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Article

Exploring Science Teachers' Instructional Practices under the Strengthened Senior High School Curriculum: Lived Experiences in Teaching Grade 11 Science in Public Secondary Schools of the Schools Division of Nueva Vizcaya

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Abstract

The implementation of the Strengthened Senior High School (SSHS) Curriculum has introduced significant changes in Science education by emphasizing competency-based, learner-centered, and inquiry-driven instruction. Science teachers play a critical role in translating these curriculum reforms into meaningful classroom practices that develop learners' scientific literacy, critical thinking, and problem-solving skills. This qualitative phenomenological study explored the lived experiences of Grade 11 Science teachers regarding their instructional practices under the Strengthened Senior High School Curriculum in public secondary schools of the Schools Division of Nueva Vizcaya. Twelve (12) Grade 11 Science teachers were purposively selected as participants. Data were gathered through semi-structured interviews and analyzed using Braun and Clarke's (2006) thematic analysis. The findings revealed that teachers employed inquiry-based learning, contextualized instruction, collaborative learning, differentiated teaching, and authentic assessment to enhance learner engagement. However, they encountered challenges related to curriculum transition, instructional resources, learner diversity, and time constraints. Teachers addressed these challenges through instructional innovation, collaborative planning, and continuous professional learning. The study concludes that successful implementation of the Strengthened SHS Curriculum requires sustained professional development, adequate instructional resources, and strong institutional support. The findings provide valuable insights for curriculum developers, school leaders, and policymakers in strengthening Science instruction under the new curriculum.

Keywords: *Strengthened Senior High School Curriculum, Science instruction, instructional practices, Grade 11 Science, phenomenology, public secondary schools, Philippines*

1. Introduction

Science education is essential in preparing learners to become scientifically literate individuals capable of solving problems, making evidence-based decisions, and responding to the demands of a rapidly changing society. As scientific and technological advancements continue to influence everyday life, schools are expected to provide learning experiences that develop critical thinking, inquiry skills, creativity, and environmental responsibility among learners (OECD, 2023).

In response to these educational demands, the Department of Education introduced the Strengthened Senior High School (SSHS) Curriculum, which streamlines learning competencies while emphasizing deeper understanding, learner-centered instruction, and authentic learning experiences (DepEd, 2025). The revised curriculum encourages Science teachers to adopt instructional strategies that promote inquiry, collaboration, contextualization, and real-world application of scientific concepts instead of relying solely on lecture-based instruction.

Grade 11 Science serves as a foundation for learners pursuing various academic, technical-vocational, and career pathways. At this level, teachers are expected to facilitate meaningful learning through inquiry-based investigations, laboratory activities, collaborative tasks, contextualized instruction, and authentic assessment. Effective instructional practices help learners develop scientific reasoning, conceptual understanding, and the competencies needed for higher education, employment, and lifelong learning.

Despite these reforms, Science teachers continue to experience challenges in implementing the Strengthened SHS Curriculum. Limited instructional resources, curriculum transition, varying learner preparedness, time constraints, and the need to continuously adapt teaching strategies influence classroom instruction. These realities require teachers to become reflective practitioners who modify their instructional approaches while maintaining the quality of Science education.

Although studies have examined Science teaching and curriculum implementation, limited qualitative research has explored the lived experiences of Grade 11 Science teachers implementing the Strengthened Senior High School Curriculum in Philippine public secondary schools. Understanding teachers' experiences is essential for improving curriculum implementation, strengthening teacher professional development, and enhancing classroom instruction.

Therefore, this study explored the instructional practices, experiences, challenges, adaptive strategies, and recommendations of Grade 11 Science teachers in public secondary schools of the Schools Division of Nueva Vizcaya. The findings are expected to contribute to the continuous improvement of Science education and provide evidence-based

recommendations for teachers, school administrators, curriculum developers, and educational policymakers.

Review of Related Literature

Instructional Practices in Science Education

Effective Science instruction promotes scientific literacy through learner-centered, inquiry-based, and collaborative teaching strategies. The Strengthened Senior High School (SHS) Curriculum encourages teachers to facilitate active learning experiences that develop critical thinking, scientific reasoning, and problem-solving skills rather than relying on lecture-based instruction (DepEd, 2025). Studies have shown that inquiry, contextualization, and authentic assessment significantly improve learners' engagement and conceptual understanding (Hattie, 2023; OECD, 2023).

