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Innovative teaching strategies and adaptations of science teachers in secondary schools of Sablayan District

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Abstract

This study aimed to explore the innovative teaching strategies and adaptations used by science teachers in secondary schools in the Sablayan District. Using an exploratory sequential design, an interview guide, and a researcher-made instrument, data were collected from 45 teachers through complete enumeration. Descriptive statistics summarized the respondents' profiles and levels of adaptation, while multiple regression analysis was used to determine the influence of teacher profile, innovative strategies, and digital literacy on adaptation. The findings show that the high level of implementation across all strategies demonstrates that teachers are consistently applying innovative approaches in their science instruction. Also, findings reveal that teachers are highly committed to ensuring that their instructional content aligns with curriculum expectations and is responsive to both contextual and learner-specific factors. Overall, the data underscore the responsiveness and professionalism of science educators as they modify their practices to ensure the continuity, quality, and relevance of science education. These adaptive strategies are vital in fostering resilient and inclusive learning environments. Findings also revealed that contextualized and localized teaching, differentiated instruction, inquiry-based learning, and current rank significantly affect teacher adaptations, whereas blended learning, game-based teaching, ICT integration, and digital literacy level did not. These results highlight the need to strengthen support for science teachers through sustained professional development, mentoring, and resource provision, particularly in contextualized teaching, differentiated instruction, and inquiry-based learning. Thus, it is recommended that school heads and administrators be encouraged to implement the proposed professional development plan to enhance teachers' instructional capacity in employing innovative teaching strategies.

Keywords: adaptations, blended learning, digital literacy, innovative teaching strategies, science teaching

Innovative teaching strategies and adaptations of science teachers in secondary schools of Sablayan District

1. Introduction

The Philippine education system prioritized curriculum reform, teacher training, and instructional innovations through the implementation of the MATATAG Curriculum (DepEd Order No. 10, s. 2024), which emphasizes essential scientific concepts, inquiry-based learning, and integration of real-life applications. The curriculum aims to simplify content while deepening conceptual understanding and promoting real-world applications. DepEd has also increased teacher training in science pedagogy and digital literacy, recognizing that effective science instruction requires both strong content knowledge and innovative teaching strategies. To support these initiatives, the Department of Education reiterates and intensifies the implementation of DepEd Order No. 42, s. 2017**,** which enforces the Philippine Professional Standards for Teachers (PPST)**.** This framework encourages educators to demonstrate innovation in delivering content, assessing learning, and creating a learner-centered environment. In alignment with this goal, both Bloom's Taxonomy and the Structure of the Observed Learning Outcome (SOLO) Taxonomy serve as valuable tools in enhancing science education. Bloom's Taxonomy, emphasized in DepEd Order No. 8, s. 2015 is widely used in lesson planning and assessment to help teachers formulate objectives that move from foundational knowledge to higher-order thinking skills, such as analysis, evaluation, and creation, using the Structure of the Observed Learning Outcome (SOLO) framework (Chandio et al., 2016).

It provides clear guidelines for designing learning outcomes, assessments, and instructional strategies—especially in science subjects where depth of understanding is critical. When integrated into the science curriculum, these frameworks guide differentiated instruction and meaningful assessment, promoting inquiry-based learning, critical thinking, and scientific literacy. Ultimately, they equip Filipino learners with essential 21st-century competencies aligned with the goals of the K to 12 Science Curriculum. Studies emphasize that combining these taxonomies allows science teachers to design instructional strategies that are both cognitively progressive and conceptually deep. This integrated approach supports the development of innovative teaching strategies that are responsive to learner needs and aligned with curriculum standards—particularly relevant to the present study on science educators' adaptations (Ramos et al., 2024).

Complementing these instructional advancements, efforts from the private sector—such as those by Diwa Learning Systems Inc. and its social development arm, the Bato Balani Foundation Inc. (BBFI)—play a significant role in promoting scientific excellence and supporting science education nationwide. Through programs like the Bato Balani Science Excellence Awards (BB SEA), which honor top-performing science students, and initiatives like the Bato Balani Pinoy Scientist, which provides platforms that celebrate academic achievement, inspire innovation, and encourage student curiosity. In this context, the present study seeks to determine the innovative teaching strategies, profiles, and digital literacy level of science teachers in the secondary schools of Sablayan District. Furthermore, it aims to examine how these factors contribute to the level of adaptations necessary for effective and responsive instruction, with the ultimate goal of enhancing students' academic performance in science.

Statement of the Problem - The primary purpose of the study is to determine the innovative teaching strategies and adaptations used by science teachers in Secondary Schools in the Sablayan District. Specifically, this study sought to answer the following questions: (1) What are the innovative teaching strategies of science teachers in secondary schools of Sablayan District? (2) What is the profile of the respondents in terms of highest educational attainment, number of years in teaching science, current rank, and number of science trainings attended? (3) What is the level of innovative teaching strategies of science teachers in secondary schools of Sablayan District in terms of blended learning, contextualized and localized teaching, differentiated instruction, game-based teaching strategies, inquiry-based learning, and ICT integration? (4) What is the level of digital literacy of science teachers in secondary schools of Sablayan District? (5) What is the level of adaptation of the science teachers in Secondary

schools of Sablayan District in terms of content standards, performance standards, most essential learning competencies, pedagogical techniques, and assessment? Moreover, (6) Is the level of adaptations of science teachers in Secondary schools of Sablayan District significantly affected by their profile, innovative teaching strategies, and digital literacy level?

Significance of the Study - The result of this study is helpful in the following: Science Teachers—it may serve as a reference or guide for improving their pedagogical practices, helping them become more adaptable and practical in diverse learning environments. To Learners, as science teachers become more adaptive and learner-centered, students are more likely to experience engaging, inclusive, and meaningful learning. To School Administrators, the results will assist principals and department heads in identifying the strengths and needs of their teaching staff. To the DepEd Division Office, this study provides evidence-based insights into the current practices, challenges, and innovations employed by science teachers in secondary schools within the Sablayan District. To DOST-MIMAROPA, this study is also significant because it provides empirical data on current levels of innovation and digital literacy among science educators in secondary schools. To Curriculum Planners and Policy Makers (DepEd), this research provides empirical data to inform decision-making on curriculum enhancement, teaching innovation policies, and professional development frameworks. To Parents, it is advisable to engage them in classroom conferences and ensure that they are kept informed of the student's academic progress. To LGU SABLAYAN, this study holds significance to the Local Government Unit (LGU) as it provides valuable insights into the state of science education within its jurisdiction, particularly in terms of innovation, teacher adaptability, and digital literacy. Lastly, for Future Researchers, this study may serve as a basis or point of comparison for future research in science education, especially studies that focus on pedagogical innovation, post-pandemic teaching, or teacher adaptability.

