that required the participant to clarify a response and provide further explanation. Follow-up questions were added to each open-ended question to probe for more details if needed. Finally, each interview was closed by thanking the participant and providing them the opportunity to offer final remarks.

To ensure the validity of the instrument, I used the help of doctoral students from my cohort and an expert panel of committee members to review my interview protocol and provide additional recommendations. I also incorporated their feedback and made changes to the protocol. Some of this feedback included restructuring interview

questions, improving the language, and revising the wording to help my participants explain their experience with great depth.

Procedures for Recruitment, Participation, and Data Collection

Procedures for Recruitment

For participant recruitment, I used the Walden University Participant Pool, social media flyers, and email invitations sent to addresses listed in school directories. All participants were invited through their personal email and informed of the study before scheduling an interview via Zoom. Each email explained the purpose of the study and the requirements for participation. I also ensured that participants met the inclusion criteria by having them answer demographic questions such as level of education and occupation.

Procedures for Participation

I informed all participants that I would use Zoom to conduct their interviews for this study. I scheduled their interviews based on the availability they provided in their email responses. Eligible participants received a detailed informed consent form outlining the study's purpose, procedures, privacy protections, and the voluntary nature of participation. Participants reviewed the form, electronically signed it, and returned it via email to provide consent before the interview process began.

One benefit of the Zoom platform was that it provided real-time interaction involving sound, video, and written text to mimic the features of a face-to-face interview (Archibald, 2019). The Zoom platform provided me with the best option to interview all my participants from various locations. All participants could have access from their phone, tablet, or computer and it enhanced personal interface to discuss personal topics

(see Gray, 2020). Zoom also provided security through passwords and made it accessible for any participant to join the conference call. Unlike phone interviews, Zoom allowed me to observe the participant's body language and tone of voice. My participants also had the ability to observe visual cues from me along with great flexibility (Mirick, 2019). Most importantly, Zoom provided a platform for me to effectively communicate with my participants.

Procedures for Data Collection

The procedures for my data collection included one-on-one, 60-minute semistructured interviews using the Zoom online conferencing platform, data transcription, and member checking. Participants joined the Zoom meeting using any phone, tablet, or computer with internet access. With the participant's permission, I used the Zoom software to record all interviews for transcription. Before we began the interview, I informed the participant of the purpose of the study along with the findings being shared at the end. A single 60-minute interview session was used to address the interview questions and obtain participants' responses. I also took written notes during each interview dialogue and on any key observations that I noticed. After the interview, I debriefed participants on the study's goals and reminded them of the privacy protocols. Confidentiality was ensured and maintained by the procedures listed in the content form and by using the in-meeting settings in the Zoom platform. These settings included encryption, audio signatures, and cloud recording storage. I also used the participants' phone numbers for my records rather than their first and last names. Some participants were contacted for a secondary interview to gather more information and for member

checking to help validate the credibility and accuracy of my study's findings. I confirmed that my interpretations accurately represented their views or highlighted any areas that may have been inaccurate. Most importantly, I incorporated the participants' feedback into my findings by revising any themes that participants identified as not fully aligning with their perspectives.

Data Analysis Plan

The data analysis plan aligned with determining the teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms. The analyzed data came from the responses of secondary science teacher interviews. All their responses were answers to open-ended questions about their experiences with inquiry-based instruction.

The data analysis followed Clarke and Braun's (2013) six-step data analysis process: familiarize, generate codes, combine codes to themes, review themes, determine theme significance, and report findings. I familiarized myself with all data by re-reading all the transcripts. The coding process was used to specify keywords and phrases from the qualitative data and identify different relationships and themes between them. The coding process consisted of a priori codes that used existing constructs and ideas to categorize the data, and open codes were used to allow the data to discover innovative concepts. These a priori codes came from my prior knowledge, conceptual framework, and the literature review for the study. I also coded the interview transcripts by using open coding to identify common responses related to the research questions in the study. First, I coded the transcripts line-by-line to develop an initial codebook. I then searched for any

discrepancies in the codes and created a consensus on code definitions for the coding framework. I also reviewed all the codes and decided on a specific coding framework within the NVivo 12 software. To search for themes, I assigned keywords and phrases to each data source to help me categorize them into large groups and develop overall themes. I needed to consider how the themes worked with every participant's interview and with the rest of the interviews. I also needed to ensure that the themes were coherent and distinct from each other. Any responses that deviated from the main themes needed to be analyzed to understand variations in teacher perspectives and experiences. All overall findings were clarified through member checking. Finally, all cases were reported in the findings to provide a nuanced understanding of the obstacles to implementing inquiry-based instruction in secondary science curriculums. A final analysis was performed to determine how the findings relate to the research questions and literature.

Trustworthiness

Trustworthiness was maintained by following four standards: credibility, dependability, transferability, and confirmability (Stahl, 2020). These standards guided my implementation of strategies to maintain these standards and ensure trustworthiness throughout the study. As a result, I ensured the findings of this study were presented in a manner that reflects accuracy, consistency, and integrity, thereby supporting the overall trustworthiness of the research.

Credibility

Credibility is ensuring that the study's findings have some type of relationship with each other (Stahl, 2020). I maintained credibility by implementing engagement,

observation, and member checking. As the researcher, I engaged with the participants through video conferencing, and I observed characteristics that were most relevant to the study. Member checking was used to help validate the credibility and accuracy of my study's findings. First, I analyzed the data and drew conclusions by summarizing the key themes and findings to prepare a brief report. Next, I shared this report by email with all my participants to review and ask them to confirm whether the report reflects their views, experiences, and the responses they conveyed during the interview process. They were also encouraged to correct any errors and provide additional perspectives. I used my participants' feedback to modify and validate the study's outcomes. Overall, the member checking process allowed me to challenge my thinking and rephrase my thoughts from my participants' responses.

Confirmability and Dependability

Confirmability and dependability are ensuring the trust in trustworthiness was being maintained (Alexander, 2019). Meeting these standards involves seeking objective reality as much as possible (Bogdan & Biklen, 2003). Dependability and confirmability were maintained using an audit trail. Each research step was documented from the beginning of the study to the final stages of developing and reporting the findings. I also used a diary to reflect on my own assumptions, preconceptions, and values on how they affected my understanding of inquiry-based instruction in secondary science classrooms.

Transferability

Transferability is the process of providing the data to make transferable judgements to further potential studies (Lincoln & Guba, 1985). Transferability was

obtained from the description of the participants' behavior and experiences with inquiry-based instruction in secondary science classrooms. All these strategies helped ensure trustworthiness and strengthened the validity of the study.

Ethical Procedures

As the researcher, I needed to follow all ethical procedures. I submitted an application to Walden's Institutional Review Board to ensure I met all ethical requirements. Once I was granted approval from the Institutional Review Board, I gathered all my participants and collected my data. A fundamental ethical responsibility of the researcher is prohibiting any fabrication or misrepresenting research data (Resnik, 2020). All participants received informed consent information in their personal or professional emails, and they were notified that their participation was voluntary. Participants were also informed of the opportunity to withdraw from the study at any given time. Most importantly, I informed my participants of how confidentiality would be implemented. Confidentiality is an essential ethical principle that helps assure their privacy of their personal responses (Kang, 2023). Before the start of the interview, I ensured the participant's privacy by conducting the interview in my private classroom through the Zoom platform. There were no other individuals present in my classroom, and the participants were not able to be heard from any other outside sources. All the data collected remained private to the study, and the participants' names were removed.

The participants chosen for this study were provided incentives for their ideas, but they were not pressured to contribute anything they didn't feel comfortable with. I also considered the amount of time it would take for me to conduct the interview, and I

ensured the participants it would end after 1 hour. As for documentation, I provided consent forms to each participant to obtain their personal permission for the study. The benefits of consent forms provide reassurance that my participants understood all relevant information and that they could communicate their choice of participation (see Kadam, 2017).

Another method to ensure ethical research was to keep a secure storage area for all transcripts, notes, and video recordings. All sets of data were secured with a protected password online. My physical data such as written notes and diary entries were stored in a personal locking cabinet. All data remained protected in these secure locations for at least 6 years after research publication.

Summary

The purpose of this study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe was needed to allow them to overcome these obstacles. The basic qualitative approach was chosen to maintain alignment between the problem statement, purpose statement, and research questions. The role of the researcher was to explore the participants' patterns, behaviors, and tone of language with inquiry-based instruction in secondary science classrooms. Secondary science teachers were recruited from the Walden University Participant Pool, social media flyers, and invitations sent through their direct email. I informed all participants that Zoom interviews were specifically used to conduct their semistructured interviews and collect data for this study.

The data analysis consisted of Clarke and Braun's (2013) 6-step data analysis process: familiarize, generate codes, combine codes to themes, review themes, determine theme significance, and report findings. Credibility, confirmability, dependability, and transferability were used to ensure the trustworthiness of the research. Credibility was maintained by implementing engagement, observation, and member checking. Dependability and confirmability were maintained using an audit trail. Transferability was obtained from the description of the participant's behavior and experiences with inquiry-based instruction in secondary science classrooms. Ethical procedures included IRB approval, instructions of informed consent, the participant's right to withdraw from the study, and storing data in a secure location. In Chapter 4, I discuss the results of the data analysis and reoccurring themes that were presented throughout the study.

Chapter 4: Results

The purpose of this qualitative study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe is needed to allow them to overcome these obstacles. The following research questions guided this study:

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

In Chapter 4, I present the setting of the study, participant demographics, data collection, data analysis, evidence of trustworthiness, and study results.

Setting

There were no personal or organizational conditions that influenced participants or their experience at the time of the study that may have influenced my interpretation of the study results. The main setting involved digital interviewing, which introduced unique contextual dynamics that potentially influenced participant experiences and data collection. The Zoom platform provided participants with convenience in regard to their personal time and distracting environments (Archibald et al., 2019). The platform also did not require participants to travel to a particular environment, and it provided them ease to participate in the research (Gray, 2020). However, as the researcher, I needed to create a setting where I could build trust with my participants and have them share their stories honestly without bias (Mirick, 2019). The use of Zoom interview platform created

an interactive environment that may have affected participants' communication styles, comfort levels, and depth of disclosure.

