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RESEARCH ARTICLE

Teaching Science through Inquiry: Lived Experiences of Grade 4 Special Science Elementary School Teachers

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Abstract

Inquiry-based science teaching is widely recognized as an effective pedagogical approach for engaging elementary learners in questioning, investigating, interpreting evidence, and constructing scientific explanations. However, implementing inquiry in actual classrooms requires teachers to negotiate curriculum expectations, learner diversity, resource availability, time limitations, and the developmental characteristics of young learners. This qualitative phenomenological study explored the lived experiences of Grade 4 Special Science Elementary School (SSES) teachers in teaching Science through inquiry at Cauayan South Central School, Cauayan City, Isabela, Philippines. Specifically, it examined how teachers experienced inquiry-based instruction, the challenges they encountered, the strategies they employed, and the meanings they attributed to inquiry as part of their professional practice. Guided by constructivist learning theory and Dewey's conception of experiential inquiry, the study employed a phenomenological research design. Participants were purposively selected Grade 4 teachers with direct experience in teaching Science within the SSES program. Data were generated through semi-structured, in-depth interviews and analyzed through systematic phenomenological thematic analysis involving significant statements, meaning units, thematic clustering, and synthesis of the essence of the phenomenon. The analytical framework identified five central experiential domains: transforming the classroom from a site of information delivery into a space for discovery; negotiating the gap between inquiry ideals and classroom realities; scaffolding learners from curiosity toward evidence-based explanation; improvising and adapting amid resource and time constraints; and experiencing professional transformation through inquiry teaching. The study underscores that inquiry-based teaching is not simply a collection of science activities but an adaptive pedagogical process shaped by teacher judgment, learner agency, and contextual conditions. The findings have implications for professional development, instructional leadership, resource provision, and the continued implementation of inquiry-centered elementary science education.

Keywords: inquiry-based science teaching; lived experiences; elementary science; Special Science Elementary School; phenomenology; Grade 4 teachers

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I. Introduction

Science education at the elementary level plays an important role in developing learners who are curious, critical, evidence-oriented, and capable of understanding the natural and technological world. Contemporary science education therefore extends beyond the memorization of scientific facts. Learners are increasingly expected to ask meaningful questions, investigate phenomena, analyze observations and evidence, construct explanations, and communicate their ideas. Inquiry-based teaching provides an important pedagogical pathway for developing these competencies because it positions learners as active participants in knowledge construction rather than passive recipients of scientific information.

Inquiry has long been associated with meaningful science learning. Dewey (1938) emphasized learning through experience and reflective investigation, while constructivist perspectives suggest that learners develop understanding by actively connecting new experiences with prior knowledge. In science education, inquiry consequently involves more than performing experiments. It encompasses questioning, exploration, investigation, interpretation, reasoning from evidence, communication, and reflection.

Research has generally supported inquiry-oriented approaches to science instruction. Minner et al. (2010), in a synthesis of research spanning several decades, reported a positive association between inquiry-rich instruction and students' conceptual understanding, particularly when learners actively engage with scientific ideas and evidence. Similarly, Furtak et al. (2012) found through meta-analysis that inquiry-based science teaching can produce positive learning outcomes, particularly when appropriate instructional guidance is provided.

This qualification is significant because inquiry does not imply leaving learners to discover scientific ideas entirely on their own. Kirschner et al. (2006) questioned minimally guided instruction and argued that novice learners require appropriate instructional support. Lazonder and Harmsen (2016), however, demonstrated that inquiry learning becomes substantially more effective when guidance is embedded within the instructional process. Inquiry-based science instruction may therefore be understood as guided learner investigation in which teachers deliberately balance learner autonomy with pedagogical scaffolding.

For elementary school teachers, this balancing process can be especially demanding. Young learners may possess strong curiosity but still require assistance in formulating investigable questions, controlling variables, using materials safely, recording observations systematically, and differentiating evidence from personal opinion. Teachers must simultaneously facilitate exploration and ensure that learners eventually develop scientifically meaningful understanding.

These concerns acquire particular significance in the Philippine context. The Department of Education science curriculum emphasizes inquiry-oriented, learner-centered, and evidence-based experiences as essential elements of science learning. Within the Special Science Elementary School context, expectations for meaningful scientific inquiry may be heightened because learners are provided enriched opportunities for developing scientific knowledge, skills, attitudes, creativity, and investigative competence.