Scope and Delimitation of the Study - This study is limited to science teachers in public secondary schools within the Sablayan District. It employed a complete enumeration of 45 respondents. The study focused specifically on the relationships among respondents' profiles, including highest educational attainment, years in teaching science, current rank, and the number of science training sessions attended, as well as innovative teaching strategies such as blended learning, contextualized, and localized teaching. Differentiated instruction, game-based learning, inquiry-based learning, ICT integration, digital literacy levels, and their level of adaptations in terms of content, performance standards, Most Essential Learning Competencies, pedagogical techniques, and assessment. Moreover, data collection relied on interviews and survey questions. It involved 45 science teachers from 16 different schools within the Sablayan district. The study employed a combination of qualitative and quantitative methods, including interviews and surveys, to gather data on innovative teaching strategies, teacher profiles, and digital literacy levels of science teachers in public secondary schools, and on how these factors influence their level of adaptation. Data collection was conducted over 60 days, from May to June 2025, allowing ample time for in-depth responses, data validation, and analysis. This mixed-methods approach ensured a comprehensive understanding of the instructional practices and adaptability of science teachers in response to evolving educational demands. This study employed regression analysis rather than Structural Equation Modeling (SEM) due to the limited number of respondents and the use of comprehensive enumeration.

2. Methodology

Research Design - This study employed a mixed sequential exploratory research design, integrating both qualitative and quantitative approaches to obtain a comprehensive understanding of the innovative teaching strategies and adaptation of science teachers in secondary schools of the Sablayan district. The qualitative component uses interviews to determine the innovative teaching strategies of science teachers. The quantitative component measures the levels of digital literacy and the adaptations of science teachers using structured survey questionnaires with Likert-scale items. It also aims to analyze the relationships among teachers' profiles, innovative teaching strategies, levels of digital literacy, and levels of adaptation.

Respondents of the Study - The respondents of this study were the entire population of science teachers in

Sablayan District, totaling 45. Since the population was relatively small and manageable, the researcher employed a complete enumeration technique. This means that all science teachers within the identified schools were included as respondents. Complete enumeration ensures that the study captures a complete set of perspectives and minimizes the risk of sampling bias. By involving the entire population, the researcher obtained more reliable and valid results, particularly when analyzing associations between respondents' profiles and their innovative teaching strategies and levels of adaptation. This approach is consistent with best practices in small-population research, where the feasibility of surveying all members outweighs the limitations of applying a sample-based method.

Research Instrument - This study used both qualitative and quantitative research instruments to gather comprehensive data aligned with a mixed sequential exploratory research design. The instruments were carefully developed to assess the types of innovative teaching strategies used by science educators, their level of digital literacy, and the extent of their adaptations across key instructional areas. In the qualitative phase, an interview question was used to elicit detailed responses on teachers' innovative teaching strategies. The responses from this phase were analyzed to identify recurring themes, from which the six most commonly cited innovative teaching strategies were extracted. For the quantitative phase, the researcher-made questionnaire was composed of four parts. The first part focused on the respondents' profiles. The second part measured the level of the six innovative teaching strategies derived from the qualitative responses. The third part, the digital literacy assessment to evaluate teachers' proficiency and confidence in using digital tools for instruction, communication, content development, and assessment. The fourth measured digital literacy.

The validity of the research instrument was crucial for ensuring the accuracy and consistency of the data collected in this study. To establish the validity of the instrument, validation was employed. The expert comprised five professors from Divine Word College of San Jose. Their feedback ensured that the items effectively measured the intended constructs: the level of adaptation, the digital literacy of science teachers, and the types of innovative teaching strategies. This review process was vital for confirming that the questions were relevant, clear, and comprehensive, thereby accurately capturing the nuances of the teachers' experiences. This approach ensured both the validity of the research instrument and meaningful alignment between qualitative themes and quantitative metrics, yielding reliable and actionable findings. The reliability of the instrument was tested outside the district of Sablayan due to the limited teacher population handling the high school Science subject. Thus, the researcher conducted the reliability through a one-time administration of the questionnaire to 12 Science high school teachers from Sta. Cruz District. They responded to 72 items, comprising 12 indicators. Using the split-half method, the reliability was estimated using the Spearman-Brown correction formula based on equal-length coefficients. The computation yielded the following results in Table 1.

Table 1

Reliability Analysis Results

Item	Reliability Coefficients*	Number of Items	Interpretation
I. Digital Literacy Level	0.861	6	High Reliability
II – Innovative Teaching Strategies			
1. Blended Learning	0.813	6	High Reliability
2. Contextualized and Localized Teaching	0.966	6	Very High Reliability
3. Differentiated Instruction	0.855	6	High Reliability
4. Game-based Teaching	0.960	6	Very High Reliability
5. Inquiry-based Approach	0.873	6	High Reliability
6. ICT Integration	0.778	6	High Reliability
III. Level of Adaptation			
1. Content Standards	0.635	6	Moderate Reliability
2. Performance Standards	0.766	6	High Reliability
3. Most Essential Learning Competency	0.935	6	Very High Reliability
4. Pedagogical Technique	0.910	6	Very High Reliability
5. Assessment	0.959	6	Very High Reliability

Table 1 shows a generally high level of reliability, reflected in the results, with coefficients ranging from 0.766 to 0.966, although one indicator yielded a moderate coefficient of 0.635. Five indicators had the highest indices, ranging from 0.910 to 0.966, reflecting very high reliability, and six indicators had high indices, ranging from

0.766 to 0.873. These results attest to the questionnaire's acceptability, which was then administered to Science high school teachers in Sablayan, Occidental Mindoro.

Data Gathering Procedure - The data-gathering process involved multiple steps for both qualitative and quantitative data collection. Initially, the researcher secured permission from the Secondary School Cluster Heads and school administrators to conduct the study. For the qualitative phase, in-depth interviews were conducted with 10 teachers from Ligaya National High School, Burgos National High School, Sablayan National Comprehensive High School–GEA Extension, Malisbong National High School, and Sablayan National Comprehensive High School–Bonifacia Extension. The interviews were conducted over five days using an online platform. An interview guide was used to ensure consistency across interviews, focusing on the types of innovative teaching strategies used by teachers. Every interview was tape-recorded, transcribed, and analyzed for recurring themes. For the quantitative phase, a researcher-made questionnaire was distributed to 45 science teachers across all secondary schools in the Sablayan District, using complete enumeration. The data were collected personally by the researcher over 7 days. Teachers were informed about the purpose of the study, and their participation was entirely voluntary.