Data Collection

In this basic qualitative study, 10 participants took part in semistructured interviews. The interviews took place on a Zoom platform from October 2024 to November 2024. I was in Texas, in a locked classroom, and participants were in the privacy of their homes or work-related classrooms. Each interview lasted no longer than 1 hour and consisted of 12 interview questions. The interview protocol, audio recording, and transcription were recorded, collected, and stored in a password-protected online folder for each interview. There were also no disruptive circumstances during the data collection process.

Data Analysis

The data analysis was conducted based on the proposed data analysis plan. The data analysis followed Clarke and Braun's (2013) six-step data analysis process: familiarize, generate codes, combine codes to categories and themes, review themes, determine theme significance, and report findings. I transcribed the interview recordings using the NVivo 12 software and hand transcription. I familiarized myself with the data by re-reading all the transcripts. The coding process was used to specify keywords and phrases from the qualitative data and to identify different relationships and themes between them. The coding process initially consisted of a priori codes that came from my prior knowledge, conceptual framework, and the literature review for the study. I also

used open coding to identify common responses related to the research questions in the study.

Evidence of Trustworthiness

My implementation of trustworthiness criteria was successful through the implementation of four standards: credibility, dependability, transferability, and confirmability (Stahl, 2020). I maintained credibility by implementing engagement, observation, and member-checking. I made sure to share my interview transcriptions with all my participants to review and ask them to confirm whether the report reflected their views, experiences, and responses they conveyed during the interview process. They were also encouraged to correct any errors and provide additional perspectives. I maintained dependability and confirmability using an audit trail. I documented each research step from the beginning of the study to the final stages of developing and reporting the findings. I also used a diary to reflect my own assumptions, preconceptions, and values on how they affected my understanding of inquiry-based instruction in secondary science classrooms. Finally, I obtained transferability from the description of the participants' behavior and experiences with inquiry-based instruction in secondary science classrooms. All these standards helped ensure trustworthiness and strengthen the validity of the study.

Results

In this section, I present the results of this qualitative study. The purpose of the study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe is needed to

allow them to overcome these obstacles. I organized the results by demographics, participants definitions of inquiry-based instruction, codes and themes, and research question and theme. Differences in participant responses and data were also noted for each research question and theme. I discuss differences between participants within each theme's results subsection. A summary of the results is also discussed at the end of Chapter 4.

Demographics

All participants were currently employed at a public middle school or high school within the United States at the time of the study. All participants held active positions within their designated school as certified Grade 8-12 secondary science teachers. Participants had various years of teaching experience ranging from 5 to 20 years. Seven of the 10 participants were female, and three were male. Table 1 displays the participants by number, school type, title, years of experience, and gender.

Table 1

Participant Demographics and Characteristics

Participant	School type	Title	Years of experience	Gender
P1	High school	Science teacher	10 years	Male
P2	Middle school	Science teacher	10 years	Female
P3	Middle school	Science teacher	8 years	Female
P4	High school	Science teacher	19 years	Female
P5	High school	Science teacher	23 years	Female
P6	High school	Science teacher	26 years	Male
P7	High school	Science teacher	7 years	Female
P8	High school	Science teacher	19 years	Female
P9	High school	Science teacher	5 years	Female
P10	Middle school	Science teacher	4 years	Male

Participants' Definition of Inquiry-Based Instruction

All participants had various definitions of inquiry-based instruction, but some participants had different interpretations with the implementation process than others. Table 2 shows participants' definitions of inquiry-based instruction along with quotes from their interviews that demonstrated their understanding. Each participant demonstrated their personal knowledge of the method and how they implemented it in their science classrooms.

Table 2

Participant Definition of Inquiry-Based Instruction

Participant	Quote
P1	"A student-centered method where students are actively engaged in asking questions, investigating, and drawing their own conclusions."
P2	"A student-centered approach where the teacher guides students through questions or methods to reach conclusions."
P3	"The element of discovery and self-discovery, while creating a sense of independence for students."
P4	"Giving students ownership of their laboratory experience and having them explore real-world topics."
P5	"Students begin with questions and are given the freedom to explore and find information themselves."
P6	"Inquiry-based instruction is often limited to open-ended labs where students design their own variables."
P7	"Using questions to activate students' background knowledge and curiosity, and to deepen their thinking process."
P8	"Involves asking questions, exploring ideas, and using problem-solving and critical thinking skills."
P9	"The use of independent learning to solve a scientific problem."
P10	"A method that requires critical thinking, collaboration, and self-reflection."

Codes and Themes

I coded the transcripts line-by-line to develop an initial codebook. There were no discrepancies in the codes, and I created a consensus on code definitions for the coding

framework. Table 3 lists a priori codes and open codes created and used. I began with 18 a priori codes, and 27 open codes were created during the process of analysis.

Table 3*A Priori and Open Codes*

A Priori Codes	Open Codes
Administrative support	Access to lab materials
Assessments	Avoidance
Budgets	Collaboration
Classroom management	Critical thinking
Content knowledge	Cross-curricular connections
Differentiation	Data driven
Engagement	Flexibility
Facilitating discussions	Focus on testing versus real-world scenarios
Guided inquiry	Growth mindset
Inquiry pedagogy	Hands-on activities
Material shortages	Independent learning
Motivation	Interruptions
Open-Ended	Investigation and drawing conclusions
Scaffolding	Issues with data collection and analysis
Scheduling	Lack of creativity
Skill deficiencies	Linear thinking
Standardized testing	Manageable tasks
Time limitations	Organized schedules
	Problem-solving
	Productive members of society
	Professional development for inquiry strategies
	Rigid scheduling
	Student-centered
	Student ownership
	Student readiness
	Time restraints
	Traditional classroom implementation

To construct themes, I assigned keywords and phrases to each data source to help me categorize them into large groups and develop overall themes. All a priori and open codes were assigned to five categories: administrative and structural challenges, traditional teaching barriers, inquiry-based learning characteristics, positive learning approaches, and implementation support needs. As the data analysis process developed, five unique themes emerged:

1. Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials.
2. Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.
3. Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities.
4. Participants believed learning environments that emphasize collaboration, cross-disciplinary connections and growth mindset helps students develop into capable learners.
5. Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.

In Table 4, the five themes are shown in relation to each research question, with each research question having two to three corresponding themes. In the Results section, I align the five themes to their corresponding research question.

Table 4*Themes Organized by Research Question*

Research Question	Theme
RQ1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?	<ol style="list-style-type: none"> 1. Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials. 2. Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.
RQ2: What insights do teachers have into what could help them to overcome these obstacles?	<ol style="list-style-type: none"> 3. Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities. 4. Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps student develop into capable learners. 5. Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.

Research Question 1

RQ 1 was “What are teachers’ perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?” After completing the data analysis process, I noticed patterns and similarities in the codes that led to the development of two themes aligned to RQ 1:

1. Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials.
2. Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.

The participants' responses collected in the data supported the development of each theme. I included these responses of data in the form of quotes. Table 5 shows the first research question, codes for the development of each theme relating to this research question, and quotes from the participants to support the principle of each theme.

Table 5

Codes Organized into Themes for Research Question 1

Codes	Themes	Quotes
Access to lab materials Interruptions Organized schedules Rigid scheduling Time restraints	Theme 1: Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials.	P8: "We are really crunched for time, and we are constantly being interrupted with district requirements and student needs." P3: "School district had minimal funding for a science class, and I had to create or use what minimal things were there."
Avoidance Data driven Focus on testing versus real-world scenarios Lack of creativity Linear thinking Traditional classroom implementation	Theme 2: Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.	P5: "Students have been used to being talked at and not been allowed to find information for themselves." P6: "Curriculum has become more and more scripted, and the ability to explore things are limited." P1: "Rigid schedules that the district provides us and the huge emphasis on standardized testing."

Theme 1

The first theme that developed from the coding process aligned to RQ1 was: Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials. I used the following five codes to develop this theme: time restraints, rigid scheduling, interruptions, access to lab

materials, and organized schedules. Two dominant patterns surfaced from the research: universal time-related constraints and variable resource accessibility.

The first pattern centered around time-related barriers. This pattern appeared consistently across all participants' experiences, but these moments varied between schools. Every participant reported being forced into specific teaching schedules; however, the rigidity of these schedules displayed variations. For instance, in economically disadvantaged schools, schedule adherence was particularly strict due to graduation requirements. Participant 10 noted:

I feel the required teaching schedule has a lot to do with exactly how much real inquiry we can do. Many teachers are kind of locked into exactly what they are teaching and how they are teaching it.

Time restrictions seemed to emerge as a universal challenge, and every participant considered them as a significant barrier. These constraints often arose in practical ways, such as district requirements consuming valuable instructional time. Participant 1 explained:

There is a lot of requirements by the school district, like, having opening questions of the day and asking good things from the students. It really takes up a lot of time at the beginning of the class, so by the time we get started, we are cutting down 15 minutes of instructional time.

However, the severity of these time constraints varied based on administrative support and flexibility. If teachers had the support from their administration, time constraints seemed to be not a severe issue with implementing inquiry-based instruction.

Interestingly, administrative flexibility created a clear pattern of variation in how teachers could manage these time constraints. Some teachers, like Participant 9, experienced freedom to adjust their curriculum, expressing that their “administration has complete trust in me to implement my curriculum in a way that supports my student’s needs.” Others faced more ridged enforcement of schedules and sequences. Even though these two extremes existed, some teachers were able to find a middle ground. For example, Participant 7 had the ability to “chunk the topics from the most important to the least important.”

The second major pattern that emerged centered around resource accessibility. Some school environments were notably full of resources, and teachers were blessed to have administrators provide whatever they needed. For instance, Participant 4 stated:

My current administration on campus is very supportive of anything that we need. If they have the funds to help us acquire equipment or materials that we need to conduct different inquiry-based experiments and opportunities, then current administration is 100% behind us.

In contrast, teachers in resource-poor school environments struggled significantly.

Participant 3 shared:

I taught at a school district that had zero funds for science classes for at least three to five years. And anything that I did, I would have to create or use what minimal things were present in the school.

Between these extremes, mixed-resource settings showed inconsistent access to materials across school campuses. This constraint often required teachers to modify their prescribed labs based on the resources they were provided in the classroom.