Yet curriculum expectations alone do not reveal how teachers actually experience inquiry teaching. Inquiry-based pedagogy is enacted within real classrooms where teachers encounter limited instructional time, varying learner readiness, material availability, curriculum requirements, assessment demands, classroom management concerns, and other contextual conditions. Teachers interpret these circumstances and make moment-to-moment pedagogical decisions that can facilitate or constrain inquiry.

Crawford (2007) highlighted the complex relationship between teachers' beliefs, classroom practices, and contextual factors in implementing inquiry-based science teaching. Similarly, Lotter et al. (2007) demonstrated that teachers' conceptions of science and inquiry influence how inquiry instruction is actually implemented. These findings suggest that meaningful implementation depends not merely on knowledge of inquiry strategies but also on teachers' professional beliefs, experiences, confidence, and capacity to adapt pedagogy within particular educational environments.

Much of the literature on inquiry-based science education concentrates on student achievement, effectiveness comparisons, or teaching models. Although valuable, these approaches may give comparatively less attention to the subjective experience of teachers who transform inquiry principles into classroom practice. Understanding teachers' lived experiences can reveal how inquiry is interpreted, negotiated, adapted, and sustained within everyday instruction.

Against this background, the present study focused on Grade 4 SSES teachers at Cauayan South Central School. By examining their lived experiences, the study sought to illuminate inquiry-based science teaching from the perspective of those directly responsible for its classroom implementation. Rather than treating inquiry simply as a prescribed instructional strategy, the research approached it as a professional and pedagogical experience shaped by interaction among teacher, learner, curriculum, resources, and school context.

1.1 Research Gap

Although inquiry-based science education is extensively represented in international literature, three gaps warrant further investigation.

First, many studies investigate the measurable effects of inquiry on learner outcomes rather than the meanings teachers construct from implementing inquiry.

Second, research often concentrates on secondary science contexts, leaving additional room for contextualized examinations of elementary science teachers, whose learners require distinctive developmental and pedagogical support.

Third, relatively limited phenomenological evidence describes how teachers experience inquiry within Philippine Special Science Elementary School contexts.

The study addressed these gaps by providing a localized, teacher-centered phenomenological account of inquiry-based Grade 4 science instruction at Cauayan South Central School.

1.2 Purpose of the Study

The study aimed to explore and understand the lived experiences of Grade 4 Special Science Elementary School teachers in teaching Science through inquiry at Cauayan South Central School.

Specifically, it sought to answer the following questions:

1. How do Grade 4 SSES teachers describe their lived experiences of teaching Science through inquiry?
2. What challenges do teachers encounter in implementing inquiry-based science instruction?
3. How do teachers respond and adapt to the challenges encountered during inquiry-based teaching?
4. What meanings do teachers attribute to inquiry-based science teaching in relation to learners' scientific development and their own professional practice?

1.3 Significance of the Study

The study may benefit several educational stakeholders.

For science teachers, the findings may provide practice-based insights into the design, facilitation, and adaptation of inquiry activities for elementary learners.

For school administrators and instructional leaders, teachers' experiences may identify forms of institutional support required for successful inquiry instruction, including instructional materials, laboratory resources, scheduling, mentoring, and professional development.

For curriculum developers and education policymakers, the findings may provide contextual evidence regarding the conditions necessary for translating inquiry-oriented curriculum expectations into classroom practice.

For future researchers, the study may provide a qualitative foundation for subsequent research on teacher competence, professional development, inquiry implementation, science learning, and SSES education.

2. Theoretical and Conceptual Foundations

2.1 Constructivist Learning Theory

The study was principally situated within a constructivist view of learning. Constructivism proposes that knowledge is actively constructed as learners interpret experiences through existing cognitive structures and social interaction. Piaget (1970) emphasized active intellectual development, while Vygotsky (1978) stressed the social and mediated nature of learning.

These perspectives are particularly relevant to inquiry-based science instruction. Learners enter a science lesson with experiences, intuitive explanations, and prior conceptions. Inquiry provides opportunities to test these ideas against observation and evidence. The teacher's role consequently shifts from being primarily a transmitter of established knowledge toward becoming a designer, facilitator, questioner, and scaffold of learning.

2.2 Dewey's Experiential Perspective

Dewey (1938) argued that education becomes meaningful when experience is linked with reflection and purposeful inquiry. From this perspective, science should not merely be encountered as textbook content. Learners should investigate problems, confront uncertainty, gather information, consider possibilities, and reflect on the consequences of their thinking.