Statistical Treatment of Data - The qualitative data from the interviews with the teacher-respondents underwent thematic analysis: this involved recording, transcription, tabulation, and coding to extract themes. To choose the final themes, the first and last thematic maps were depicted. For the quantitative data, statistical analysis was conducted using SPSS version 26. Weighted means and rankings were computed to assess the levels of teachers' innovative teaching strategies based on the results of the final thematic analysis and the level of adaptations. This statistical approach allowed for an examination of the relationships among respondents' profiles, innovative teaching strategies, levels of digital literacy, and levels of adaptation. This study employed regression analysis instead of Structural Equation Modeling (SEM) due to the limited number of respondents and the use of complete enumeration.

Ethical Considerations - The research adhered to ethical guidelines throughout the study. Permission was obtained from the secondary schools' cluster head and school principals in the Sablayan district to gather data, ensuring transparency in the research process. The purpose and procedures of the study were clearly communicated to the respondents, fostering trust and understanding. Confidentiality was prioritized, with all collected data secured and used exclusively for the study's purpose. Participants were informed of their right to withdraw at any time without consequence. Additionally, the research instrument and findings were presented with academic integrity, following the American Psychological Association (APA) style for citations. The study aimed to contribute positively to the field of education without harming participants or stakeholders.

3. Results and Discussions

Figure 1. Final Thematic Map for Innovative Teaching Strategies

The diagram illustrates the final thematic analysis of innovative teaching strategies as identified from the qualitative data collected in the study. These strategies represent the finalized themes that emerged from a systematic coding process of science teachers' responses. Initially, multiple developing codes were identified, which were then refined and grouped into broader thematic categories based on conceptual similarities and the

frequency with which they appeared in the data. This final diagram synthesizes the core innovative strategies used by science teachers, including Blended Learning, Contextualized and Localized Teaching, Differentiated Instruction, Game-Based Learning, Inquiry-Based Learning, and ICT Integration. In this regard, Reyes and Del Mundo (2023) observed that Science teachers in rural areas of Northern Luzon creatively adapted blended learning by maximizing radio-based instruction and community learning hubs, ensuring that learners without gadgets or stable internet access could still engage in science activities. The Department of Education has supported blended learning through its Basic Education Learning Continuity Plan (BE-LCP), which encourages the use of flexible learning modalities and teacher upskilling. These local findings highlight the flexibility, creativity, and resilience of science teachers in implementing blended learning strategies that are inclusive and responsive to learners' varied needs. Moreover, DepEd Order No. 32, s. 2015 emphasizes the importance of contextualizing and localizing instruction to make lessons more meaningful to learners. In science education, this means connecting scientific concepts to real-life situations, local issues, and community resources. In addition, the study showed that using visual aids, hands-on materials, and small-group instruction helped all students engage more deeply with science topics, particularly physics and environmental science (Pulkkinen & Rautopuro, 2022). Moreover, Corpuz & Manalo (2022) reported that teachers found this method most effective when aligned with clear objectives and followed by structured reflection, as it enhances retention, promotes collaboration, and makes learning more meaningful and enjoyable. In addition, Tan et al. (2021) noted that inquiry-based science teaching significantly enhanced students' understanding of scientific methods and increased their ability to evaluate scientific claims critically. Secondary science teachers were trained to design lessons involving guided and open inquiry activities that mimic real-world problem-solving. Platforms like Google Classroom and LMS tools facilitated blended learning, while interactive tools promoted higher-order thinking and increased student motivation and performance in subjects such as biology and chemistry (Yunus et al., 2021).

Table 2

Science Teachers' Profile in terms of Highest Educational Attainment, Number of Years in Teaching Science, Current Rank, and Number of Science Trainings Attended (n = 45)

Highest Educational Attainment	Frequency	Percent
Bachelor's Degree	39	86.7
Master's Degree	5	11.1
Doctorate Degree	1	2.2
Number of Years in Teaching Science		
1 - 5	11	24.4
6 - 10	18	40.0
11 - 15	7	15.6
16 and above	9	20.0
Current Rank		
Teacher, I	11	24.4
Teacher II	2	4.4
Teacher III	28	62.2
Master Teacher I	3	6.7
Master Teacher II	1	2.2
Number of Trainings Attended in Science		
1 - 2	20	44.4
3 - 4	9	20.0
5 and above	16	35.6
Total	45	100.0

Table 2 presents the science teachers' profiles by highest educational attainment, years of teaching science, current rank, and number of science training sessions attended. The data reveal that a significant majority of science teachers in the study area hold only a Bachelor's degree, with 39 (86.7%) holding one. This indicates that while most teachers meet the minimum academic requirements to teach at the secondary level, opportunities for further academic or professional advancement, such as pursuing a Master's or Doctoral degree, may be limited or underutilized. The small percentage of teachers with graduate degrees at 11.1% and doctorates with 2.2 % implies that advanced educational qualifications are not yet widespread among the teaching force. This may have implications for the implementation of innovative teaching strategies, as teachers with higher academic qualifications often have greater exposure to recent research, advanced pedagogical training, and professional

networks. According to Cabansag (2021), teachers with postgraduate degrees exhibit greater confidence in adapting instruction to diverse learner needs and integrating advanced teaching methods such as differentiated instruction, blended learning, and ICT-based assessment tools. Her study across secondary schools in Region II of the Philippines found that teachers with a Master's or Doctorate were more likely to engage in action research and instructional innovations aligned with the DepEd's learning continuity initiatives. Moreover, in terms of the number of years in teaching science. The data reveal that 18 of 45 science teachers surveyed (40%) have 6 to 10 years of teaching experience. This distribution suggests a relatively youthful and dynamic workforce, with a strong presence of early- to mid-career educators. While early-career teachers often bring fresh ideas and are more open to integrating innovative strategies and digital tools, they may also require additional mentoring and training to develop pedagogical depth and classroom management skills fully. In support of these findings, Ingersoll and Strong (2021) believed that teaching experience positively correlates with increased instructional competence, especially in subject-specific fields such as science. Teachers with more years in the classroom develop more profound content knowledge, stronger classroom management skills, and more effective pedagogical skills, all of which enhance learning outcomes.

In addition, the current rank data show that the majority of science teachers hold the rank of Teacher III, accounting for 28 of 45 respondents (62.2%). The dominance of the Teacher III position suggests that many of the district's science educators have already advanced beyond entry-level ranks, indicating accumulated teaching experience and likely completion of the necessary qualifications. However, the relatively low number of Master Teachers implies that while many teachers are progressing, only a small portion have reached higher levels of career advancement. This distribution may reflect limited opportunities for promotion due to either structural limitations within schools or the demanding prerequisites for becoming a master teacher. These findings are supported by Bautista and Ortega (2020), who found that Teacher III and Master Teacher positions correlate with greater involvement in curriculum development, research initiatives, and school improvement programs. Teachers in higher ranks are more likely to have undergone extensive training and to possess graduate degrees, enhancing their ability to implement differentiated, technology-enhanced, and inquiry-based instruction.