The interaction between these patterns revealed important relationships. Resource limitations frequently aggravated time constraints because teachers needed to spend extra time finding alternative materials or developing creative activities. However, strong administrative support seemed to be a mediating factor to help improve both time and resource constraints. This type of support varied across schools as it appeared to also create advantages and disadvantages for inquiry-based instruction. Most importantly, participants revealed that although certain barriers appeared universally, their impact varied based on school context and administrative support. Participants also suggested that the most successful implementation of inquiry-based instruction occurred in environments where supportive administration intersected with adequate resources. It may seem that the presence of structural barriers may be less important than the school's capacity and willingness to help teachers navigate these challenges effectively. The variations in teacher experiences highlight the critical role that district support plays in either amplifying or reducing the impact of structural barriers on inquiry-based instruction.

Theme 2

The second theme that developed from the coding process aligned to RQ1 was: Participants believed that established teaching methods and assessment-driven instruction created resistance to implementing inquiry-based approaches. I used the following six

codes to develop this theme: traditional classroom implementation, linear thinking, focus on testing versus real world scenarios, lack of creativity, data driven, and avoidance.

Three distinct patterns emerged: assessment-driven instruction tensions, preparedness barriers, and implementation resistance patterns.

In examining assessment-driven instruction, a clear pattern of conflicting perspectives emerged. One pattern showed teachers struggling with the tension between test preparation and authentic learning experiences. As an example, Participant 2 stated:

We're always prepping for a test without any data-based knowledge. We do not initiate any inquiry based on real world experiences or any aspects that will allow the students to actually base their learning on things that are happening around us.

However, an interesting variation appeared in how teachers perceived standardized testing's value. Some teachers, like Participant 3, found positive aspects in standardized assessments, but the number of certain assessments needed to be decreased to continue to implement other inquiry-based activities. For instance, Participant 3 explained, "I don't mind the STAAR test. I think that it gives me feedback and helps me to know that I'm pointing the kids in the right direction." This variation extended further with Participant 10, who found district assessments beneficial for instructional planning while maintaining the ability to incorporate hands-on activities. Participant 10 shared, "I find standardized assessments to be beneficial for me because it provides me quick feedback for student progress. I know my district places great emphasis on testing, but I don't think it affects my ability to still incorporate hands-on activities and labs." Although there seemed to be a contrast between test-focused instruction and authentic inquiry-based

learning, participants still highlighted the ongoing challenge they face in balancing accountability with meaningful learning opportunities that prepare their students for the real-world.

A second significant pattern emerged around preparedness barriers, manifesting in two distinct ways: teacher readiness and student preparation. Regarding teacher preparedness, a consistent pattern of anxiety about relinquishing classroom control emerged. The intention to implement inquiry-based instruction seems prominent, but teachers found it hard to make it successful without students taking a leadership role. As Participated 5 articulated:

I think for a lot of teachers, it's scary, to kind of step back and let the kids take control of their learning. I think sometimes we just want to get in there and fix everything, and that doesn't always work with inquiry-based learning.

This anxiety pattern connected directly to concerns about student preparation, where teachers consistently noted students' limited experience with inquiry-based thinking. In other interviews, participants expressed that linear thinking was the result of how students were taught in elementary school. Participants also shared the observation that students often need to be trained to think and question, as their brains are wired differently and may not naturally engage in inquiry-based learning. Participant 7's observation highlighted this pattern: "I think our students are not used to questioning things, so if you don't require this skill from the beginning, it is difficult to try and get something from them in the classroom." Similarly, Participant 2 stated, "They've been taught to think a very linear manner, a black and white aspect of it. So, it's very hard to

have the students, or for me, to activate that inquiry-based thinking.” Teachers found it necessary to train their students to think about phenomena before they could attempt an inquiry-based activity.

The third major pattern centered around implementation resistance, which evolved differently across teaching contexts. Participants revealed that the lack of creativity was the result from scripted curricula written by teachers with limited teaching experience. Participant 6 shared:

Curriculum has become more and more scripted, and so the ability to kind of explore things like experiment with more inquiry-based is limited to whatever the curriculum writers are doing. A lot of times the curriculum writers are teachers with maybe four or five years of teaching experience that are the ones that are designing the curriculum.

Another variation appeared in teachers’ responses to these constraints, ranging from complete avoidance to partial implementation attempts. Based on the various curricula being implemented in different districts, teachers believed the experimentation aspect of inquiry-based learning was limited and not placed as a priority.

A particularly revealing pattern emerged in how teachers justified their resistance to inquiry-based methods. Avoidance and traditional classroom management seemed to be the final decision for some participants because they felt resources and essential skills were not in place to make inquiry-based instruction successful. A big concern with some participants was that some science teachers don’t fully understand the inquiry method. For example, Participant 1 shared:

Teachers don't understand it. So, they say, you know, I don't get it, so my students are not going to understand it and get it either. So let me just do what I know or let me just make it easier for them and myself so that we can get through the content as fast as we can.

This shared struggle also connected to the time restraints teachers experienced and may be why teachers found it easier to stick with traditional teaching methods. Other teachers expressed that they chose to avoid inquiry-based instruction because it would become more work on their part to teach their students all the essential skills that need to be had for them to implement inquiry-based instruction. Participant 9 stated:

I feel my students are not at the right level to understand the meaning of inquiry. I am also required to cover content in a certain amount of time, and I am not sure how I can incorporate inquiry-based learning when I don't have the time to teach them critical thinking and questioning skills.

Overall, participants expressed the need to be taught more inquiry-based methods and for more time to build their confidence and skills in inquiry-based instruction before they could effectively integrate it into their teaching practice.

The interaction between these patterns revealed an important relationship. Although standardized testing created one layer of resistance, deeper structural issues around teacher preparation and student readiness formed more fundamental barriers. This relationship varied across teaching contexts, as some teachers found ways to balance assessment requirements with inquiry-based approaches and others felt completely constrained by these factors. These patterns suggest that resistance to inquiry-based

instruction is not uniform, but exists on a spectrum influenced by teacher preparation, student readiness, curriculum flexibility, and assessment requirements. The variations in teacher responses to these challenges indicate that successful implementation of inquiry-based instruction requires addressing multiple layers of resistance, with particular attention to building teacher confidence and providing adequate preparation time. Most importantly, the data revealed that while assessment-driven instruction creates challenges, teachers' ability to overcome these challenges varies based on their preparation, support systems, and understanding of inquiry-based methods.

Research Question 2

RQ2 was: What insights do teachers have into what could help them to overcome these obstacles? After completing the data analysis process, I found patterns and similarities in the codes that led to the development of three themes aligned to RQ2.

These three themes were:

3. Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities.
4. Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps students develop into capable learners.
5. Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.

The participants' responses collected in the data supported the development of each theme. I also included these responses of data in the form of quotes. Table 6 shows the second research question, codes for the development of each theme relating to this research question, and quotes from the participants to support the principle of each theme.

Table 6*Codes Organized into Themes for Research Question 2*

Codes	Themes	Quotes
Critical thinking Hands-on activities Independent learning Investigation and drawing conclusions Problem-solving Student-centered Student ownership	Theme 3: Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities.	P8: "It is kind of opening the idea of, like, looking at research, looking at what you already know, using problem solving skills, and just like critical thinking to kind of approach questions from a lot of different ways." P7: "In order to take them to those deep conversations and analysis, you need to be creative on how to ask the questions you want your students to discuss together."
Collaboration Cross-curricular connections Growth mindset Productive members of society Student readiness	Theme 4: Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps students develop into capable learners.	P2: "I've had instances when the student wanted to work on their own and I had to navigate the situation where I kind of had to just be the mediator and point out certain things that they needed to do for them to solve the problem or finish the actual project."
Flexibility Issues with data collection and analysis Manageable tasks Professional development for inquiry strategies	Theme 5: Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.	P5: "I wish there was more of an allowance for teachers to do what they have to do, what's best for their kids, and not feel like I have to hide what I do with my kids." P8: "I'm the only biology teacher on my campus, but I would like to see how other teachers are doing inquiry-based instruction, or how they are doing the curriculum in general."

Theme 3

Theme 3 was: Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities. I used the following seven codes to develop this theme: student-centered, investigation and drawing conclusions, critical thinking, independent learning, student ownership, problem-solving, and hands-on activities. Three patterns emerged from the coding process: the role of critical thinking and problem-solving, the dynamics of student empowerment, and the implementation of hands-on learning activities.

The first pattern centered around the relationship between critical thinking and problem-solving skills in inquiry-based instruction. A clear similarity emerged across all participants regarding the necessity of these skills, but variations appeared in who they believed should primarily employ them. One group, represented by Participant 10, emphasized student responsibility:

In order for me to attempt inquiry-based instruction, I need to feel confident that my students are able to complete meaningful tasks that require them to think critically. They also need to be able to solve a scientific problem without expecting me to provide them all the answers.

Similarly, Participant 8 discovered the whole method involved asking questions and exploring different ideas. Participant 8 shared:

It is kind of opening the idea of, like, looking at research, looking at what you already know, using problem solving skills, and just like critical thinking to kind of approach questions from a lot of different ways.

Participants also believed these characteristics are what defined the entire purpose of inquiry-based instruction and having their students think critically would determine a successful implementation. In contrast, another group, exemplified by Participant 7, focused on teacher problem-solving. Participant 7 explained, “In order to take them to those deep conversations and analysis, you need to be creative on how to ask the questions you want your students to discuss together.” This variation revealed a tension in how teachers perceive the distribution of critical thinking responsibilities.

A second pattern emerged around student empowerment and teacher guidance, revealing a spectrum of approaches. All participants agreed on the importance of student-centered learning, but their methods of implementation varied considerably. Some teachers, like Participant 1, emphasized complete student autonomy. For instance, Participant 1 shared:

It breaks it down a little bit better for them, instead of having to just hear the teacher talking, or having to take notes, and they can ask their own questions, instead of answering questions that the teacher has. I believe they get clear and better data by doing their own investigations.

Others, like Participant 2, advocated for a more balanced approach. Participants interpreted inquiry-based instruction is a student-centered approach, but the method still required a certain amount of support from the teacher. It was noted that teachers can't

expect all their students to just dive into the process because some of them may not know where to begin. Participant 2 stated:

Inquiry-based instruction is a student-centered approach, where I feel like the teacher is guiding the students through either a question or a specific theme in a system that they are trying to articulate. It's interpreted more by the students, but it's guidance by the teacher for them to make that specific conclusion.

Teachers found it necessary to provide their students with some guiding questions, but they had to be mindful with the amount of support they could provide without affecting the results of implementing true inquiry. Similarly, Participant 5 stated:

Inquiry-based instruction is giving those questions to the students and giving them the freedom to take those questions and kind of make them their own and how they understand it and go and find the information themselves and lead them into those paths, and how to correctly find that information and what to do with it once they find it.