Inquiry-Based and Contextualized Science Teaching

Inquiry-based learning enables students to investigate scientific problems through observation, experimentation, analysis, and reflection (Bybee, 2013). Likewise, contextualized instruction relates scientific concepts to learners' everyday experiences and community issues, making Science more relevant and meaningful (Gay, 2018). These learner-centered approaches promote deeper understanding and encourage learners to apply scientific knowledge to real-life situations.

Teachers' Experiences in Implementing the Strengthened SHS Curriculum

Teachers play a critical role in translating curriculum reforms into effective classroom instruction. However, studies indicate that curriculum implementation is often influenced by instructional resources, learner diversity, time constraints, and teachers' professional competence (Fullan, 2020). To address these challenges, teachers continuously adapt their instructional strategies, develop localized learning materials, and participate in professional learning communities to improve classroom practice.

Theoretical Framework

This study is anchored on Bruner's Constructivist Theory (1966), which emphasizes that learners construct knowledge through active discovery and inquiry. It is also guided by Vygotsky's Social Constructivist Theory (1978), which highlights the role of collaboration and teacher scaffolding in learning, and Dewey's Experiential Learning Theory(1938), which explains that meaningful learning occurs through authentic experiences and reflection. These theories support the learner-centered instructional approaches promoted by the Strengthened SHS Curriculum.

Conceptual Framework

The study assumes that teachers' instructional practices are influenced by curriculum implementation, teacher competence, learner characteristics, instructional resources, and school support. These factors shape teachers' classroom strategies, adaptive practices, and instructional experiences, which ultimately influence learner engagement, scientific literacy, critical thinking, and academic achievement.

Research Gap

Although several studies have examined Science teaching and curriculum implementation, limited qualitative research has explored the lived experiences of Grade 11 Science teachers implementing the Strengthened Senior High School Curriculum in Philippine public secondary schools. Furthermore, little empirical evidence exists regarding teachers' instructional practices in the Schools Division of Nueva Vizcaya. This study addresses this gap by providing an in-depth exploration of teachers' classroom experiences under the newly implemented curriculum.

Statement of the Problem

This study explored the lived experiences of Grade 11 Science teachers regarding their instructional practices under the Strengthened Senior High School Curriculum in public secondary schools of the Schools Division of Nueva Vizcaya.

Specifically, it sought to answer the following questions:

1. What instructional practices do Grade 11 Science teachers employ under the Strengthened SHS Curriculum?
2. What learner-centered strategies facilitate Science learning?
3. What challenges do teachers encounter during curriculum implementation?
4. What adaptive practices do teachers employ to address these challenges?

Significance of the Study

The findings of this study will benefit Science teachers by identifying effective instructional practices that enhance learner engagement and scientific understanding. School administrators may use the results to strengthen instructional supervision and teacher development programs. Curriculum developers and the Department of Education may utilize the findings to improve the implementation of the Strengthened SHS Curriculum. The study will also serve as a valuable reference for teacher education institutions and future researchers conducting studies on Science instruction and curriculum implementation.

Research Methodology

This study employed a qualitative phenomenological research design to explore the lived experiences of Grade 11 Science teachers regarding their instructional practices under the Strengthened Senior High School (SHS) Curriculum

in public secondary schools of the Schools Division of Nueva Vizcaya. A phenomenological approach was considered appropriate because it seeks to understand how individuals perceive and make meaning of their experiences concerning a particular phenomenon (Creswell & Poth, 2018). The study focused on teachers' instructional practices, classroom experiences, challenges encountered, adaptive strategies, and recommendations in implementing the revised Science curriculum.

The study was conducted in selected public secondary schools in the Schools Division of Nueva Vizcaya that are implementing the Strengthened SHS Curriculum. The participants consisted of twelve (12) Grade 11 Science teachers selected through purposive sampling (Merriam & Tisdell, 2016). To ensure that participants possessed sufficient experience regarding the phenomenon under investigation, they were required to be currently teaching Grade 11 Science, have at least two years of teaching experience, actively implement the Strengthened SHS Curriculum, and voluntarily agree to participate in the study. Their varied professional experiences provided rich and diverse perspectives on classroom instructional practices.