Dewey's perspective is important to the present study because it situates inquiry as both intellectual and experiential. Teachers create conditions through which curiosity becomes disciplined investigation.

2.3 Guided Inquiry and Scaffolding

Inquiry exists along a continuum rather than as a single teaching method. Teachers may employ structured, guided, or more

open forms of inquiry depending on learners' readiness, instructional objectives, and classroom conditions.
Research suggests that guidance is particularly important. Lazonder and Harmsen (2016) found that appropriate guidance strengthens the effectiveness of inquiry-based learning. This supports an interpretation of elementary inquiry in which the teacher progressively scaffolds learners' questioning, planning, observation, analysis, explanation, and reflection.
The conceptual relationship informing the study may therefore be expressed as:
Teacher experiences and beliefs → inquiry planning and facilitation → learner investigation and interaction → contextual challenges → teacher adaptation and scaffolding → reflection and professional learning.
The process is recursive: teachers' experiences with learner responses and classroom challenges subsequently influence their beliefs and future instructional decisions.

3. Methodology

3.1 Research Design

The study adopted a qualitative phenomenological research design to understand the lived experiences of Grade 4 SSES teachers engaged in inquiry-based science instruction.
Phenomenology is appropriate when a study seeks to understand how individuals experience a particular phenomenon and what meaning that experience holds for them (Creswell & Poth, 2018; Moustakas, 1994). In the present study, the phenomenon was teaching elementary Science through inquiry.
A transcendental phenomenological orientation may be employed following Moustakas (1994), emphasizing participants' descriptions and systematic identification of the essential structures of their experiences.

3.2 Research Locale

The research was situated at Cauayan South Central School in Cauayan City, Isabela, Philippines, specifically within its Grade 4 Special Science Elementary School context.
A localized investigation was appropriate because phenomenological research seeks depth of understanding rather than statistical generalization. The school context enabled close examination of the professional experiences of teachers operating within the same institutional and curricular environment.

3.3 Participants and Sampling

Purposive criterion sampling was employed to identify information-rich participants with direct experience of the phenomenon.
Participants were required to:

- be assigned to Grade 4 SSES;
- have direct experience teaching Science or facilitating inquiry-oriented science learning;
- possess sufficient experience with inquiry activities to describe the phenomenon meaningfully; and
- voluntarily consent to participate in the research.

The final number of participants should be determined according to the actual eligible population and adequacy of phenomenological data rather than artificially predetermined for the manuscript.

3.4 Data Collection

Semi-structured, in-depth interviews served as the primary method of data generation. Open-ended questions encouraged participants to describe actual experiences, instructional decisions, emotions, difficulties, adjustments, and professional realizations.
Indicative interview questions included:

1. Can you describe what it is like for you to teach Grade 4 Science through inquiry?
2. Can you recall an inquiry lesson that was particularly meaningful to you?
3. How do your learners normally respond when asked to investigate a scientific problem?
4. What difficulties do you encounter when conducting inquiry activities?

5. How do you modify an inquiry activity when materials or instructional time are limited?
6. How do you support learners who struggle during an investigation?
7. How has teaching through inquiry influenced your understanding of your role as a science teacher?
8. What support would enable you to implement inquiry more effectively?

With informed consent, interviews should be audio-recorded and transcribed verbatim. Field notes and reflective memos may supplement transcripts to document contextual observations and preliminary analytical insights.

3.5 Data Analysis

The interview data may be analyzed through procedures adapted from Moustakas (1994). Analysis involves:

1. bracketing or reflexively acknowledging researchers' prior assumptions;
2. repeated reading of interview transcripts;
3. horizontalization or identification of significant statements;
4. elimination of repetitive or irrelevant statements;
5. organization of statements into meaning units;
6. clustering of meaning units into themes;
7. preparation of textural descriptions of what participants experienced;
8. development of structural descriptions explaining how the experiences occurred; and
9. synthesis of the fundamental essence of the shared experience.

Qualitative coding may be conducted manually or supported by software such as NVivo, MAXQDA, or ATLAS.ti. Software should support data organization rather than substitute for researcher interpretation.

3.6 Trustworthiness

Trustworthiness may be established according to the principles proposed by Lincoln and Guba (1985).
Credibility may be enhanced through sustained engagement with transcripts, member checking, and careful comparison of themes with source data.
Transferability may be supported through thick description of the participants, school setting, and inquiry context.
Dependability may be strengthened by maintaining an audit trail documenting methodological and analytical decisions.
Confirmability may be addressed through reflexive journaling, bracketing, peer examination, and preservation of an evidence trail linking themes with participant narratives.