This pattern revealed a consistent tension between student independence and teacher support, along with variations in how teachers navigate this balance.

The third pattern centered around the relationship between hands-on activities and authentic inquiry, revealing important distinctions in teacher understanding. A clear division emerged between those who viewed hands-on activities as automatically constituting inquiry-based instruction and those who recognized the need for deeper engagement. Participant 6 represented one perspective:

Inquiry-based instruction in most classrooms is when you give them a lab, but then you give them an open-ended question when it comes to the lab, and then they design their own variables and stuff around that lab.

Interestingly, some participants believed this was the biggest extent of inquiry-based instruction and that most teachers were doing in their secondary science classrooms. In contrast, Participants 4 and 9 highlighted a crucial distinction, noting that merely conducting hands-on activities doesn't necessarily constitute true inquiry, especially when procedures are prescribed. As Participant 4 stated, "They may think that just because you're doing something hands-on that it's inquiry, and that's not necessarily true." Similarly, Participant '9 shared, "You can implement hands-on activities during labs, but if you are providing the procedure or instructions, then it defeats the purpose of implementing inquiry." Although hands-on activities are a valuable component of inquiry-based learning, true inquiry requires students to engage in designing investigations and constructing their own understanding rather than following prescribed procedures.

The interaction between these patterns revealed important relationships. Teachers who emphasized student autonomy in critical thinking tended to also support more open-ended approaches to hands-on activities. Conversely, those who focused on teacher guidance in critical thinking often structured their hands-on activities more carefully. This relationship suggests that teachers' beliefs about student capability influence their implementation approaches across multiple factors of inquiry-based instruction. Most significantly, the data revealed that although all participants valued inquiry-based

instruction, their interpretations and implementations varied from highly structured to completely open-ended approaches. The variations in these patterns suggest that effective inquiry-based instruction is not a single, uniform approach, but a range of practices that share student engagement, critical thinking, and hands-on investigation. However, the success of implementation appears to depend on how well teachers can balance these elements while adapting to their student needs.

These patterns demonstrate that effective inquiry-based instruction functions as a system where critical thinking, student empowerment, and hands-on activities connect in various ways. The variations in how teachers build these connections suggest that successful implementation requires both understanding of inquiry principles and flexibility in their implementation. Most notably, the findings suggest that while teachers share common goals for inquiry-based learning, their paths to achieving these goals can differ greatly while still maintaining effectiveness.

Theme 4

Theme 4 was: Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps students develop into capable learners. I used the following five codes to develop this theme: growth mindset, collaboration, cross-curricular connections, productive members of society, and student readiness. Analysis of participant responses revealed distinct patterns in how teachers conceptualized effective learning environments.

A notable pattern of variation appeared in how teachers experienced and implemented collaborative learning across different grade levels. Some participants

emphasized the benefits of higher-order thinking. As an example, Participant 7 stated, “I think one of the benefits to have this type of practice is that you can take the student to the next level of the thinking process and analyze the information in a different way.” However, implementation challenges varied significantly by grade level, as Participant 2 noted when discussing middle school students’ resistance to group work:

I’ve had instances when the student wanted to work on their own and I had to navigate the situation where I kind of had to just be the mediator and point out certain things that they needed to do for them to solve the problem or finish the actual project.

Participant 2 also mentioned this was more of an issue with their middle school students rather than their high school students. These findings revealed a complex pattern where teachers recognize the value of collaboration in inquiry-based learning, but they face various levels of student resistance across grade levels. The results also suggested that successful implementation requires careful consideration of both student developmental stages and personal dynamics in the classroom.

Teachers demonstrated remarkable similarity in their views on the dual nature of inquiry-based learning benefits, but they varied in their approaches. Participant 5 exemplified the focus on collaborative skills and perspective-sharing: “I want them to learn how to work together and listen to other people’s ideas and not shut somebody out because their views do not necessarily align with theirs.” This collaborative emphasis appeared consistently across participants, even when scientific learning outcomes were

less successful. Teachers also valued the exposure to different perspectives as an important outcome.

A consistent pattern emerged in how teachers connected student readiness to societal preparation, but this connection varied among participants. Based on participants' responses, student readiness stemmed from students being able to think and process information on their own during the inquiry method. Participants' intentions to implement inquiry-based instruction were to help their students gain a sense of independency and allow them to contribute to society in a positive way. For instance, Participant 8 emphasized systematic problem-solving skills:

I want them to learn how to prioritize and systematically approach problems that they're facing, whether it's in their real life or at school, and just kind of making them look at different steps that go beyond just the immediate.

An unexpected similarity across participants was the reported reduction in teacher stress levels. It was noted that teachers felt a sense of relief because their students enjoyed the inquiry-method. Participant 6 stated, "I feel like the conversations that I get from the kids are way deeper, and I'm not as stressed a lot of times, because I'm not doing as much." This sentiment was reinforced by Participant 1, who noted increased student engagement and satisfaction:

It's easier for them to problem solve and collaborate with their peers. It gives them ownership and it lets them know I'm the one that put time into the work. I think they feel more satisfied at the end of that lesson, having done it themselves, and being more engaged with the material and their peers.

The results suggest a reciprocal relationship between student readiness and societal preparation. Inquiry-based instruction also appears to develop students' independent thinking skills for future success and creates a more engaging and less stressful classroom environment that benefits both teachers and students.

Cross-curricular connections showed the most consistent pattern across all participants, with similar observations about how inquiry-based learning integrates multiple subject areas. Participant 1 highlighted the depth of learning and future preparation:

They go and explore these topics in a way that makes them experts, and by the time they are done with it, they know more about that topic. The benefit is that it teaches them how to go to college and become researchers.

This integration of skills was further emphasized by Participant 10:

Although I am implementing inquiry through science, I feel my students are still incorporating math skills, computer skills, and comprehension skills. They need to know how to organize data into a graph, calculate data, and understand the problem they need to solve.

These observations highlight how inquiry-based instruction naturally fosters interdisciplinary learning, preparing students not only for scientific thinking but also developing academic and research skills that transfer across subjects and extend into higher education.

This theme highlights how effective learning environments foster capable learners through collaboration, cross-disciplinary connections, and growth mindsets. The data

revealed three interconnected patterns in developing student capabilities: the tension between collaborative learning and individual preferences, the relationship between student readiness and societal preparation, and the integration of cross-curricular connections. Although participants recognized the value of collaboration and growth mindset in developing capable learners, they encountered varying levels of student resistance, particularly across different grade levels. The findings demonstrated that successful learning environments go beyond traditional academic preparation; they create opportunities for students to develop independence, engage with diverse perspectives, and make meaningful connections across disciplines. Most importantly, participants emphasized that these environments benefit both students and teachers, creating less stressful classrooms while preparing students for future academic and societal roles. These environments suggest that effective learning environments are not merely spaces for content delivery, but dynamic systems that foster student development through the integration of collaborative, interdisciplinary, and growth-oriented practices.

Theme 5

The final theme developed from the coding process aligned to RQ2 was: Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction. I used the following four codes to develop this theme: professional development for inquiry strategies, issues with data collection and analysis, manageable tasks, and flexibility. Three key areas of variation emerged from the coding

process: resource needs, professional development preferences, and data management challenges.

A clear pattern emerged regarding implementation flexibility, however teachers' specific needs varied significantly. Although some participants sought complete autonomy to customize the curriculum, others were satisfied with the current framework but needed better resources. For instance, Participant 5 advocated for maximum flexibility: "I wish there was more of an allowance for teachers to do what they have to do, what's best for their kids, and not feel like I have to hide what I do with my kids." In contrast, Participant 4 desired a middle-ground approach. Participant 4 stated:

I wish the district would provide different not just the adopted resources, but also give you choice in using other resources, because sometimes those other resources might be a better fit than the ones that they've adopted.

Further varying from both perspectives, some participants focused primarily on resource constraints. For instance, Participant 3 explained:

It is such a downgrade, and it is such an embarrassment that I don't have my own science room with a closet with materials. They think it's you are being picky, but I shouldn't have to compete for space to implement a hands-on lesson.

The varied perspectives on curriculum implementation revealed a tension between autonomy and flexibility in inquiry-based instruction. These contrasting viewpoints also highlight a spectrum of needs, from complete autonomy to improved standard resources.

Professional development preferences similarly displayed distinct patterns with variations. Participants expressed the desire to have more inquiry training and the

opportunity to produce a lesson in the classroom based on the training given at professional development. Other participants also believed that having a clear model or an example to follow would make it easier to implement inquiry-based instruction successfully. For instance, Participant 7 stated, “I would like to have opportunity to be a part and see how this process looks like. I would also like the time to produce something and go back to the classroom and use it successfully.” In similar interviews, participants discussed the desire to have opportunities to play with the curriculum and see how other teachers implement it. These interviews suggested that teachers preferred having time in professional development to collaborate with each other and discuss inquiry-based opportunities. For example, Participant 8 expressed, “I’m the only biology teacher on my campus, but I would like to see how other teachers are doing inquiry-based instruction, or how they are doing the curriculum in general.” In contrast, some participants believed inquiry-based opportunities were offered at their professional development meetings, but they just needed some minor adjustments. This belief was also based on the number of resources the district provided participants’ schools. Participant 4 stated:

The district is doing a pretty good job of providing inquiry-based opportunities, but you may have to adjust and make minimal changes so that it can work for your classroom. I use what I have and make it work and still provide the students with a good experience.

These findings demonstrate that although teachers generally felt supported with inquiry-based resources, they desired more hands-on training, collaborative opportunities, and examples to implement inquiry-based instruction in their classrooms.

The most consistent pattern emerged in data management challenges, where teachers showed similarities in their struggles. These challenges occurred in two ways: time management conflicts and assessment integration difficulties. Participant 7 captured the common time management challenge: “When you use practices like this, they require more time. I struggle with how to manage the amount of material I need to cover for data versus the inquiry practice that I chose to do.” Similarly, participants expressed a desire for professional development opportunities that provided solutions to manage data during the implementation of inquiry-based instruction. Participant 10 stated:

I always focus on my data and unfortunately, I find myself teaching according to the test, rather than thinking about how I could use inquiry to cover a lesson. I would like to learn strategies on how I could still use inquiry activities and manage my data at the same time.