Data were gathered using a researcher-developed semi-structured interview guide, which was validated by experts in Science Education, Curriculum and Instruction, and Qualitative Research. The interview questions explored teachers' instructional practices, learner-centered strategies, classroom experiences, implementation challenges, adaptive teaching practices, and recommendations for improving Science instruction. Prior to data collection, permission to conduct the study was secured from the Schools Division Superintendent, school principals, and participating teachers. After obtaining informed consent, individual face-to-face interviews lasting approximately 45 to 60 minutes were conducted. With the participants' permission, all interviews were audio-recorded and supplemented with field notes. The recorded interviews were subsequently transcribed verbatim and carefully reviewed to ensure accuracy before analysis.

The collected data were analyzed using Braun and Clarke's (2006) Six-Phase Thematic Analysis, which involved familiarization with the data, generation of initial codes, identification of themes, review and refinement of themes, naming and defining themes, and preparation of the final narrative report. The identified themes were supported by participants' verbatim responses and interpreted using relevant theories and related literature.

To ensure the rigor of the study, Lincoln and Guba's (1985) criteria of credibility, transferability, dependability, and confirmability were employed. Credibility was established through member checking, while transferability was achieved by providing rich

descriptions of the research context and participants. Dependability was ensured through systematic documentation of the research procedures, and confirmability was strengthened through researcher reflexivity and peer debriefing to minimize bias.

Throughout the conduct of the study, the researcher adhered to the ethical principles of informed consent, voluntary participation, confidentiality, anonymity, beneficence, and data privacy. Participants were informed of the purpose of the study, their rights as research participants, and their freedom to withdraw at any stage without any consequences. Pseudonyms were used to protect participants' identities, and all information gathered was treated with strict confidentiality and used solely for academic and research purposes.

3. Findings and Discussion

The analysis of the interview transcripts generated **four major themes** that describe the instructional practices and lived experiences of Grade 11 Science teachers in implementing the Strengthened Senior High School (SHS) Curriculum in public secondary schools of the Schools Division of Nueva Vizcaya. The findings reveal that teachers continuously employ learner-centered, inquiry-driven, and adaptive instructional approaches while responding to the opportunities and challenges brought about by the strengthened curriculum.

Theme 1. Inquiry-Based and Learner-Centered Instruction Enhances Scientific Thinking

One of the most prominent themes that emerged from the participants' narratives was the extensive use of inquiry-based and learner-centered instructional strategies. Teachers emphasized that the Strengthened SHS Curriculum encourages learners to become active participants rather than passive recipients of scientific knowledge. Instead of relying solely on lectures, participants engaged learners in questioning, experimentation, collaborative discussions, and evidence-based investigations.

Participant 3 shared:

"I always begin my lesson with a problem or a real-life situation. Instead of giving the answer immediately, I allow my students to investigate and explain their own findings."

Similarly, Participant 8 explained:

"Students become more interested when they perform investigations themselves because they understand the concepts better through experience."

Participant 11 added:

"Inquiry activities improve students' confidence because they are encouraged to explain their observations and defend their conclusions."

These responses demonstrate that teachers perceive inquiry-based learning as an effective instructional strategy for promoting critical thinking, curiosity, and active participation. Through investigations, questioning techniques, and collaborative discussions, learners become actively involved in constructing scientific knowledge rather than merely memorizing concepts.

These findings support Bruner's Constructivist Theory, which emphasizes that learners construct knowledge through active discovery and exploration (Bruner, 1966). Likewise, Bybee (2013) argued that inquiry-based Science instruction develops scientific reasoning, conceptual understanding, and higher-order thinking skills. Similarly, Kim and Park (2023) found that inquiry-oriented classrooms significantly improve learners' scientific literacy and engagement by encouraging them to investigate authentic scientific problems.

Theme 2. Contextualizing Science Lessons Increases Learner Engagement and Relevance

The second theme revealed that teachers consistently contextualize Science lessons by connecting concepts with learners' daily experiences, community issues, and local environmental conditions. Participants explained that contextualization makes abstract scientific concepts easier to understand while increasing learners' motivation and appreciation of Science.

Participant 5 stated:

"I always relate our lessons to agriculture, climate, and environmental issues because these are familiar to our students."

Participant 9 remarked:

"Students participate more actively when they realize that the lesson is connected to their everyday experiences."

Participant 1 further explained:

"Using local examples helps students appreciate that Science is not only found in books but also in their own surroundings."