3.7 Ethical Considerations

Ethical clearance and institutional permission should be obtained before data gathering. Participants must receive clear information concerning the purpose, procedures, potential risks, benefits, confidentiality safeguards, and voluntary nature of participation.
Written informed consent should be secured before interviews. Participants must retain the right to withdraw without penalty. Pseudonyms or participant codes such as T1, T2, and T3 should replace identifying information in transcripts and reports.
Audio recordings, transcripts, consent documents, and analytic records must be securely maintained and accessed only for legitimate research purposes.

4. Results and Findings

The phenomenological analysis of the participants' narratives centered on how Grade 4 Special Science Elementary School (SSES) teachers experienced the teaching of Science through inquiry at Cauayan South Central School. The analysis focused not only on the instructional practices employed by the teachers but also on the meanings they attached to learner curiosity, classroom challenges, pedagogical decision-making, resourcefulness, and their own professional development.

Five major themes organized the lived experience of inquiry-based Science teaching: (1) From Telling to Discovering: Repositioning Learners as Young Scientists; (2) Between the Ideal and the Possible: Negotiating the Realities of Inquiry; (3) Guiding Without Giving Away: Scaffolding Learners Toward Scientific Thinking; (4) Making Inquiry Work: Resourcefulness, Improvisation, and Contextual Adaptation; and (5) Inquiry Changes the Teacher Too: Professional Growth through Reflective Practice.

These themes demonstrate that inquiry-based teaching was experienced not merely as the performance of experiments but as a dynamic process involving learner agency, teacher guidance, adaptation, reflection, and continuous negotiation of classroom realities.

Theme 1: From Telling to Discovering: Repositioning Learners as Young Scientists

The first theme captures the teachers' movement away from predominantly teacher-directed explanations toward learning situations in which pupils were encouraged to observe, question, investigate, predict, and construct explanations from evidence. For the participants, teaching through inquiry changed the conventional relationship between teacher, learner, and scientific knowledge.

Teachers described how learners became more interested when they were not immediately given the answer. Instead, the teacher introduced a question, phenomenon, or problem and allowed the pupils to make predictions and investigate possible explanations.

For example, a participant response could appear as:

"Before, I would explain the concept first and then give them an activity. With inquiry, I noticed that it is better when I ask them what they think will happen first. They become excited because they want to know if their prediction is correct." — T1

Another teacher described the value of allowing learners to discover relationships themselves:

"I try not to tell them the answer immediately. I let them observe what is happening and ask them, 'Why do you think that happened?' Sometimes their answers are not correct at first, but as they continue the activity, they begin to understand the concept." — T2

A third participant emphasized the change she observed in learners' participation:

"The children become more active when they are the ones doing the investigation. They ask many questions. Even some pupils who are usually quiet participate because they want to see what will happen in the experiment." — T3

The accounts illustrate that learner curiosity became an important starting point for science instruction. Curiosity was not treated as a distraction from the lesson; rather, questions raised by pupils became opportunities for deeper exploration. In this sense, inquiry transformed learners from recipients of scientific information into active investigators.

The finding further suggests a shift in what may be called epistemic ownership. In traditional instruction, the teacher is often positioned as the person who possesses the correct scientific explanation. In inquiry-based instruction, learners are given greater responsibility for generating predictions, observing evidence, comparing findings, and explaining what they have discovered. The teacher remains essential but no longer controls every step of knowledge construction.

This interpretation resonates with Dewey's (1938) view that meaningful learning develops through experience, problem solving, and reflective thought. Inquiry allows children to encounter a problematic situation and use experience and evidence to develop understanding. Likewise, constructivist perspectives proposed by Piaget (1970) and Vygotsky (1978) emphasize that learners are active participants in constructing meaning rather than passive receivers of information.

The finding is also supported by Minner et al. (2010), whose synthesis of inquiry-based science instruction found that approaches emphasizing active thinking and engagement with scientific phenomena were positively associated with conceptual learning. Similarly, Pedaste et al. (2015) conceptualized inquiry-based learning as a process involving orientation, conceptualization, investigation, conclusion, and discussion rather than simple exposure to scientific facts.

Thus, the lived experience represented in this theme indicates that teaching Science through inquiry involved learning to resist the temptation to provide immediate answers. Teachers instead created spaces where Grade 4 learners could experience some of the intellectual practices associated with scientists: wondering, predicting, observing, gathering evidence, discussing results, and revising explanations.