Lastly, in terms of the number of science training courses attended. The data reveal that 20 of 45 respondents (44.4%) have attended only 1 to 2 science-related training sessions. This distribution shows that while all science teachers have undergone some forms of professional development, nearly half have had limited exposure to in-depth or repeated training. On the other hand, over one-third of the teachers have demonstrated a strong commitment to professional growth by participating in five or more training sessions. This finding aligns with the assertion of Guskey (2020) that consistent and targeted professional development significantly improves teaching practices and student achievement when it is sustained, subject-specific, and aligned with teachers' classroom needs. In science education, such training is even more vital due to the rapid evolution of scientific knowledge and the growing emphasis on inquiry-based, experimental, and digital science teaching is finding aligns with the assertion of Guskey (2020), that consistent and targeted professional development significantly improves teaching practices and student achievement when it is sustained, subject-specific, and aligned with teachers' classroom needs. In science education, such training is even more vital due to the rapid evolution of scientific knowledge and the growing emphasis on inquiry-based, experimental, and digital science teaching.

Table 3 presents science teachers' mean level of innovative teaching strategies in terms of blended learning, contextualized and localized teaching, and differentiated instruction. The results show that the science teachers in the study demonstrate a generally high level of blended learning implementation, with an overall weighted mean of 3.84. The data reveal that science teachers in Sablayan District are consistently applying innovative teaching strategies, particularly those that integrate digital and face-to-face instruction. This reflects a strong capability to create hybrid learning environments that engage students in both online and in-person settings. In the Philippines, Mendoza and Silva (2022) reported that science teachers in selected public secondary schools in Metro Manila noted that blending online instruction with modular learning helped maintain instructional continuity while addressing students' limited internet access.

Table 3

Science Teachers' Mean Level of Innovative Teaching Strategies in terms of Blended Learning, Contextualized and Localized Teaching, and Differentiated Instruction

Indicators (Blended Learning)	Mean	Verbal Description
1. I regularly combine face-to-face and online instruction in my science classes.	3.80	High Level
2. I use learning management systems (e.g., Google Classroom, Moodle) to distribute lessons or assignments.	3.56	High Level
3. I adapt learning materials based on the learners' cultural and linguistic backgrounds.	3.87	High Level
4. I involve community resources or local experts in science activities or discussions.	3.84	High Level
5. I design activities that integrate digital and physical classroom experiences.	4.00	High Level
6. I assess students using both online and in-person formats.	3.96	High Level
Composite Mean	3.84	High Level
Indicators (Contextualized and Localized Teaching)		
1. I relate science concepts to real-life experiences of my learners.	4.51	Very High Level
2. I use examples from the local community (e.g., environment, health, culture) when teaching science topics.	4.44	Very High Level
3. I integrate indigenous or traditional knowledge into relevant science lessons when appropriate.	4.09	High Level
4. I involve community resources or local experts in science activities or discussions.	3.91	High Level
5. I encourage students to observe and analyze phenomena within their own locality.	4.16	High Level
6. I modify my instructional strategies to suit the socioeconomic conditions of my students.	4.18	High Level
Composite Mean	4.21	Very High Level
Indicators (Differentiated Instruction)		
1. I modify instructional materials to meet the specific needs of learners with difficulties.	4.16	High Level
2. I provide different levels of tasks or activities to accommodate learners' varying abilities.	4.13	High Level
3. I adjust my teaching strategies based on students' learning styles and preferences.	4.18	High Level
4. I provide different levels of tasks or activities to accommodate learners' varying abilities.	4.02	High Level
5. I integrate both remediation and enrichment activities in my science lessons.	4.04	High Level
6. I group students strategically for peer learning or collaborative work.	4.38	Very High Level
Composite Mean	4.15	High Level

Moreover, the data in contextualized and localized teaching show that science teachers exhibit a very high level of implementation of Contextualized and Localized Teaching strategies, as reflected by a composite mean of 4.21. This indicates that educators are effectively embedding local context, indigenous knowledge, and culturally relevant examples into their science instruction. This suggests a strong commitment among teachers to make science education meaningful and relatable to their students' day-to-day lives. Overall, the high and very high mean scores indicate that contextualization and localization are essential elements of science teaching practices among the surveyed educators. These practices not only enhance the relevance and accessibility of science education but also foster deeper student engagement through culturally responsive teaching. In a similar study, Bautista (2022) examined the practices of junior high school Science teachers in Bukidnon and found that localized instruction increased students' participation and improved their ability to apply science in practical contexts. Teachers designed performance tasks that incorporated local environmental issues, such as deforestation and water pollution, thus fostering environmental awareness. Moreover, Ramos and Dela Cruz (2023) reported that teachers in multicultural communities in Mindanao contextualized lessons to align with students' linguistic and cultural identities, thereby promoting inclusivity and deeper understanding.

While the level of differentiated instruction indicates a high level of implementation among science educators, with a composite mean of 4.15, this suggests that teachers actively adjust their instruction to address students' individual needs, learning styles, and performance levels. These findings affirm that differentiated instruction is well integrated into science classrooms, allowing for inclusive and flexible learning environments. Supporting this, Pulkkinen and Rautopuro (2022) found that science teachers use DI strategies effectively to accommodate students with learning difficulties and language barriers. The study showed that using visual aids, hands-on materials, and small-group instruction helped all students engage more deeply with science topics, particularly physics and environmental science. At the same time, Mngomezulu et al. (2022) emphasized that formative assessments played a crucial role in guiding DI in science. Teachers continuously assessed students' understanding using quizzes, think-pair-share, and concept maps, then adjusted content depth and pacing based on individual learning needs. Similarly, Aquino and Flores (2022) reported that public high school Science teachers in Quezon Province

implemented differentiated instruction by modifying content delivery, assessment strategies, and classroom activities based on learners' readiness and learning profiles.