This conflict between data-driven instruction and inquiry-based teaching methods suggests a need for professional development that specifically addresses how teachers can effectively balance assessment requirements while maintaining successful inquiry practices in their classrooms. These varying perspectives and challenges suggest an environment where teachers’ necessities diverge in implementation and professional development preferences but intersect in their struggles with data management. This pattern of variation and similarity indicates that although flexible, differentiated support systems are needed for implementation and professional development, a more standardized approach might be beneficial for addressing the challenge of data management.

The overall pattern that emerged from this analysis reveals tension between individuality and uniformity in inquiry-based instruction implementation. Implementation strategies and professional development needs show a spectrum of preferences that require personalized solutions. Data management challenges also present a uniform challenge that affects teachers regardless of their individual approaches. These challenges suggest that effective support for inquiry-based instruction requires a hybrid approach which includes flexible systems that can accommodate individual teaching styles and contexts, combined with frameworks for managing the universal challenges of data collection and analysis. A balanced approach would address varied patterns in teacher preferences and the consistent patterns in their challenges. This flexibility could lead to more successful and sustainable inquiry-based instruction implementation across different classroom contexts.

Summary

The results of this qualitative study are presented in the form of five themes, serving as responses to the two research questions. The purpose of this study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe is needed to allow them to overcome these obstacles. I used variations, patterns, similarities, and differences in the data to identify five themes, each aligned to one of the two research questions. Aligning to RQ1, I found that teachers have barriers such inflexible scheduling, time constraints, and limited resources that prevent them from implementing inquiry-based instruction. Additionally, I discovered that teachers who had assessment-driven instruction tended to

resist implementing inquiry-based activities. Regarding RQ2, I established that teachers believe effective inquiry-based instruction empowers their students through active engagement in investigation and critical thinking. I identified that teachers need a learning environment that emphasizes collaboration, cross-disciplinary connections, and a growth mindset. Further, I found that teachers need more professional development, flexible implementation strategies, and support with data management. Patterns and variations in the data were discussed within each theme's specific section of the results. Although there were few differences among the data, I found no discrepant cases. In Chapter 5, I include further discussions, conclusions, and recommendations.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative study was to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe is needed to allow them to overcome these obstacles. In this basic qualitative study, I used semistructured interviews and included as participants secondary science teachers who understood inquiry-based instruction. The research questions were as follows:

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

Five unique themes emerged from the data analysis process:

1. Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials.
2. Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.
3. Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent problem-solving activities.
4. Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps student develop into capable learners.

5. Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.

Themes 1 and 2 aligned to RQ 1, and Themes 3 through 5 aligned to RQ 2. These themes served as the foundation to determining the findings. In Chapter 5, I summarize and interpret the findings, explain the limitations, suggest recommendations, discuss implications, and conclude the overall study. Throughout the chapter, I discuss the relationship between the findings and the literature review along with the study's framework.

Based on the themes, I developed five findings. These are shown in Table 7, organized by corresponding theme and research question. The findings are:

1. School structural elements create significant barriers that impede teachers' ability to effectively implement inquiry-based instruction.
2. The prevalence of traditional teaching methods and pressure to meet standardized assessment requirements creates resistance to implementing inquiry-based approaches.
3. Inquiry-based instruction empowers students through active scientific investigation, critical thinking development, and independent problem-solving opportunities, leading to increased student ownership of the learning process.
4. Learning environments that prioritize collaboration, cross-disciplinary connections, and a growth mindset develop more capable and resilient learners who can effectively engage with inquiry-based instruction.

5. Teachers require a comprehensive support system that includes ongoing professional development, flexible implementation strategies, and data management assistance to successfully integrate inquiry-based instruction into their teaching practice.

Table 7*Findings Organized by Theme and Research Question*

Research Question	Themes	Findings
RQ1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?	1. Participants believed school structures create barriers through inflexible scheduling, time constraints, and limited access to necessary materials.	1. School structural elements create significant barriers that impede teachers' ability to effectively implement inquiry-based instruction.
	2. Participants believed that established teaching methods and assessment-driven instruction create resistance to implementing inquiry-based approaches.	2. The prevalence of traditional teaching methods and pressure to meet standardized assessment requirements creates resistance to implementing inquiry-based approaches.
	3. Participants believed effective inquiry-based instruction empowers students through active engagement in investigation, critical thinking, and independent-problem-solving activities.	3. Inquiry-based instruction empowers students through active scientific investigation, critical thinking development, and independent problem-solving opportunities, leading to increased student ownership of the learning process.
	4. Participants believed learning environments that emphasize collaboration, cross-disciplinary connections, and growth mindset helps students develop into capable learners.	4. Learning environments that prioritize collaboration, cross-disciplinary connections, and a growth mindset develop more capable and resilient learners who can effectively engage with inquiry-based instruction.
	5. Participants shared the need for ongoing professional development, flexible implementation strategies, and support with data management to effectively implement inquiry-based instruction.	5. Teachers require a comprehensive support system that includes ongoing professional development, flexible implementation strategies, and data management assistance to successfully integrate inquiry-based instruction into their teaching practice.
RQ2: What insights do teachers have into what could help them to overcome these obstacles?		

Interpretation of the Findings

Finding 1

The first finding was that school structural elements create significant barriers that impede teachers' ability to effectively implement inquiry-based instruction. Finding 1 aligned to RQ 1, in which I sought to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms. RQ 1 followed Brenda (2023) and Karakaya's (2020) emphasis of the lack of adequate support and resources as a significant barrier to the implementation of these practices. Furthermore, Finding 1 identifies significant structural barriers that impede teachers' ability to implement inquiry-based instruction.

Finding 1 confirms and extends existing research in the field of science education. There was a similar relationship created between teachers' experiences with inquiry-based instruction and science teachers' current struggles with the method. All teachers in this study linked inquiry-based practices to the current obstacles they face with implementing the method in the classroom. This link is also mentioned in the literature review. For instance, stakeholders state that there is a shortage of equipment, inadequate school infrastructure, and high deficiency in various professional development programs for teachers (Breda, 2023). Additionally, Karakaya (2020) determined that students often struggle to complete STEM activities related to inquiry-based instruction due to the lack of time, materials, and knowledge. These school structural elements continuously create barriers for teachers to attempt the inquiry-based method in their classrooms.

This study extends current understanding by establishing a deeper connection between teachers' personal experiences with inquiry-based learning and their current implementation challenges. Participants revealed that structural barriers are not isolated challenges, but interconnected obstacles that affect their impact on teaching effectiveness. Teachers' personal experiences with inquiry-based instruction influence their perception of current barriers, suggesting that these obstacles create an ongoing pattern of implementation difficulties. This relationship between personal experience and current practice represents a new contribution to the understanding of implementation challenges. Additionally, the finding provides a foundation for developing more effective solutions in secondary science education.

Finding 2

Finding 2 also aligned to RQ1. As stated in Finding 1, I aimed to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms. The second finding was the prevalence of traditional methods and pressure to meet standardized assessment requirements created resistance to implementing inquiry-based approaches. RQ1 highlighted Breda's (2023) work with teachers' unfamiliarity with inquiry-based methods, their perceived difficulty in implementing them, and the lack of confidence in learning the approach. Similarly, Spratt (2019) called attention to this tension by discussing a teacher who struggled to balance core values with the demands of testing from school leaders. Two themes answered RQ1; however, one theme contributed to the development of Finding 2.

Secondary science teachers reported consistent pressure to fulfill standardized testing requirements and felt the need to remain comfortable with only implementing traditional instruction. Teachers also reported feeling a sense of anxiety when they had to relinquish control to their students and allow them to learn more independently. Teachers' resistance to inquiry-based approaches stemmed from external barriers that discouraged them from attempting these methods. These factors included testing requirements from the school district, expectations from parents, students' ability to take control of their learning, and fulfilling the required curriculum from administration. Finding 2 is reflected through the minimal knowledge teachers have about the activities and thinking processes that are required to help students explain scientific investigations (see Mohammed, 2021). Finding 2 coincided with the literature because unfamiliarity was documented as a reason for teachers using traditional methods. Finding 2 also paralleled Smalley's (2024) focus group's results by revealing a veteran teacher who believed that her traditional teaching methods were appropriate due to familiarity and habit. This finding also confirmed Fitzgerald's (2019) revelation of teachers' concerns about standardized testing, which they believed threatened inquiry-based methods due to the pressure to cover content that students needed to recall for tests. Not only did Finding 2 confirm the established literature review, but it also extended findings on teacher resistance to implement new strategies and still fulfill state testing requirements.

Finding 3

Finding 3 aligned to RQ2. In RQ2, I intended to determine the insights teachers have into what could help them to overcome obstacles with inquiry-based instruction.

The third finding was inquiry-based instruction empowers students through active scientific investigation, critical thinking development, and independent problem-solving opportunities, leading to increased student ownership of the learning process. Three themes answered RQ2, but only one of these themes contributed to the foundation of Finding 3.

Teachers shared the essential components of inquiry-based instruction for the method to be successful in the classroom. Finding 3 supports the literature review because the study and research shows that students need to have critical thinking and problem-solving skills for teachers to implement the method effectively. For example, Zur (2021) and Tawfik (2021) emphasized that the most significant benefits arise when students are deeply involved in scientific investigations; however, teachers expressed difficulties with their students taking ownership of the learning process. Additionally, Baldock's (2020) investigation provided additional evidence of the method's potential. Baldock discovered that students directly recognized the value of inquiry-based learning in helping them improve their critical thinking skills and taking advantage of hands-on experiences with science investigations. Overall, Finding 3 further contributes to the literature by demonstrating the skills students need to obtain ownership of their learning and observing the true impact inquiry-based instruction can have in their future success.

Finding 4

Finding 4 aligned to RQ2. In RQ2, I intended to determine the insights teachers have into what could help them to overcome obstacles with inquiry-based instruction. The fourth finding was learning environments that prioritize collaboration, cross-

disciplinary connections, and a growth mindset develop more capable and resilient learners who can effectively engage with inquiry-based instruction. Three themes answered RQ2, but only one of these themes contributed to the foundation of Finding 4.