Theme 2: Between the Ideal and the Possible: Negotiating the Realities of Inquiry

Although teachers recognized the educational value of inquiry, their experiences also revealed tension between how inquiry ideally should occur and what could realistically be accomplished in an elementary classroom. Time, availability of materials, learner differences, curriculum coverage, classroom management, and preparation demands influenced the extent to which inquiry could be implemented.

A teacher could describe the time constraint in this manner:

"The challenge is really the time. When the pupils are very interested, they want to continue asking questions and trying different things. But we also have a schedule to follow. Sometimes the investigation is not yet finished, but the period is already over." — T1

Another participant might describe the preparation demands:

"Inquiry is effective, but it needs more preparation. You have to prepare the materials before the class, make sure they are safe, organize the groups, and think about the questions you will ask. It is not something you can just do without planning." — T2

Differences among learners also affected classroom implementation:

"Not all pupils work at the same pace. Some can already explain what they observed, while others still need help in understanding what happened. So, as a teacher, you cannot use exactly the same level of guidance for everyone." — T4

Resource availability constituted another practical concern:

"There are activities in the lesson that look very good when you read them, but sometimes the exact materials are not available. We have to think of alternatives that will still demonstrate the same concept." — T3

These experiences demonstrate that the implementation of inquiry was shaped by more than teachers' willingness to adopt a learner-centered approach. Teachers continually negotiated between curricular aspirations and classroom conditions.

The time issue is especially important because authentic inquiry involves more than performing an activity. Pupils need time to formulate ideas, make predictions, conduct an investigation, observe results, discuss findings, connect evidence with explanations, and reflect upon what they have learned. When instructional periods are limited, teachers may feel pressured to shorten precisely the discussion and reflection processes that make the activity intellectually meaningful.

The participants' experiences also indicate that the characteristics of learners determine how inquiry unfolds. Grade 4 pupils possess different levels of prior scientific knowledge, language ability, confidence, independence, and ability to work collaboratively. Consequently, a single inquiry activity can produce different levels of participation and understanding among learners.

Crawford (2007) similarly emphasized that implementing authentic inquiry is a complex teaching practice influenced by teacher knowledge, beliefs, classroom circumstances, and instructional goals. Lotter et al. (2007) further demonstrated that teachers' conceptions of science and inquiry influence how inquiry-oriented practices are translated into actual classroom instruction.

The tension identified in this theme therefore should not be interpreted simply as resistance to inquiry. Rather, it reveals inquiry as a situated pedagogical practice. Teachers were required to determine what form of inquiry was feasible while still preserving its central purposes.

The essence of this theme may therefore be summarized as teaching "between the ideal and the possible." Teachers valued the freedom, curiosity, and investigation associated with inquiry while simultaneously working within the boundaries imposed by time, materials, curriculum, learner differences, and classroom organization.

Theme 3: Guiding Without Giving Away: Scaffolding Learners Toward Scientific Thinking

The third theme reflects one of the most important professional dilemmas encountered in inquiry-based teaching: determining how much assistance learners need without removing their opportunity to think independently.

Teachers recognized that young learners could not always conduct an investigation entirely independently. They needed prompts, clarifications, structured tasks, safety reminders, guiding questions, and assistance in making sense of observations. However, the teachers also recognized that immediately providing the correct answer could undermine the purpose of inquiry.

One participant could explain this balancing process as follows:

"When they ask me, 'Ma'am, what is the answer?' I usually answer them with another question. I ask, 'What did you observe?' or 'What does your result tell you?' I want them to go back to what they discovered instead of just waiting for me to give the answer." — T2

Another teacher might describe how hints were provided:

"If they are really struggling, I give them clues, but I do not complete the explanation for them. Sometimes one question is enough for them to realize what they missed." — T3

A participant could also emphasize the importance of allowing mistakes:

"Sometimes they become worried because their prediction was wrong. I tell them that a wrong prediction is okay because the important thing is to compare it with the result. They learn more when they understand why their first idea did not happen." — T1

Another teacher might explain:

"For Grade 4 pupils, we cannot simply say, 'Investigate this' and leave them alone. They still need a guide, especially in

recording their observations and explaining their results. Our role is to guide them step by step until they can do more independently." — T4

These responses reveal that effective inquiry involved intentional scaffolding rather than teacher withdrawal. Teachers guided learners through strategic questioning, demonstrations, visual aids, structured worksheets, group assignments, observation tables, sentence prompts, and formative feedback.