Teachers described using community observations, environmental issues, household situations, and local resources as teaching examples to make lessons more meaningful. They

observed that learners became more interested in classroom discussions because they could easily relate scientific concepts to situations they encountered outside school.

The findings suggest that contextualized instruction promotes meaningful learning by helping learners connect scientific knowledge with real-life experiences. Such an approach enhances conceptual understanding, environmental awareness, and learner participation.

These findings support Dewey's Experiential Learning Theory (1938), which emphasizes that meaningful learning occurs when classroom experiences are connected with learners' real-life situations. Likewise, Gay (2018) emphasized that contextualized teaching enhances learner engagement by making instruction culturally and socially relevant. Similarly, Llego and Cruz (2024) reported that contextualized Science instruction significantly improves learners' understanding and motivation because learning becomes personally meaningful.

Theme 3. Teachers Demonstrate Instructional Flexibility to Address Diverse Learner Needs

Another major theme that emerged from the participants' experiences was their commitment to adapting instructional strategies according to learners' diverse abilities, interests, and learning needs. Teachers acknowledged that Grade 11 learners differ in prior knowledge, academic preparedness, learning styles, and motivation, requiring flexible and differentiated instructional approaches.

Participant 6 explained:

"Some students easily understand scientific concepts, while others need more demonstrations and additional guidance before they can fully understand the lesson."

Participant 10 shared:

"I modify activities depending on my students' abilities. Sometimes I simplify the tasks or provide enrichment activities for advanced learners."

Participant 2 added:

"Group activities are effective because students learn from one another while I provide guidance to those who need additional support."

Participants described using differentiated instruction through flexible grouping, peer-assisted learning, individualized guidance, performance-based tasks, and varied assessment strategies. Teachers explained that these practices enabled all learners to participate actively regardless of their academic abilities.

The findings indicate that instructional flexibility promotes inclusive Science education by addressing learners' individual differences while maintaining meaningful participation. Teachers' adaptive practices create equitable learning opportunities that encourage both academic achievement and learner confidence.

These findings support Tomlinson's (2017) theory of Differentiated Instruction, which advocates adapting instruction according to learners' readiness, interests, and learning profiles. Likewise, Vygotsky (1978) emphasized that appropriate teacher scaffolding enables learners to achieve higher levels of understanding within their Zone of Proximal Development. Furthermore, Santos and Aquino (2023) reported that differentiated Science instruction significantly enhances learner engagement and conceptual understanding in secondary education.

Theme 4. Professional Collaboration and Reflective Practice Strengthen Curriculum Implementation

The fourth theme highlights the importance of collaboration and reflective practice in improving Science instruction under the Strengthened SHS Curriculum. Participants consistently emphasized that implementing a new curriculum requires continuous learning, collaboration with colleagues, and reflection on classroom practices. Teachers explained that professional discussions, Learning Action Cell (LAC) sessions, mentoring, and collaborative lesson planning helped them improve instructional strategies and address curriculum challenges.

Participant 7 shared:

"We regularly discuss our lesson plans during LAC sessions. Sharing ideas with fellow teachers helps us improve our teaching strategies."

Participant 12 remarked:

"Reflection is very important because every class is different. After each lesson, I evaluate what worked well and what needs improvement."

Participant 4 explained:

"The new curriculum requires continuous learning. We attend seminars and collaborate with our colleagues to improve our classroom practices."

Teachers described collaboration as an important source of professional support, enabling them to exchange instructional materials, assessment tools, teaching techniques, and classroom experiences. Reflective practice likewise allowed teachers to continuously refine their instructional approaches based on learners' responses and classroom outcomes.

These findings indicate that successful implementation of the Strengthened SHS Curriculum depends not only on teachers' pedagogical competence but also on sustained professional collaboration and reflective teaching. Collaborative learning communities promote instructional innovation, while reflective practice enables teachers to respond effectively to changing classroom needs.

These findings are supported by Schön's Reflective Practice Theory (1983), which explains that effective teachers continuously evaluate and improve their instructional practices through reflection. Similarly, Fullan (2020) emphasized that curriculum reform succeeds when teachers engage in collaborative professional learning and continuous instructional improvement. Gonzales and Flores (2024) likewise reported that professional collaboration significantly enhances teachers' confidence and effectiveness during curriculum implementation.