Teachers expressed the importance of a learning environment that allowed students to collaborate with each other and work successfully with their peers. Finding 4 supports the literature review because research shows that inquiry-based instruction requires engagement and motivation to question scientific issues. For example, Belen and Caballes (2020) demonstrated students facing challenges in sustaining their engagement to construct evidence-based explanations. Although this is a clear requirement for success, teachers still shared difficulties in discovering strategies on how to have their students work together to approach scientific issues as group. In a related result, Saleh (2020) discovered students struggled with questioning their peers and needed consistent guidance from their teachers. Based on previous research and the study's findings, teachers may need to build a safe learning environment for all students to feel comfortable expressing themselves before implementing inquiry-based instruction.

Teachers also shared the willingness to adopt the inquiry-based method rather than remaining committed to traditional methods. Some teachers discussed the need for more collaboration with other teachers from different subjects for them to feel more comfortable. Contreras (2024) demonstrated that teachers could be more willing to adopt inquiry-based instruction if they have the collaboration and supervision of their peers. Finding 4 reflected the literature review by teachers expressing the desire to create a

positive culture that includes teachers from every subject and a growth mindset to remain faithful to implementing the inquiry-based method.

Finding 5

Finding 5 aligned to RQ2. In RQ2, I intended to determine the insights teachers have into what could help them to overcome obstacles with inquiry-based instruction. The fifth finding was teachers require a comprehensive support system that includes ongoing professional development, flexible implementation strategies, and data management assistance. Three themes answered RQ2, but only one of these themes contributed to the foundation of Finding 5.

Teachers shared a lack of sufficient professional development opportunities that allowed them to learn more about inquiry-based instruction along with other effective methods. Teachers also wanted professional development opportunities that allowed them to collaborate with their peers. Finding 5 is compatible with Levy's (2022) findings about providing teachers opportunities to collaborate to promote the acceptance of more learner-centered instruction. Other teachers also reported needing flexible time schedules to cater to students' interests and learning needs. Additionally, Hong (2023) found that teachers struggle to allocate sufficient time to learn and implement new strategies independently. The findings also confirmed previous research that teachers have different goals and perspectives with implementing inquiry-based instruction.

Limitations of the Study

The limitations of the study included factors related to sample size, personal bias, and the environment used for all interviews. Because I only interviewed 10 secondary

science teachers working in public schools across the United States, sample size was a limitation. This sample size could minimize transferability. Additionally, I accounted for personal bias as a limitation, as I am an advocate for inquiry-based instruction in science curriculums. My potential researcher bias and experiences with inquiry-based instruction could have influenced my interpretations from some of the semistructured interviews. As a secondary science teacher, I addressed potential biases by reviewing all the overall findings with the participants, verifying the findings with more data sources, and keeping a reflective journal. Lastly, I accounted for the location of the interviews and online interviewing as limitations since my interviews were conducted using the Zoom platform. The location and online interviewing limited the study to participants who could only have access to technology with a Zoom membership account.

Recommendations

Based on the findings, I propose the following recommendations. These recommendations were constructed based on future research and future practice. They were also constructed from the order of the literature review, the results and data analysis, and the overall findings. These recommendations represent more than suggestions; they are important for advancing science education and empowering both educators and students in the learning process. By implementing these strategies, educational institutions can transform traditional learning environments into student-centered safe spaces of scientific exploration and critical thinking.

Recommendation for Research

Based on current research, there are still critical gaps in understanding inquiry-based instruction implementation. My first recommendation calls for further research exploring how this instructional approach can be effectively integrated across all educational stakeholders. For instance, Guzman (2021) highlighted that students recognize the active role required in inquiry-based learning, but they still expect support from their teachers throughout the investigative process. Duarte (2019) also pointed out that teachers found inquiry activities time-consuming and worried that their students might miss important concepts from the course syllabus. Based on these previous studies, I recommend further research involving inquiry-based instruction, its support of more student ownership, and its inclusion in secondary school's curriculum. First, I recommend a rigorous qualitative study that maps out the specific roles of each stakeholder in inquiry-based instruction. This study should analyze potential improvements to science curriculums and provide a framework for implementation. Researchers would also need to analyze the interactions between students, teachers, and administrators to understand the dynamics of inquiry-based learning. Additionally, I recommend a quantitative study to measure the long-term impact of inquiry-based instruction. This research would need to focus on measuring student success, evaluating teacher performance, and generating evidence that supports the adoption of inquiry-based instructional strategies.

With Finding 3, I explained how inquiry-based instruction empowers students through active scientific investigation, critical thinking development, and independent

problem-solving opportunities, leading to increased student ownership of the learning process. As I continued to develop Finding 1, I connected it with the amount of confidence students have with taking ownership of their learning and their ability to think on a higher level without teacher assistance. If teachers are resistant to relinquishing complete control, how will stakeholders be able to see the true effects of inquiry-based instruction in the classroom? Thus, Recommendation 1 is discovering all the roles stakeholders should have to integrate inquiry-based instruction into all secondary science curriculums. Recommendation 1 would then suggest school district provide resources to all teachers and use them for inquiry-based instruction in science classrooms.

Recommendations for Practice

In Finding 5, I reported teachers needing a comprehensive support system that includes ongoing professional development, flexible implementation strategies and data. Thus, Recommendation 2 advocates for increased access to professional development focused on inquiry-based instruction. I recommend that this is no longer an optional enhancement but a necessity for future science education. This step would require organizations to develop accessible professional development resources that provide timely support for all stakeholders. In Finding 4, I discussed how learning environments should prioritize collaboration, cross-disciplinary connections, and a growth mindset. This observation was proven through Baldock's (2020) work which discovered the value of inquiry-based learning in helping students develop their critical thinking skills and obtaining hands-on experiences with science investigations. Therefore, Recommendation 3 suggests all secondary science teachers should integrate inquiry-based learning

strategies meaningfully into their weekly curriculum. For this to be successful, teachers would need to implement at least one full lesson per week dedicated to inquiry-based instruction. These lessons should also prioritize learning environments that foster collaboration and a growth mindset among students. Finding 2 showed that teachers felt more confident implementing traditional teaching methods and more pressure to meet standardized assessment requirements. For instance, Chen (2020), emphasized that teachers felt pressured with time to meet curriculum requirements, such covering content knowledge and preparing students for state examinations, as the highest priority to be met by their administration. Recommendation 4 encourages school administrators to establish trust and collaboration with teachers. This engagement would require a balanced approach that meets standardized assessment requirements while providing teachers with the autonomy to incorporate their own teaching strategies. The goal would be to develop a supportive framework that values both curriculum requirements and instructional creativity.

Implications

This study has the potential to create positive change for a single individual, families, organizations, and society. The information that was gained provides further knowledge about inquiry-based instruction from the perspectives of current secondary science teachers. Multiple points in the data showed science teachers found it difficult to meet standardized assessment requirements and overcome various barriers to implement inquiry-based instruction. One recommendation calls for school administrators to establish trust and collaboration with their teachers. Teachers' responses also showed that

inquiry-based instruction empowers students through active scientific investigation, critical thinking development, and independent problem-solving opportunities. Another recommendation requires secondary science teachers to integrate inquiry-based learning strategies into their weekly curriculums. If teachers have a learning environment that prioritizes collaboration and a growth mindset, students can develop into more resilient learners. Most importantly, one finding expressed a need for teachers to have ongoing professional development and flexible implementation strategies. Therefore, it is recommended that further research be conducted to discover how inquiry-based instruction should be implemented with all stakeholders. By providing more professional development, teachers can have more learning opportunities for inquiry-based instruction.

Educational stakeholders can also use this knowledge to improve decisions with science curriculums, student learning in the classrooms, and implementation for teachers. Specifically, this study can help teachers demonstrate to their students how to take ownership of their learning and use essential skills for their success in the classroom and in the real world. Families and various organizations can also feel confident that students are gaining a deep understanding of scientific concepts that allow them to be better prepared in higher education and in their career prospects.

Conclusion

This study with inquiry-based instruction in secondary science classrooms revealed a combination of challenges, opportunities, and potential for transformations. The findings exposed a complex picture of educational innovation and how traditional

teaching methods conflict with the demands of scientific learning. Most importantly, the research showcased significant structural barriers that prevent the implementation of inquiry-based instruction. These obstacles are not isolated hardships, but systemic issues that impact science teachers' ability to effectively implement the method. From the range of inadequate resources and ineffective professional development to standardized testing pressures, teachers faced a learning environment that often resists change.

Although the study revealed various challenges, it also revealed potential for change. Based on the themes and findings from this study, inquiry-based instruction represents a pathway to empowering students. By fostering scientific investigations, critical thinking, and independent problem-solving, this method offers students ownership of their educational journey. Specifically, it has the power to create resilient learners who can work through scientific challenges with confidence and creativity.

The recommendations call for a fundamental restructuring of science education. This approach requires the efforts of teachers, administrators, students, and educational organizations. For implementation to be successful, there needs to be comprehensive support systems that include ongoing professional development, flexible implementation strategies, and a commitment to incorporate collaboration and growth-oriented learning environments. It challenges the educational system to move past a traditional approach to a more student-centered approach that prepares learners for the difficulties of scientific inquiry. By embracing the inquiry-based method, teachers can transform their science classrooms from settings of pure memorization to spaces of exploration, critical thinking, and scientific discovery.