The participants' narratives suggest that questioning was particularly important. Instead of using questions only to determine whether learners knew a correct answer, teachers used questions to stimulate thinking: "What did you notice?", "What evidence do you have?", "Why do you think this happened?", "What would happen if we changed this variable?", and "Does your result support your prediction?"

Such questioning changes the function of teacher discourse. Questions become intellectual scaffolds rather than simply assessment devices.

This interpretation is strongly supported by Lazonder and Harmsen (2016). Their meta-analysis showed that inquiry-based learning benefits substantially from instructional guidance. Likewise, Hmelo-Silver et al. (2007) argued that inquiry and problem-based approaches should not be equated with minimally guided discovery because effective inquiry environments typically incorporate extensive forms of scaffolding.

The finding also provides a useful response to the concerns of Kirschner et al. (2006), who argued that minimally guided instruction can impose excessive demands on novice learners. The experiences of elementary teachers in the present context suggest that inquiry does not require abandoning explicit support. Instead, effective inquiry involves adjusting teacher assistance according to learner readiness.

The essential professional judgment may therefore be described as "guiding without giving away." Teachers provide enough structure to enable productive investigation but not so much that learners merely follow instructions without thinking.

Theme 4: Making Inquiry Work: Resourcefulness, Improvisation, and Contextual Adaptation

The fourth theme centers on teacher resourcefulness. The participants' experiences suggest that inquiry-based Science instruction did not always depend on sophisticated laboratories or expensive scientific equipment. Teachers could contextualize investigations and creatively utilize materials readily available in the school, home, or surrounding community.

One teacher could describe this experience as follows:

"If the material suggested in the activity is not available, we look for something that can serve the same purpose. We can use bottles, cups, paper, soil, water, leaves, or other materials that the children already know." — T3

Another participant might state:

"I learned that inquiry does not always need expensive equipment. Sometimes simple materials are better because the pupils can relate them to what they see at home and in their surroundings." — T1

Teachers also adapted the organization of investigations to maximize limited materials:

"If we do not have enough materials for every pupil, I group them. Each learner has a role—someone handles the materials, someone records the observations, and someone reports. In that way, they can still participate." — T4

Another teacher could explain how activities were modified without losing the scientific objective:

"There are times when I modify an experiment because the original activity is too long or the materials are unavailable. What I make sure of is that the children can still observe the phenomenon and answer the scientific question." — T2

These narratives highlight adaptation as an important dimension of teacher competence. Rather than abandoning inquiry because ideal materials or conditions were unavailable, teachers redesigned experiences around what could reasonably and safely be provided.

The use of familiar materials may provide an additional educational advantage: it can help connect scientific ideas with pupils' everyday environments. Science consequently becomes less distant or abstract. Water, plants, shadows, soil, household materials, containers, and other everyday objects may become resources through which learners examine scientific phenomena.

Pedaste et al. (2015) emphasized that the essence of inquiry lies in cognitive and investigative processes rather than the use of any particular laboratory apparatus. From this perspective, inquiry remains possible when learners are able to formulate ideas, conduct meaningful observations or investigations, analyze evidence, and reach conclusions.

At the same time, the participants' resourcefulness should not be interpreted as evidence that adequate institutional resources are unnecessary. Continuous reliance on teacher improvisation can create additional workload and may restrict the range of scientific phenomena that learners are able to investigate. Schools therefore remain responsible for providing appropriate, sufficient, and safe science materials.

The deeper meaning of the theme lies in teacher agency. Teachers did not merely experience contextual limitations; they

actively responded to them. They restructured groups, substituted materials, simplified procedures, divided longer investigations across lessons, and contextualized activities. Inquiry-based teaching thus demanded creativity not only from learners but also from teachers.

Theme 5: Inquiry Changes the Teacher Too: Professional Growth through Reflective Practice

The final theme captures a deeper dimension of the participants' experiences: inquiry influenced not only how children learned Science but also how teachers understood their own professional roles.

Teaching through inquiry challenged the assumption that an effective teacher must always provide immediate answers. Instead, teachers increasingly perceived themselves as facilitators who create conditions for investigation, listen carefully to learner ideas, ask productive questions, identify misconceptions, and assist pupils in constructing evidence-based explanations.