Table 4

Science Teachers' Mean Level of Innovative Teaching Strategies in terms of Game-Based Teaching Strategies, Inquiry-based Learning, and ICT Integration

Indicators (Game-Based Teaching Strategies)	Mean	Verbal Description
1. I use digital quiz platforms (e.g., Kahoot, Quizzes) to review or assess science lessons.	3.64	High Level
2. I use both digital and offline (manual) games to teach science concepts.	3.93	High Level
3. I design classroom activities that simulate games or challenges.	4.02	High Level
4. I align game-based activities with the science competencies or learning outcomes.	3.80	High Level
5. I use leaderboards or rankings to encourage friendly competition among students.	3.89	High Level
6. I regularly reflect on and improve my game-based activities based on student feedback.	3.78	High Level
Composite Mean	3.84	High Level
Indicators (Inquiry-based Learning)		
1. I provide opportunities for students to collect, analyze, and interpret data.	4.29	Very High Level
2. I promote student autonomy by allowing them to plan or modify investigation procedures.	4.04	High Level
3. I design activities that allow students to investigate and discover concepts on their own.	4.09	High Level
4. I use real-world problems to initiate inquiry in my science lessons.	4.36	Very High Level
5. I guide students in formulating hypotheses and testing them through experiments or observations.	4.20	Very High Level
6. I assess student understanding through performance tasks and inquiry-based outputs.	4.24	Very High Level
Composite Mean	4.20	Very High Level
Indicators (ICT Integration)		
1. I use digital tools (e.g., videos, simulations, virtual labs) to explain science concepts.	4.39	Very High Level
2. I promote student autonomy by allowing them to plan or modify investigation procedures.	4.04	High Level
3. I utilize online assessments or quizzes to evaluate student learning.	3.80	High Level
4. I use digital tools (e.g., videos, simulations, virtual labs) to explain science concepts.	4.29	Very High Level
5. I integrate mobile applications or educational software into classroom instruction.	3.96	High Level
6. I regularly update my teaching methods to include new and relevant technologies.	4.16	High Level
Composite Mean	4.11	High Level

Table 4 presents the mean level of Innovative teaching strategies, including game-based teaching, inquiry-based learning, and ICT integration, for science teachers. The results reveal that science educators demonstrate a high level of implementation of game-based teaching strategies, as reflected by a composite mean of 3.84. This suggests that gamification is being actively employed in science classrooms as a tool to engage students and enjoyably reinforce learning. To support these findings, Fernandez and Dizon (2022) observed that public high school Science teachers in Pampanga reported improved student participation and conceptual understanding when integrating educational games, such as crossword puzzles, science trivia contests, and mobile quiz apps like Quizizz and Kahoot, into their lessons. These games encouraged collaboration, healthy competition, and instant feedback, thereby reinforcing learning objectives. Moreover, the level of inquiry-based learning indicates that science educators demonstrate a very high level of implementation, with a composite mean of 4.20. This reflects the teachers' strong commitment to fostering scientific thinking and active engagement through student-centered inquiry processes. The results emphasize that science educators widely practice inquiry-based learning in the district. These strategies support critical thinking, student agency, and engagement, aligning well with modern science education goals. Teachers are effectively creating environments where learners explore, investigate, and construct knowledge, which is fundamental in developing scientific literacy. To confirm these findings, Tan et al. (2021) found that inquiry-based science teaching significantly enhanced students' understanding of scientific methods. It increased their ability to evaluate scientific claims critically. Secondary science teachers were trained to design lessons involving guided and open inquiry activities that mimic real-world problem-solving. Similarly. Locally, Inquiry-based learning (IBL) has been increasingly adopted by science teachers in the Philippines to develop Students' scientific curiosity, problem-solving abilities, and critical thinking. As emphasized by Corpuz and Manalo (2022), Science teachers in Metro Manila implemented structured and guided inquiry strategies to encourage students to explore scientific concepts through questioning, experimentation, and reflection. Meanwhile,

Santos (2021) examined the practices of junior high school Science teachers in Iloilo. He noted that teachers integrated inquiry by designing experiments and problem-solving tasks aligned with real-life contexts, such as local environmental concerns and health-related topics. This localized inquiry approach helped make science learning more meaningful and relevant.

Lastly, the level of ICT integration shows that science educators demonstrate a high level of implementation of ICT (Information and Communication Technology) Integration strategies, with a composite mean of 4.11. This suggests that teachers are actively leveraging technology to enhance science instruction, promote engagement, and improve assessment processes. In Malaysia, Yunus et al. (2021) found that science teachers who integrated ICT—such as interactive whiteboards, learning management systems (LMS), and digital simulations—fostered higher-order thinking skills and active learning. The use of platforms such as Google Classroom and PhET was associated with improved student motivation and achievement in biology and chemistry. Moreover, in the Philippines, the use of Information and Communication Technologies (ICT) in science teaching has expanded significantly due to the need for remote learning. Tools such as simulations, online laboratories, and learning management systems (LMS) have enabled teachers to continue science instruction beyond the physical classroom (UNESCO, 2021). The integration of Information and Communication Technology (ICT) in science education has increasingly become a focal point for innovation among Filipino educators. In particular, Science teachers have begun adopting various ICT tools to improve instructional delivery, student engagement, and learning outcomes.

Table 5

Science Teachers' Mean Level of Digital Literacy

Indicators	Mean	Verbal Description
1. I am confident in using a learning management system (e.g., Google Classroom, Moodle)	3.89	High Level
2. I can create and share digital instructional materials (e.g., videos, presentations, worksheets).	4.27	Very High Level
3. I am able to use online assessment tools (e.g., Google Forms, Kahoot, Quizizz) effectively.	3.60	High Level
4. I integrate digital resources into my science lessons to enhance learning.	3.98	High Level
5. I can troubleshoot basic technical problems (e.g., file sharing, connectivity, software errors).	3.69	High Level
6. I use a digital tool to communicate or collaborate with students and colleagues.	3.98	High Level
Overall Mean	**3.90**	**High Level**

Scale: 4.20-5.00 Very High Level; 3.40 -4.19 High Level; 2.60-3.39 Moderate Level; 1.80-2.59 Low Level; 1.00-1.79 Very Low Level

Table 5 presents the mean digital literacy level of science teachers. The results show that science teachers in the study demonstrate a generally high level of digital literacy, with an overall weighted mean of 3.90. This indicates that, on average, teachers are confident and competent in using digital tools to support teaching, assessment, communication, and classroom management. Teachers expressed very high confidence in creating and sharing digital instructional materials such as videos, presentations, and worksheets (M = 4.27), highlighting their proficiency in content creation and digital resource development. This suggests that educators are well-equipped to design engaging and interactive materials that support student learning. Overall, these results confirm that science teachers in the district are digitally literate and effectively utilize various digital tools to support instruction. However, opportunities for further development remain—particularly in technical troubleshooting and maximizing the use of assessment technologies. In a study conducted by Alvarado and Reyes (2022), Science teachers in public high schools in Quezon City demonstrated moderate to high levels of digital literacy, particularly in using online learning platforms such as Google Classroom and Microsoft Teams.

However, the same study revealed that while teachers were competent with basic ICT tools, they struggled to create interactive digital content and to use data-driven assessment tools. Similarly, Delos Santos (2021) found that in the Bicol Region, many Science teachers learned to adapt through self-directed learning and peer support, often relying on YouTube tutorials and webinars to build digital competencies. These practices were not merely stopgap measures but represented innovative and resourceful responses to professional development constraints. In the absence of structured training programs, teachers supported one another by sharing digital teaching tips, co-creating lesson materials, and collectively troubleshooting technical challenges. This grassroots approach revealed

the power of peer-led learning communities to enhance educators' adaptability and resilience. It demonstrated that, even without formal institutional support, teachers can successfully integrate technology into their pedagogy by leveraging shared experiences, networked resources, and on-demand learning tools.