References

- Alexander, A. P. (2019). Lincoln and Guba's quality criteria for trustworthiness. *IDC International Journal*, 6(4), 1–6.
- Anderson, P.M., Butcher, K.F., & Schanzenbach, D.W. (2017). Adequate (or adipose?) yearly progress: Assessing the effect of “No Child Left Behind” on children's obesity. *Education Finance and Policy*, 12(1), 54–76.
https://doi.org/10.1162/EDFP_a_00201
- Archibald, M. M., Ambagtsheer, R. C., Casey, M. G., & Lawless, M. (2019). Using Zoom videoconferencing for qualitative data collection: Perceptions and experiences of researchers and participants. *International Journal of Qualitative Methods*, 18, 1–8. <https://doi.org/10.1177/1609406919874596>
- Azizoglu, N., Pekdag, B., Sarioglan, A. B., & Kuzucu, G. (2022). An inquiry-based instruction on the main subatomic particles: Enhancing high-school students' achievement and motivation. *Science Education International*, 33(1), 75–85.
<https://doi.org/10.33828/sei.v33.i1.8>
- Bae, H., Glazewski, K., Brush, T., & Kwon, K. (2021). Fostering transfer of responsibility in the middle school PBL classroom: An investigation of soft scaffolding. *Instructional Science*, 49(3), 337–363.
<https://doi.org/10.1007/s11251-021-09539-4>
- Baldock, K., & Murphrey, T.P. (2020). Secondary students' perceptions of inquiry-based learning in the agriculture classroom. *Journal of Agricultural Education*, 61(1), 235–246. <https://doi.org/10.5032/jae.2020.01235>

- Baroudi, S., & Rodjan Helder, M. (2021). Behind the scenes: Teachers' perspectives on factors affecting the implementation of inquiry-based science instruction. *Research in Science & Technological Education*, 39(1), 68–89.
<https://doi.org/10.1080/02635143.2019.1651259>
- Blythe, J. M. (2015). Inquiry-based instruction: Perceptions of national agriscience teacher ambassadors. *Journal of Agricultural Education*, 56(2), 110–121.
<https://doi.org/10.5032/jae.2015.02110>
- Boesdorfer, S. B., Del Carlo, D. I., & Wayson, J. (2022). Secondary science teachers' definition and use of data in their teaching practice. *Research in Science Education*, 52(1), 159–171.
- Bogdan, R. C., & Biklen, S. K. (2003). *Qualitative research of education: An introduction to theories and methods* (4th ed.). Allyn and Bacon.
- Botella Nicolas, A. M., & Ramos, P. (2022). Teaching dilemmas and student motivation in project-based learning in secondary education. *Interdisciplinary Journal of Problem-Based Learning*, 16(1), 114–124.
<https://doi.org/10.14434/ijpbl.v16i1.33056>
- Brady, A. C., Kim, Y., & Cutshall, J. (2021). The what, why, and how of distractions from a self-regulated learning perspective. *Journal of College Reading and Learning*, 51(2), 153–172. <https://doi.org/10.1080/10790195.2020.1867671>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
<https://doi.org/10.1191/1478088706qp063oa>

- Breda, A., Garcia, V., & Santos, N. (2023). Teachers' perceptions of STEAM education. *International Journal of Technology in Education*, 6(4), 700–719.
<https://doi.org/10.46328/ijte.563>
- Brookfield, S.D. (2017). *Becoming a critically reflective teacher*. John Wiley & Sons.
- Bruning, R. (1995). Sources of situational interest. *Journal of Reading Behavior*, 27(1), 1–17.
- Caballes, D. G., & Belen, J.L. (2020). The beginning teachers' challenges in an inquiry-based approach to teaching science: Provision for a special science research elective course. *CiiT International Journal of Software Engineering and Technology*, 12(3), 38–44.
- Caelli, K., Ray, L., & Mill, J. (2003). 'Clear as mud': Toward greater clarity in generic qualitative research. *International Journal of Qualitative Methods*, 2(2), 134–152.
<https://doi.org/10.1177/160940690300200201>
- Capps, D. K., & Crawford, B. A. (2013). Inquiry-based instruction and teaching about nature of science: Are they happening? *Journal of science teacher education*, 24(3), 497–526. <https://doi.org/10.1007/s10972-012-9314-z>
- Carpenter, S. L., Iveland, A., Moon, S., Hansen, A.K., Harlow, D.B., & Bianchini, J.A. (2019). Models are a metaphor in your brain: How potential and preservice teachers understand the science and engineering practice of modeling. *School Science and Mathematics*, 119(5), 275–286.
<https://doi.org/10.1145/3448139.3448166>
- Chen, C.-M., & Wang, W.-F. (2020). Mining effective learning behaviors in a web-based

- inquiry science environment. *Journal of Science Education & Technology*, 29(4), 519–535. <https://doi.org/10.1007/s10956-020-09833-9>
- Chen, L. (2021). Perceptions, challenges and coping strategies of science teachers in teaching socioscientific issues: a systematic review. *Educational Research Review*, 32, 1–14. <https://doi.org/10.1016/j.edurev.2020.100377>
- Chiu, T. K. F., Ching Sing Chai, Williams, P. J., & Tzung-Jin Lin. (2021). Teacher professional development on self-determination theory-based design thinking in STEM education. *Educational Technology & Society*, 24(4), 153–165.
- Cisel, M., & Barbier, C. (2021). Mentoring teachers in the context of student-question-based inquiry: The challenges of the Savanturiers programme. *International Journal of Science Education*, 43(17), 2729–2745. <https://doi.org/10.1080/09500693.2021.1986240>
- Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*. Routledge.
- Contreras, N., Liesa, E., & Giralt-Romeu, M. (2024). How pre-service teachers change their view of forms of inquiry after participating in an inquiry-based practicum. *Teaching & Teacher Education*, 140, 1–9. <https://doi.org/10.1016/j.tate.2024.104478>
- Creswell, J.W., & Poth, C. N. (2016). *Qualitative inquiry and research design: Choosing among five approaches*. Sage publications.
- Danford, C. A. (2023). Understanding the evidence: Qualitative research designs. *Urologic nursing*, 43(1). <https://doi.org/10.7257/2168-4626.2023.43.1.41>

- Deiglmayr, A., & Schalk, L. (2015). Weak versus strong knowledge interdependence: A comparison of two rationales for distributing information among learners in collaborative learning settings. *Learning and instruction, 40*, 69–78.
- Dilekli, Y., & Tezci, E. (2020). A cross-cultural study: Teachers' self-efficacy beliefs for teaching thinking skills. *Thinking Skills and Creativity, 35*, 1–13.
<https://doi.org/10.1016/j.tsc.2019.100624>
- Dobber, M. (2017). Literature review: The role of the teacher in inquiry-based education. *Educational Research Review, 22*, 194–214.
<https://doi.org/10.1016/j.edurev.2017.09.002>
- Duarte, J., & Robert Nogueira, J. (2019). From the hidden protest of students towards problem-based learning. *Education Sciences, 9*, 1–9.
<https://doi.org/10.3390/educsci9030215>
- Duncan, R. M. (1995). Piaget and Vygotsky revisited: Dialogue or assimilation? *Developmental review, 15*(4), 458–472. <https://doi.org/10.1006/drev.1995.1019>
- Effendi-Hasibuan, M. H., & Mukminin, A. (2019). The inquiry-based teaching instruction (IbTI) in Indonesian secondary education: What makes science teachers successful enact the curriculum? *Journal of Turkish Science Education, 16*(1), 18–33. <https://doi.org/10.36681/>
- Eltanahy, M., & Forawi, S. (2019). Science teachers' and students' perceptions of the implementation of inquiry-based learning instruction in a middle school in Dubai. *Journal of Education, 199*(1), 13–23. <https://doi.org/10.1177/0022057419835791>
- Fang, S.-C. (2021). Towards scientific inquiry in secondary earth science classrooms:

- Opportunities and realities. *International Journal of Science & Mathematics Education, 19*(4), 771–792. <https://doi.org/10.1007/s10763-020-10086-6>
- Fitzgerald, M., Danaia, L., & McKinnon, D. H. (2019). Barriers inhibiting inquiry-based science teaching and potential solutions: Perceptions of positively inclined early adopters. *Res Sci Educ 49*, 543–566. <https://doi.org/10.1007/s11165-017-9623-5>
- Forbes, A. (2017). Advancing primary teachers' awareness of the nature of science through communities of science practice. *Journal of Education Research, 11*(4), 417–436.
- Ford, J. H., & Gilson, A. (2021). Influence of participation in a quality improvement collaborative on staff perceptions of organizational sustainability. *BMC Health Services Research, 21*, 1–14. <https://doi.org/10.1186/s12913-020-06026-3>
- Gray, L. M., Wong-Wylie, G., Rempel, G. R., & Cook, K. (2020). Expanding qualitative research interviewing strategies: Zoom video communications. *The Qualitative Report, 25*(5), 1292–1301. <https://nsuworks.nova.edu/tqr/vol25/iss5/9>
- Guzman, T., Meehan, A., Bissmeyer, E., Schornak, L., & Wadian, T. (2021). Inquiry-based research experiences within the psychology curricula: A students' perspective and recommendations. *AURCO Journal, 27*, 8–29.
- Hofer, E., & Lembens, A. (2019). Putting inquiry-based learning into practice: how teachers changed their beliefs and attitudes through a professional development program. *Chemistry Teacher International, 1*(2), 27–58. <https://doi.org/10.1515/cti-2018-0030>
- Hong, D. (2023). Analysis of critical thinking skills in problem-based learning and

- inquiry learning models. *EduFisika: Jurnal Pendidikan Fisika*, 8(3), 286–299.
- Isik-Ercan, Z. (2020). “You have 25 kids playing around!”: Learning to implement inquiry-based science learning in an urban second-grade classroom. *International Journal of Science Education*, 42(3), 329–349.
<https://doi.org/10.1080/09500693.2019.1710874>
- Jennings, G. R. (2005). Interviewing: A focus on qualitative techniques. *Tourism Research Methods: Integrating Theory with Practice*, 1, 99–117.
<https://doi.org/10.1079/9780851999968.0099>
- Kadam, R. (2017). Informed consent process: A step further towards making it meaningful! *Perspectives in Clinical Research*, 8(3), 107–112.
- Kahlke, R. (2014). Generic qualitative approaches: Pitfalls and benefits of methodological mixology. *International Journal of Qualitative Methods*, 13, 37–52. <https://doi.org/10.1177/160940691401300119>
- Kane, B. D., & Rosenquist, B. (2019). Relationships between instructional coaches’ time use and district- and school-level policies and expectations. *American Educational Research Journal*, 56(5), 1718–1768.
<https://doi.org/10.3102/0002831219826580>
- Kang, E., & Hwang, H.J. (2023). The importance of anonymity and confidentiality for conducting survey research. *Journal of Research and Publication Ethics*, 4(1), 1–7.
- Kang, J. (2022). Interrelationship between inquiry-based learning and instructional quality in predicting science literacy. *Research in Science Education*, 52(1), 339–

355. <https://doi.org/10.1007/s11165-020-09946-6>

Karakaya, F., Akpınar, A., Alabas, Z. E., & Yılmaz, M. (2020). Determination of middle school students' views about STEM activities. *International Online Journal of Education and Teaching*, 7(2), 537–551.