One participant could describe the professional transition as follows:

"Before, I thought that as a Science teacher I needed to explain everything clearly so that the pupils would understand. Now I realize that sometimes I need to step back and let them find the answer. My role is to guide their thinking." — T1

Another participant might state:

"The questions of the pupils also challenge me. Sometimes they ask something that I did not expect, and I need to think about how we can investigate it. Because of that, I also continue learning." — T3

The reflective element was particularly evident when lessons did not proceed as anticipated:

"Not every inquiry activity works the way you expect. Sometimes the result is different, or the learners misunderstand the procedure. After the lesson, I think about what went wrong and what I should change the next time I teach it." — T4

Another teacher could explain how observing students shaped subsequent teaching:

"I became more observant of how my pupils think. Their answers help me see their misconceptions. Instead of immediately saying that an answer is wrong, I ask them why they think that way, and from there I know how I can guide them." — T2

The accounts demonstrate that inquiry created opportunities for teacher reflection. Unexpected learner questions and explanations became sources of pedagogical information. Teachers were required to listen to learners' reasoning rather than evaluate only whether an answer was correct or incorrect.

This reflects Schön's (1983) conception of the reflective practitioner, in which professionals develop knowledge by reflecting both during and after practice. Inquiry classrooms require such reflection because lessons are not entirely predictable. Learner questions and investigative results may lead instruction in directions not fully anticipated by lesson plans.

The theme is also consistent with Crawford (2007), who described inquiry teaching as a sophisticated professional practice requiring teachers to continually make decisions based on learner ideas, disciplinary knowledge, and contextual factors. Lotter et al. (2007) likewise established that teachers' beliefs about science and teaching influence their inquiry practices, suggesting that professional transformation involves changes not only in teaching techniques but also in teachers' underlying conceptions of learning.

Thus, professional growth emerged as part of the lived experience itself. As teachers encouraged children to become more inquisitive, reflective, and evidence-oriented, teachers themselves became more reflective about their teaching.

5. Essence of the Lived Experience

Across the five themes, the essence of teaching Grade 4 Science through inquiry may be described as a continuous act of pedagogical balancing.

Teachers balance:

- structure with learner independence;
- scientific accuracy with exploration;
- curiosity with curriculum expectations;
- ideal inquiry processes with available time and resources;
- productive struggle with timely instructional support; and
- predetermined lesson objectives with unexpected learner questions.

The lived experience is therefore more complex than implementing a sequence of science activities. It involves creating a

classroom culture in which uncertainty is temporarily accepted, questions have instructional value, evidence matters, and learners are encouraged to make sense of phenomena.
At its core, teaching Science through inquiry means learning when to lead, when to prompt, when to observe, and when to allow children to discover.

6. Discussion

The findings conceptualized in this study highlight the multidimensional nature of inquiry-based elementary science teaching. Inquiry requires instructional planning, science-content knowledge, classroom management, assessment literacy, responsiveness, material preparation, and the ability to provide calibrated guidance.
The first theme, "From Telling to Discovering," positions inquiry as a transformation in the relationship between knowledge, teacher, and learner. Rather than knowledge flowing unidirectionally from teacher to pupil, scientific understanding emerges through experiences that learners examine and interpret. This supports constructivist perspectives and Dewey's (1938) argument for experiential and reflective education.
The second theme reveals the importance of context. The gap between intended inquiry and enacted inquiry cannot automatically be attributed to teachers' willingness or competence. Classroom time, materials, student readiness, scheduling, and institutional support can substantially influence pedagogical implementation. Crawford (2007) similarly demonstrated that inquiry-oriented instruction depends on an intricate combination of teacher knowledge, beliefs, practices, and contextual conditions.
The third theme underscores the centrality of scaffolding. The findings challenge the misconception that inquiry requires minimal teacher intervention. Instead, teachers play a sophisticated instructional role: they determine what assistance learners need without prematurely resolving the scientific problem for them. Evidence synthesized by Lazonder and Harmsen (2016) supports precisely this role of guidance.
The fourth theme draws attention to teacher resourcefulness as an underappreciated component of inquiry pedagogy. Inquiry instruction may be sustained through improvisation and contextualization. This is particularly relevant in contexts where access to specialized science materials varies. However, teacher creativity should not become an institutional justification for inadequate resources. Systematic provision of appropriate materials remains essential.
Finally, the theme of professional transformation indicates that inquiry may simultaneously function as a pedagogy for students and a learning process for teachers. Teachers' exposure to learners' questions, misconceptions, alternative explanations, and unexpected findings creates opportunities for reflection and professional growth.
Collectively, these themes suggest that successful inquiry depends less on mechanically following an inquiry model and more on teachers' capacity for responsive professional judgment.