Table 6

Science Teachers' Mean Level of Adaptations in terms of Content Standards, Performance Standards, and Most Essential Learning Competencies

Indicators (Content Standards)	Mean	Verbal Description
1. I align my teaching content with the prescribed content standards.	4.58	Very High Level
2. I select appropriate science content to fit the time and modality constraints.	4.60	Very High Level
3. I select content based on the Most Essential Learning Competencies (MELCs).	4.49	Very High Level
4. Incorporate interdisciplinary concepts as outlined in the content standards.	4.58	Very High Level
5. I align my content with available resources and students' access to technology.	4.62	Very High Level
6. I regularly review and revise my lesson content based on students' feedback or performance.	4.67	Very High Level
Composite Mean	**4.59**	**Very High Level**
Indicators (Performance Standards)		
1. I adjust learning activities to meet the set performance standards under remote/blended learning.	4.40	Very High Level
2. I select appropriate science content to fit the time and modality constraints.	4.51	Very High Level
3. I reduce the scope of science topics to focus on core concepts.	4.51	Very High Level
4. I reduce the scope of science topics to focus on core concepts.	4.62	Very High Level
5. I align performance assessments with learners 'available resources and tools.	4.58	Very High Level
6. I provide students with multiple formats or modalities for demonstrating learning (e.g., written, video, oral).	4.62	Very High Level
Composite Mean	**4.54**	**Very High Level**
Indicators (Most Essential Learning Competencies)		
1. I collaborate with colleagues in unpacking and clustering MELCs.	4.44	Very High Level
2. I align my assessment tools to reflect the MELCs.	4.60	Very High Level
3. I modify learning tasks to directly target MELCs.	4.47	Very High Level
4. I ensure students achieve MELCs despite learning limitations.	4.47	Very High Level
5. I provide enrichment activities that extend learning beyond MELCs when possible.	4.56	Very High Level
6. I create or select materials that directly support MELCs.	4.60	Very High Level
Composite Mean	**4.52**	**Very High Level**

Table 6 presents the mean levels of adaptation for science teachers across content standards, performance standards, and the most essential learning competencies. The results reveal that science educators demonstrate a very high level of alignment between instruction and Content Standards, as evidenced by a composite mean of 4.59. This suggests that teachers are highly committed to ensuring that their instructional content aligns with curriculum expectations and is responsive to both contextual and learner-specific factors. Supporting this, Tytler et al. (2022) examined how content standards were revised to balance scientific rigor with accessibility. They found that science teachers appreciated the updated standards that allowed greater flexibility to contextualize content while ensuring conceptual coherence across grade levels. This helped accommodate diverse student populations without compromising quality. Teachers noted that grade-level coherence was preserved through the structured progression of concepts. However, the flexibility in implementation allowed for real-time adjustments—such as simplifying complex terminology for younger learners or integrating culturally relevant examples. This adaptability fostered both engagement and understanding, especially in classrooms with students from diverse linguistic, socioeconomic, and cultural backgrounds.

Moreover, the mean level of adaptation in terms of performance standards indicates that science educators exhibit a very high level of adaptation relative to Performance Standards, with a composite mean of 4.54. This suggests that teachers consistently align their teaching practices with expected learner outcomes, even across varying instructional delivery modes. The results reveal a very high level of adaptation in addressing performance standards, with teachers actively adjusting instruction and assessment methods to support learner success. These

findings emphasized that science educators are not only aware of performance standards but also make strategic adjustments to ensure learners can achieve them. Teachers are assessed not only on content delivery but also on their ability to engage students in higher-order thinking, collaborative lab work, and the integration of local scientific issues. Darling-Hammond et al. (2021) showed that clear and actionable performance standards promote self-reflection and continuous improvement. Science teachers who regularly reviewed their performance with mentors were more likely to innovate their instructional methods. Furthermore, Bautista (2021) found that in Region VI, teachers implemented performance standards by engaging students in community-based scientific investigations, such as water quality testing and waste management projects, which made learning more authentic and aligned with local issues. However, inconsistencies in assessment practices were also reported, with some teachers relying heavily on written tests rather than performance-based assessments.

Furthermore, the level of most essential learning competencies reveals that science educators exhibit a very high level of adaptation in addressing the Most Essential Learning Competencies (MELCs)**,** as indicated by a composite mean of 4.52**.** This suggests a strong commitment to aligning instruction and assessment with essential learning outcomes despite various instructional challenges. Aligning with these findings, Yılmaz and Malone (2020). examined how science teachers prioritized essential learning competencies in low-tech and blended learning setups. Key science MELCs included ecosystem relationships, properties of matter, and energy flow, which were taught using contextual examples and simplified learning packets that were well-aligned with science educators. To support this study, DepEd's emphasis on MELCs demonstrates adaptive teaching practices that promote both mastery and flexibility in science education. In support of this, Montebon's (2024) study explored teachers' perceptions of MELCs in the K–12 curriculum. Findings showed that teachers view MELCs as useful for filtering essential competencies across subject areas and grade levels while ensuring curriculum coherence.

Table 7

Science Teachers' Mean Level of Adaptations in terms of Pedagogical Technique and Assessment

Indicators (Pedagogical Technique)	**Mean**	**Verbal Description**
1. I use innovative strategies suited for online or modular instruction, like blended and flipped classrooms.	4.16	High Level
2. I adapt my teaching style to accommodate learners with varied needs.	4.27	Very High Level
3. I use research-based teaching strategies such as differentiated instructions, inquiry and problem-based, etc.	4.09	High Level
4. I create or adapted digital learning materials for my science classes.	4.18	High Level
5. I integrate digital tools (e.g., simulations, videos, interactive platforms) into my teaching.	4.33	Very High Level
6. I design activities that promote independent learning and critical thinking.	4.27	Very High Level
Composite Mean	4.21	Very High Level
Indicators (Assessment)		
1. I modify assessments to suit online, modular, or blended formats.	4.20	Very High Level
2. I assess collaboration and communication skills during group tasks, even in virtual or hybrid setups.	4.27	Very High Level
3. I provide timely and meaningful feedback to students in the new setup.	4.22	Very High Level
4. I employ performance-based assessments that encourage real-world application of science concepts.	4.29	Very High Level
5. I use higher-order thinking skills questions.	4.33	Very High Level
6. I adjust my assessments to fit the limitations of remote/blended learning.	4.33	Very High Level
Composite Mean	**4.27**	**Very High Level**