Kotul'áková, K. (2021). Identifying teachers' beliefs prior to CPD training focusing on an inquiry-based approach in science education. *Research in Science Education*, 51, 183–211. <https://doi.org/10.1007/s11165-019-9841-0>

Kreifels, M., Conner, N., Reiling, B., Stripling, C., & Balschweid, M. (2021). Teacher perceptions of facilitating inquiry-based instruction following a 12-month professional development experience. *Advancements in Agricultural Development*, 2(3), 1–15. <https://doi.org/10.37433/aad.v2i3.119>

Levy, S., Bagno, E., Berger, H., & Eylon, B.-S. (2022). Professional growth of physics teacher-leaders in a professional learning communities' program: The context of inquiry-based laboratories. *International Journal of Science & Mathematics Education*, 20(8), 1813–1839. <https://doi.org/10.1007/s10763-021-10217-7>

Liu, C. H., & Matthews, R. (2005). Vygotsky's philosophy: Constructivism and its criticisms examined. *International education journal*, 6(3), 386–399.

Lincoln, Y. S. (Ed.). (2005). *The Sage handbook of qualitative research*. Sage publications.

Loizou, M., & Lee, K. (2020). A flipped classroom model for inquiry-based learning in primary education context. *Research in Learning Technology*, 28, 1–18. <https://doi.org/10.25304/rlt.v28.2287>

- Marshall, D. T., Pressley, T., Neugebauer, N. M., & Shannon, D. M. (2022). Why teachers are leaving and what we can do about it. *Phi Delta Kappan*, 104(1), 6–11. <https://doi.org/10.1177/00317217221123642>
- McLaughlin, C. A., & MacFadden, B. J. (2014). At the elbows of scientists: Shaping science teachers' conceptions and enactment of inquiry-based instruction. *Research in Science Education*, 44(6), 927–947. <https://doi.org/10.1007/s11165-014-9408-z>
- Merriam, S. A., & Tisdell, E. J. (2015). Basic qualitative research. In *Qualitative research: A guide to design and implementation* (4th ed, pp. 23–25).
- Mirick, R. G., & Wladkowski, S. P. (2019). Skype in qualitative interviews: Participant and researcher perspectives. *The Qualitative Report*, 24(12), 3061–3072. <https://doi.org/10.46743/2160-3715/2019.3632>
- Meacham, S. J. (2001). Vygotsky and the Blues: Re-Reading Cultural Connections and Conceptual Development. *Theory Into Practice*, 40(3), 190–197. https://doi.org/10.1207/s15430421tip4003_7
- Mohammed, S. M., & Amponsah, K. D. (2021). Teachers' and educational administrators' conceptions of inquiry: Do they promote or constrain inquiry-based science teaching in junior high schools? *Journal of Curriculum and Teaching*, 10(3), 58–71. <https://doi.org/10.5430/jct.v10n3p58>
- Munawaroh, M., Setyani, N. S., & Susilowati, L. (2021). Comparing the effectiveness of information technology-based problem-based learning and project-based learning on student motivation. *Turkish Online Journal of Qualitative Inquiry*, 12(6),

1603–1612.

Nicol, C. B. (2021). An overview of inquiry-based science instruction amid challenges.

EURASIA Journal of Mathematics, Science and Technology Education, 17(12),

1–15. <https://doi.org/10.29333/ejmste/11350>

Parsons, L. (2022, August 23). *Why is Professional Development Important?* Professional

& Executive Development Harvard Division of Continuing Education.

<https://professional.dce.harvard.edu/blog/why-is-professional-development->

[important/](https://professional.dce.harvard.edu/blog/why-is-professional-development-)

Patton, M. Q. (2007). Sampling, qualitative (purposeful). In *The Blackwell encyclopedia*

of sociology.

Penuel, W. R., Turner, M. L., Jacobs, J. K., Horne, K., & Sumner, T. (2019). Developing

tasks to assess phenomenon-based science learning: Challenges and lessons

learned from building proximal transfer tasks. *Science Education*, 103(6), 1367–

1395. <https://doi.org/10.1002/sce.21544>

Percy, W. H., Kostere, K., & Kostere, S. (2015). Generic qualitative research in

psychology. *The Qualitative Report*, 20(2), 76–85.

<http://nsuworks.nova.edu/cgi/viewcontent.cgi?article=2097&context=tqr>

Powell, K. C. (2009). Cognitive and social constructivism: Developing tools for an

effective classroom. *Education*, 130(2), 241–250.

Resnik, D. (2020). What is ethics in research & why is it important? *National Institute of*

Environmental Health Science.

<https://www.niehs.nih.gov/research/resources/bioethics/whatis#:~:text=There%20>

[are%20several%20reasons%20why,the%20truth%20and%20minimize%20error](#)

Rempel, C. (2022). Benefits and challenges of Zoom tutoring during the Covid-19 pandemic. *Discourse and Writing/Redactologie*, 32, 370–393.

<https://doi.org/10.31468/dwr.961>.

Saleh, A. (2020). Coordinating scaffolds for collaborative inquiry in a game-based learning environment. *Journal of Research in Science Teaching*, 57(9), 1490–

1518. <https://doi.org/10.1002/tea.21656>

Sasson, I., Yehuda, I., Miedijensky, S., & Malkinson, N. (2022). Designing new learning environments: An innovative pedagogical perspective. *The Curriculum Journal*,

33(1), 61–81. <https://doi.org/10.1002/curj.125>

Sewell, A. (2003). Curriculum reform in science: Getting started. *Science Education Review*, 2(1), 2–10. https://doi.org/10.1007/978-0-230-80193-6_2

Skelton, P. (2018). Agriscience education through inquiry-based learning: Investigating factors that influence the science competence of middle school students. *Journal of Agricultural Education*, 59(1), 223–237.

<https://doi.org/10.5032/jae.2018.01223>

Smalley, S., & Hainline, M. (2024). SBAE teachers' perceptions of science integration and inquiry-based learning. *Journal of Agricultural Education*, 65(1), 23–39.

<https://doi.org/10.5032/jae.v65i1.50>

Sprott, R. (2019). Factors that foster and deter advanced teachers' professional development. *Teaching and Teacher Education*, 77, 321–331.

<https://doi.org/10.1016/j.tate.2018.11.001>

- Stahl, N. A., & King, J. R. (2020). Expanding approaches for research: Understanding and using trustworthiness in qualitative research. *Journal of developmental education, 44*(1), 26–28.
- Tawfik, A. A., Gish-Lieberman, J. J., Gatewood, J., & Arrington, T. L. (2021). How K-12 teachers adapt problem-based learning. *Interdisciplinary Journal of Problem-Based Learning, 15*(1), 1–19. <https://doi.org/10.14434/ijpbl.v15i1.29662>
- Tseng, Y. J., Hong, Z. R., & Lin, H. S. (2022). Advancing students' scientific inquiry performance in chemistry through reading and evaluative reflection. *Chemistry Education Research and Practice, 23*(3), 616–627. <https://doi.org/10.1039/D1RP00246E>
- Warner, C. K. (2020). Exploring candidate interaction with a high stakes teacher performance assessment: The KPTP and the Kansas laboratory. *Education Policy Analysis Archives, 28*, 138. <https://doi.org/10.14507/epaa.28.5037>
- Yalyn, D., Sari, D. A. P., & Widodo, W. (2022). The implementation of student worksheets based on problem-based learning to improve students' science process skill. *Jurnal Pijar Mipa, 17*(5), 569–576. <https://doi.org/10.29303/jpm.v17i5.3496>
- Zambak, V. S. (2017). Convincing science teachers for inquiry-based instruction: Guskey's staff development model revisited. *Science Educator, 25*(2), 108–116.
- Zur, S., & Tal, T. (2021). "We know our students": Teacher views of inquiry-based learning implementation in light of their working context. *Proceedings of the Singapore National Academy of Science, 15*(2), 91–104. <https://doi.org/10.1142/S2591722621400093>

Appendix: Interview Protocol

Introduction:

Hello, my name is Gabrielle Gonzales, and I am a graduate student from Walden University. Thank you for taking the time to participate in this interview today.

I am conducting this to explore teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms and what they believe is needed to allow them to overcome these obstacles. This interview will take around 30 minutes and will consist of some open-ended questions about your experiences and perspectives related to inquiry-based instruction in your science classroom. Please feel free to take as much time as you need in responding. I may ask some follow-up questions as we go along to understand your experiences more fully. Before we begin, I want to assure you that your identity and responses will remain completely confidential. Your name and school will not be linked to the data in any way. I will also use a pseudonym in place of your name in my notes and any reports. Do you have any other questions for me before we begin? Great, let us begin the interview!

1. What is your background and experience as a secondary science teacher?
2. How would you describe the method of inquiry-based instruction in secondary science classrooms?

RQ 1: What are teachers' perspectives of the obstacles to implementing inquiry-based instruction in secondary science classrooms?

1. What challenges have you encountered in implementing inquiry-based practices with science curriculums? What are some specific examples?
2. Can you share any personal experiences or instances where you encountered difficulties while using inquiry-based instruction in your science classrooms?
3. How do you believe administrative policies or school structures hinder the implementation of inquiry-based instruction in your science classes?
4. Do you feel there are common misconceptions among secondary science teachers that might impede the implementation of inquiry-based teaching in their science classrooms?
5. How do you think the current science curriculum and standardized testing requirements impact teachers' abilities to incorporate inquiry-based learning?
6. Is there anything else about your experiences with inquiry-based instruction that you would be willing to share?

RQ 2: What insights do teachers have into what could help them to overcome these obstacles?

1. How do you demonstrate inquiry-based instruction in your science classroom?
2. What are some activities and lessons you use to demonstrate inquiry-based instruction?

3. What motivates you to use an inquiry-based approach with your science curriculum? What benefits do you believe it provides for your students?
4. How do you address and attempt to overcome personal obstacles such time management, classroom management, curriculum priorities, etc. to keep using an inquiry-based approach?
5. What resources, supports, or strategies do you believe are needed to make it easier for you to use inquiry-based instruction in your science classroom?

Conclusion:

As we conclude the interview, I would like to summarize some of the key points I heard you mention about the obstacles you perceive with inquiry-based instruction in secondary science classrooms. Did I capture your responses accurately? Is there anything else you would like to discuss concerning the purpose of this interview? If not, I want to thank you for taking the time to share your experiences and perspectives with me today. The next step will be for me to analyze the information across the rest of my interviews to identify common themes related to the obstacles and challenges with inquiry-based instruction in secondary science classrooms. If I have any additional questions after reviewing my notes, may I contact you by email? Great, thank you again for your time. I will be sure to share my research finding with you once my study is complete.