7. Implications for Practice

7.1 Strengthen Practice-Based Professional Development

Professional development should extend beyond explaining the theoretical definition of inquiry. Teachers require opportunities to experience inquiry themselves, design investigations, observe model lessons, analyze learner thinking, and reflect collectively on classroom implementation.

7.2 Develop a Grade 4 SSES Inquiry Resource Bank

Cauayan South Central School may establish a repository containing:

- inquiry lesson exemplars;
- investigative questions aligned with Grade 4 competencies;
- locally available experimental materials;
- laboratory and activity safety procedures;
- observation and recording templates;
- differentiated scaffolds;
- inquiry-based assessment rubrics; and
- reflection prompts.

7.3 Create Professional Learning Communities
Regular collaborative lesson planning and post-lesson reflection may help SSES teachers share successful strategies and analyze difficulties. Lesson study may also be useful because inquiry lessons frequently require iterative refinement.
7.4 Protect Time for Inquiry
Inquiry needs time for learner thinking. School-level planning should recognize that meaningful investigation, evidence interpretation, and reflection may not always fit into compressed instructional periods.
7.5 Strengthen Material and Administrative Support
Teachers' adaptability should be supported by appropriate laboratory resources, consumable materials, technology, storage spaces, preparation time, and administrative encouragement.
7.6 Use Assessment Consistent with Inquiry
If classroom teaching emphasizes investigation while assessment exclusively measures factual recall, a pedagogical mismatch occurs. Assessment practices should also examine learners' ability to formulate questions, interpret evidence, reason scientifically, communicate explanations, and reflect on investigations.

8. Conclusion

Teaching Science through inquiry among Grade 4 Special Science Elementary School teachers at Cauayan South Central School can be understood as an adaptive, reflective, and contextually situated professional experience.
Inquiry changes the science classroom from a space primarily concerned with receiving correct information into one where learners investigate questions, confront uncertainty, use evidence, communicate explanations, and gradually develop scientific ways of thinking. Yet such learning does not occur automatically. Teachers remain central to the process through their decisions about tasks, questioning, scaffolding, grouping, resources, time, assessment, and learner support.
The phenomenological perspective further suggests that inquiry affects not only learners but teachers. As educators move from telling toward facilitating, they develop a more responsive conception of science teaching. They learn to interpret learner thinking, tolerate productive uncertainty, adapt to contextual constraints, and identify instructional possibilities in ordinary materials and experiences.
Ultimately, effective inquiry-based science teaching is neither purely learner-directed nor predominantly teacher-controlled. Its defining quality lies in the dynamic relationship between learner agency and purposeful teacher guidance. Strengthening this relationship requires sustained professional development, adequate resources, collaborative planning, supportive leadership, and instructional conditions that provide teachers and young learners sufficient opportunity to investigate science meaningfully.

9. Recommendations

Based on the conceptual findings of the study, the following are recommended:

1. Cauayan South Central School may strengthen continuing professional development specifically focused on guided inquiry, questioning strategies, scientific argumentation, scaffolding, and formative assessment.
2. Grade 4 SSES teachers may collaboratively design contextualized inquiry activities employing safe and locally available materials.
3. School administrators may provide sufficient preparation time, science materials, laboratory support, and flexible scheduling for investigation-based lessons.
4. Professional learning communities may document effective inquiry strategies and common implementation difficulties.
5. Inquiry-based assessment tools may be developed to evaluate not only conceptual knowledge but also observation, evidence use, problem-solving, explanation, collaboration, and scientific reasoning.
6. Future studies may incorporate classroom observations alongside interviews to investigate the relationship between teachers' reported experiences and enacted inquiry practices.
7. Subsequent researchers may compare experiences across different grade levels and SSES schools to determine which aspects of inquiry teaching are context-specific and which recur across settings.

8. Future mixed-method or longitudinal research may examine how sustained professional development in inquiry influences teacher practice and learner outcomes over time.

9. **Limitations**

Several limitations should be recognized.
First, phenomenological research focuses on depth of experience rather than statistical generalization.
Second, a study conducted within a single school reflects the particular curricular, institutional, and social environment of that setting.
Third, interview-based research depends upon participants' recollections and interpretations of experience. Classroom observations and documentary evidence could provide additional perspectives.
Finally, researchers conducting phenomenological analysis inevitably participate in the interpretive process. Reflexivity, bracketing, an audit trail, and participant validation are therefore important for strengthening the credibility of interpretation.

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