Table 7 presents the mean level of adaptation among science teachers in pedagogical techniques and assessment. The findings indicate that science educators exhibit a very high level of adaptation in pedagogical techniques, with a composite mean of 4.21. This reflects their strong commitment to modifying teaching practices in response to evolving educational demands and learner needs. Other indicators—such as creating digital materials, using blended instruction, and applying research-based strategies—also scored high, affirming the use of varied, practical approaches in both online and face-to-face settings. These findings aligned with Choi and Park (2021), who documented the growing use of technology-enhanced tools like virtual labs, augmented reality (AR),

and online collaborative platforms (e.g., Padlet, Google Jamboard). Teachers used these tools not only for content delivery but also for formative assessment and student feedback. Moreover, the mean level of adaptation in assessment indicates that science educators exhibit a very high level of adaptation in pedagogical techniques, with a composite mean of 4.27. This reflects their strong commitment to modifying teaching practices in response to evolving educational demands and learner needs. Overall, the data highlight the exceptional efforts of science teachers to maintain assessment quality and relevance despite shifting instructional modalities. Their adaptability reflects a deep understanding of practical assessment principles and a strong alignment with modern educational standards. The literature supported these findings by providing a broader perspective on how teachers evaluate learning. Kim and Park (2021) studied the integration of digital tools, such as online quizzes, virtual labs, and learning analytics platforms, into science assessment. Teachers reported benefits such as instant feedback, customizable tasks, and progress tracking for students. In addition, Cruz and Evangelista (2022) note that teachers in rural areas of Visayas adapted their assessment strategies to address the challenges of modular and blended learning, relying more on take-home performance tasks, reflective journals, and oral presentations. Teachers also reported difficulties in designing fair and valid assessments due to limited student feedback and inconsistent module completion.

Table 8

Regression Analysis Among Science Teachers' Profiles and Innovative Teaching Strategies, Digital Literacy Level, and Level of Adaptations

Independent Variables	Dependent Variable (Level of Adaptations)	Multiple R	Adjusted R^2	p-value	Interpretation
Contextualized and Localized Teaching	Content Standards	0.593	0.336	0.000	Highly Significant
Inquiry-Based Learning	Performance Standards	0.533	0.267	0.000	Highly Significant
Inquiry-Based Learning				0.007	Significant
Profile: Current Rank	MELC	0.774	0.570	0.003	Significant
Contextualized and Localized Teaching				0.026	Significant
Differentiated Instruction	Pedagogical Technique	0.457	0.190	0.002	Significant
Inquiry-Based Learning	Assessment	0.606	0.353	0.000	Highly Significant
Digital Literacy		0.355	0.106	0.017	Significant

Scale: p-value – The significance level of the regression analysis:

The regression analysis results in Table 8, indicated by the multiple R values, examined the significant effects of the science teachers' profiles and the level of innovative teaching strategies on their levels of adaptation, considering content and performance. Standards, most essential learning competency (MELC), pedagogical technique, and assessment. All statistical results were generated using SPSS version 26. In the succeeding discussions, the p-value of 0.000 indicates a value below 0.0005, since the software prints only three decimal places. Inquiry-based learning, as an innovative strategy, moderately relates to performance standards (R=0.533, p=0.000) and assessment (R=0.606, p=0.000). The relation is highly significant, as evidenced by the p-value of 0.000. The level of adaptation, taking into account performance standards and assessment, is significantly affected by the inquiry-based strategy at 26.7% (R^2=0.267) and 35.3% (R^2=0.353), in that order. Performance standards serve as benchmarks that define the expected levels of student work and teacher performance for specific learning goals.

Another strategy, contextualized and localized teaching, has a highly significant effect on the level of adaptations to content standards, although the regression coefficient is moderate (R=0.533, p=0.000). The adjusted R^2 of 0.336 suggests that 33.6% of the effect on content standards is likely contributed by contextualized and localized teaching. Content standards serve as guidelines that specify what students should know and be able to do at different grade levels within a specific subject. In support of this, Tytler et al. (2022) examined how content standards were revised to balance scientific rigor with accessibility. They found that science teachers appreciated the updated standards that allowed greater flexibility to contextualize content while ensuring conceptual coherence across grade levels. This helped accommodate diverse student populations without compromising quality. Pedagogical technique is affected by differentiated instruction to a moderate degree (R=0.457, p=0.002). An

effective pedagogy considers students' diverse needs and uses a variety of approaches to maximize learning outcomes. Differentiated instruction is well-suited, as it involves tailoring teaching methods to accommodate students' diverse learning needs, interests, and readiness levels. In terms of the most essential learning competency, the combined contributions of inquiry-based learning (p=0.007), teachers' rank (p=0.003), and contextualized and localized teaching (p=0.026) have emerged, yielding a high multiple R of 0.774. This combined contribution also represents a significant 57% effect on the most important skills and knowledge that students need to acquire at each grade level. These competencies are crucial for future learning and success, and they help educators focus on what truly matters in the curriculum.

Table 9

Professional Development Plan for Science Teachers: Integrating Innovative Teaching Strategies for Enhanced Student Learning

Components Innovative Teaching Strategies	Objectives	Activities/ Strategies	Timeline	Expected Outcome	Assessment/ Evaluation
Contextualized and Localized Teaching	To equip teachers in designing and implementing contextualized and localized teaching approaches.	Workshop on Contextualized and Localized Teaching	September 2025	Increased use of Contextualized and Localized Teaching in the classroom.	Lesson plan review, Classroom observation
Differentiated Instruction	To capacitate teachers in implementing differentiated instruction effectively in diverse classrooms.	Focused Group Discussion/ Workshop	October 2025	Effective implementation of Differentiated Instruction in the classroom.	Lesson plan review, Classroom observation
Inquiry-Based Learning	Enhance teachers' capability in using Inquiry-Based Learning.	Coaching and Mentoring/ Workshop	November 2025	Impactful use of Inquiry-Based lessons inside the classroom.	Lesson plan review, Classroom observation

4. Conclusions

Based on the summary of the findings presented, the following conclusions are drawn: Science educators in the secondary schools of Sablayan District actively apply a range of innovative teaching strategies, including blended learning, contextualized and localized teaching, differentiated instruction, game-based teaching, inquiry-based learning, and ICT tools. They respond effectively to learners' varied needs and the evolving demands of science education. Regarding the respondents' profiles, the data show that most hold only a bachelor's degree, indicating they meet the minimum qualifications but may have limited opportunities for further academic and professional growth. Most of the respondents are in the early to mid-stages of their careers, with over half having 10 years or less of teaching experience. This suggests a relatively young workforce with growth potential but also sees a need for continued professional development and mentorship. The dominance of the Teacher III position suggests that many of the district's science educators have already advanced beyond entry-level ranks, indicating accumulated teaching experience and likely completion of the necessary qualifications or training for promotion. However, the relatively low number of Master Teachers implies that while many teachers are progressing, only a small portion have reached higher levels of career advancement. The data indicate that while all science teachers have participated in professional development, nearly half have had limited exposure, attending only 1 to 2 science-related trainings. This highlights the need for more frequent and sustained training to deepen instructional expertise and support continuous improvement. The respondents demonstrate a generally high level of blended learning. Implementation: This indicates that, on average, teachers are confident and competent in using digital tools to support teaching, assessment, communication, and classroom management. The respondents demonstrate a generally high level of implementation of contextualized and localized teaching strategies. This suggests that teachers consistently incorporate local experiences, cultural relevance, and real-world applications into science lessons.