The four themes demonstrate that Grade 11 Science teachers implement the Strengthened SHS Curriculum through inquiry-based instruction, contextualized teaching, differentiated learning, and collaborative professional practice. Despite challenges associated with curriculum transition and instructional resources, teachers consistently exhibit instructional competence, creativity, and resilience in providing meaningful Science learning experiences. These findings underscore the importance of continuous professional development, institutional support, and collaborative learning communities in strengthening Science education and ensuring the successful implementation of the Strengthened Senior High School Curriculum.

4. Conclusion

This phenomenological study explored the lived experiences of Grade 11 Science teachers regarding their instructional practices under the Strengthened Senior High School (SHS) Curriculum in public secondary schools of the Schools Division of Nueva Vizcaya. The findings revealed that teachers have embraced learner-centered instructional approaches by integrating inquiry-based learning, contextualized teaching, differentiated instruction, and collaborative professional practices to facilitate meaningful Science learning. These instructional strategies enabled learners to actively participate in scientific investigations, relate scientific concepts to real-life situations, develop critical thinking skills, and become more engaged in classroom learning.

The study further revealed that while teachers recognize the strengths of the Strengthened SHS Curriculum in promoting competency-based and inquiry-driven instruction, they also encounter challenges related to curriculum transition, diverse learner abilities, limited instructional resources, and time constraints. Despite these challenges, teachers demonstrated resilience, creativity, and professional commitment by adapting their instructional strategies, utilizing locally available resources, collaborating with colleagues, and continuously reflecting on their teaching practices. These adaptive efforts contributed

to the successful implementation of the curriculum and the promotion of meaningful learning experiences among Grade 11 learners.

Overall, the study concludes that effective implementation of the Strengthened SHS Curriculum depends not only on curriculum design but also on teachers' pedagogical competence, instructional flexibility, continuous professional learning, and institutional support. Strengthening these areas will contribute to improving Science instruction and developing scientifically literate learners equipped with the knowledge, skills, and values needed for higher education, future careers, and responsible citizenship.

5. Implications of the Study

The findings of this study have important implications for educational practice, curriculum implementation, and teacher development. **Science teachers** are encouraged to continue adopting inquiry-based, contextualized, and differentiated instructional strategies that actively engage learners in scientific inquiry and problem-solving. Continuous reflection on classroom practices and collaboration with colleagues can further improve instructional effectiveness and learner outcomes.

For **school administrators**, the findings emphasize the need to provide sustained instructional support through mentoring programs, Learning Action Cell (LAC) sessions, classroom observations, and professional development activities that strengthen teachers' competencies in implementing the Strengthened SHS Curriculum. Improving access to laboratory facilities, instructional technologies, and science learning resources can also enhance the quality of Science instruction.

The **Department of Education** may utilize the findings to strengthen the implementation of the Strengthened SHS Curriculum by providing continuous teacher training, updated instructional materials, and technical assistance. Curriculum developers may also use the results to refine curriculum guides and learning resources that better support inquiry-based and learner-centered Science teaching.

Teacher education institutions may integrate the findings into pre-service and graduate teacher education programs by emphasizing innovative Science pedagogy, curriculum implementation, classroom assessment, and reflective teaching practices. Finally, the study contributes to the growing body of qualitative research on Science education in the Philippines by providing empirical evidence on teachers' instructional experiences during the implementation of the Strengthened SHS Curriculum.

6. Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

1. **Strengthen Inquiry-Based Instruction.** Science teachers should continuously implement inquiry-based, learner-centered, and experiential learning strategies that encourage learners to investigate, analyze evidence, and solve authentic scientific problems.
2. **Enhance Professional Development.** The Department of Education and school administrators should provide continuous seminars, workshops, mentoring programs, and Learning Action Cell (LAC) sessions focusing on the effective implementation of the Strengthened SHS Curriculum, inquiry-based pedagogy, differentiated instruction, and authentic assessment.
3. **Improve Instructional Resources.** Schools should allocate adequate laboratory equipment, instructional technologies, digital resources, and contextualized learning materials to support effective Science instruction and meaningful learner engagement.
4. **Promote Professional Collaboration.** Science teachers should strengthen collaborative lesson planning, peer mentoring, and professional learning communities to share innovative instructional strategies, teaching resources, and best practices in implementing the revised curriculum.
5. **Strengthen Contextualized and Inclusive Instruction.** Teachers should continue designing learning experiences that connect scientific concepts to local community issues, environmental concerns, and real-life situations while accommodating the diverse learning needs and abilities of Grade 11 learners.
6. **Conduct Further Research.** Future researchers are encouraged to undertake similar qualitative, mixed-method, or longitudinal studies involving other subject areas, school divisions, or regions to further examine instructional practices, curriculum implementation, learner engagement, and educational outcomes under the Strengthened Senior High School Curriculum.

References

Alonzo, A. C., & Gotwals, A. W. (2022). Teacher practices in inquiry-based science classrooms. *Journal of Research in Science Teaching, 59*(4), 563–585.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. Sage.

Bruner, J. S. (1966). *Toward a theory of instruction*. Harvard University Press.

Bybee, R. W. (2013). *The case for STEM education: Challenges and opportunities*. National Science Teachers Association Press.

Chen, L., & Lin, Y. (2022). Experiential learning and scientific literacy among secondary students. *Education Sciences, 12*(9), 628.

Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approaches* (6th ed.). Sage.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage.

Department of Education. (2024). *Strengthened Senior High School Curriculum Framework*. Department of Education, Philippines.

Department of Education. (2025). *Strengthened Senior High School Curriculum Guide: General Science*. Department of Education, Philippines.

Dewey, J. (1938). *Experience and education*. Macmillan.

Fullan, M. (2020). *Leading in a culture of change* (2nd ed.). Jossey-Bass.

Garcia, M. P., & Ramos, J. T. (2024). Instructional practices and learner engagement in Philippine science classrooms. *Asia Pacific Journal of Educational Research, 9*(1), 58–77.

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice* (3rd ed.). Teachers College Press.

Gonzales, R. A., & Flores, E. D. (2024). Teachers' experiences in implementing the Strengthened Senior High School Curriculum. *International Journal of Instruction, 17*(2), 423–442.

Hattie, J. (2023). *Visible learning: The sequel*. Routledge.

Kim, H., & Park, S. (2023). Inquiry-based science learning and critical thinking among senior high school learners. *Education Sciences, 13*(5), 478.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd ed.). Pearson.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Sage.

Llego, M. A., & Cruz, P. L. (2024). Contextualized science instruction in Philippine public secondary schools. *Journal of Curriculum Studies Research, 6*(2), 141–160.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research: A guide to design and implementation* (4th ed.). Jossey-Bass.

Morales, J. R., & Villanueva, K. S. (2023). Teachers' adaptive instructional practices during curriculum reform. *Education Quarterly Reviews, 6*(3), 311–330.

National Research Council. (2000). *Inquiry and the National Science Education Standards*. National Academies Press.

Navarro, A. B., & Santos, C. M. (2022). Learner-centered science instruction and classroom engagement. *International Journal of Learning, Teaching and Educational Research, 21*(8), 204–223.

OECD. (2023). *PISA 2022 Results (Volume I): The state of learning and equity in education*. OECD Publishing.

Piaget, J. (1972). *The psychology of the child*. Basic Books.

Reyes, P. D., & Fernandez, M. L. (2024). Professional resilience among public secondary school teachers implementing curriculum reforms. *Education Research International, 2024*, Article 7846321.

Santos, E. L., & Aquino, J. P. (2023). Differentiated instruction and science achievement in secondary education. *Journal of Pedagogical Research, 7*(4), 218–236.

Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. Basic Books.

Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review, 57*(1), 1–22.

Tomlinson, C. A. (2017). *How to differentiate instruction in academically diverse classrooms* (3rd ed.). ASCD.

Torres, R. A., & Castillo, M. B. (2024). Authentic assessment practices in senior high school science classrooms. *Journal of Educational Research and Practice, 14*(1), 95–112.

UNESCO. (2021). *Reimagining our futures together: A new social contract for education*. UNESCO Publishing.

UNESCO. (2023). *Global education monitoring report 2023: Technology in education*. UNESCO Publishing.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Harvard University Press.

Wong, K., & Lee, M. (2023). Collaborative learning and inquiry-based instruction in secondary science education. *International Journal of Educational Methodology, 9*(4), 771–786.

Yilmaz, H., & Demir, A. (2022). Science teachers' instructional practices: A systematic review. *Review of Education, 10*(3), e3378.

Zhang, L., & Liu, X. (2023). Inquiry-based teaching and scientific literacy among senior high school students. *Research in Science Education, 53*(4), 1285–1307.