The level of innovative teaching strategies in differentiated instruction was generally high, reflecting teachers' strong commitment to meeting diverse learner needs through varied approaches. The level of innovative teaching

strategies in game-based teaching was interpreted as high, suggesting that they are practiced but may be less prioritized due to challenges such as time, training, or resource limitations. A very high level of implementing inquiry-based learning was rated, indicating that teachers are actively fostering critical thinking, problem-solving, and scientific inquiry among students. The respondents demonstrate a generally high level of ICT integration, indicating consistent use of technology in instruction. However, the results suggest a need to enhance teachers' digital skills further and improve access to technological resources. Science teachers in the Sablayan District possess a generally high level of digital literacy, with particular strength in creating and sharing digital instructional materials. Teachers demonstrated strong competence in integrating digital tools into their lessons, communicating and collaborating through digital platforms, and enhancing science instruction online.

The level of adaptation of the respondents in terms of content standards demonstrates a very high level of adaptation in terms of aligning instruction with Content Standards. This suggests that teachers are highly committed to ensuring that their instructional content aligns with curriculum expectations and is responsive to both contextual and learner-specific factors. The respondents exhibit a very high level of adaptation to Performance Standards, suggesting that they consistently align their teaching practices with expected learner outcomes, even amid varying instructional delivery modes. The respondents demonstrate a very high level of adaptation to the Most Essential Learning Competencies (MELCs), reflecting their strong commitment to aligning instruction and assessment with key learning outcomes despite instructional challenges. The respondents exhibit a very high level of adaptation in pedagogical techniques, reflecting their strong commitment to modifying teaching practices in response to evolving educational demands and learner needs. Findings indicate that respondents exhibit very little pedagogical knowledge. This reflects their strong commitment to modifying teaching practices in response to evolving educational demands and learner needs. The district was significantly affected by its profile, particularly current rank, innovative teaching strategies, and digital literacy level. The professional development plan seeks to enhance teachers' instructional capacity in employing innovative teaching strategies—particularly contextualized and localized teaching, differentiated instruction, and inquiry-based learning—and to strengthen their adaptability, ultimately improving the quality of science education in the secondary schools of the Sablayan District.

4.1 Recommendations

Based on the findings and conclusions presented, the following recommendations are stated for further development: School heads and master teachers are encouraged to provide strong instructional leadership by supporting continuous professional development, mentoring, and resource allocation that promote innovative teaching strategies. School heads and human resources may facilitate access to graduate studies for the continuous growth and development of teachers. School heads and Human Resources may encourage and support science teachers in pursuing a higher career position by offering clear promotion pathways, mentorship, and access to advanced training and graduate studies. DepEd Occidental Mindoro, in collaboration with the LGU, may increase the frequency and accessibility of science-related professional development programs to ensure all teachers receive sustained, in-depth training that enhances their instructional skills and keeps them up to date with the latest developments in scientific teaching. The level of innovative teaching strategies in terms of blended learning, contextualized and localized teaching, differentiated instruction, game-based teaching strategies, ICT integration, and inquiry-based education. The Curriculum Implementation Division may provide targeted training and support to enhance teachers' blended learning practices. Administrators, master teachers, and school heads may strengthen support for contextualized and localized teaching by developing resources and providing continuous training to sustain its very high implementation level. School heads may incorporate game-based teaching strategies into LAC sessions and in-service training for teachers. The human resource office may provide targeted training and resources to enhance inquiry-based learning practice, addressing barriers and promoting wider implementation in science classrooms. The Schools Division office and school administrators may strengthen digital literacy programs and ensure equitable access to technological tools to support more effective and advanced ICT integration in science teaching. School heads are encouraged to provide regular hands-on training, allocate time for peer mentoring, and fund to ensure the availability of necessary digital resources. Curriculum planners are

encouraged to continue supporting and reinforcing alignment with content standards by providing clear guidelines, exemplar lesson plans, and localized curriculum materials that address diverse learner needs and contextual realities. Curriculum planners may enhance support for performance standards implementation by using flexible assessment tools and teaching guides that align with diverse delivery modes, ensuring consistent learner outcomes across various contexts. The Curriculum Implementation Division, School heads, and master teachers are encouraged to provide continuous support and clear guidance in contextualizing MELCs to ensure that science teachers can sustain effective instruction and assessment practices, even in diverse or constrained learning environments. The Curriculum Implementation Division, School heads, and master teachers may continue to support adaptive pedagogy by integrating training modules on innovative teaching methods and encouraging the use of flexible instructional models tailored to diverse learning environments. Curriculum implementers and school leaders may continue supporting teachers with targeted training on flexible, performance-based, and technology-integrated assessment strategies to maintain and further enhance their adaptability in diverse learning environments. The Curriculum Implementation Division, School administrators, and Human Resources are encouraged to implement professional development plan initiatives aligned with science teachers' current ranks, promote innovative teaching strategies, and enhance digital literacy to improve their level of adaptation. School heads and Human Resources may implement targeted professional development and career growth opportunities based on teacher rank and need. The Curriculum Implementation Division (CID) may develop focused training, contextualized and localized teaching, differentiated instruction, game-based teaching strategies, inquiry-based learning, and ICT integration, ensuring improved instructional quality and relevance. School heads and ICT experts may conduct advanced training on emerging educational technologies and innovative digital pedagogy. This will help sustain and elevate their ability to create, share, and integrate digital instructional materials to enrich science teaching and learning. School heads and administrators are encouraged to implement the proposed professional development plan to enhance teachers' instructional capacity in employing innovative teaching strategies—particularly in contextualized and localized teaching, differentiated instruction, and inquiry-based learning—and to strengthen their level of adaptation, ultimately improving the quality of science education in the secondary schools of the Sablayan District. Future researchers may explore the long-term impact of innovative teaching strategies on student performance and engagement or conduct comparative studies across different regions or subject areas to identify broader trends and contextual differences in teacher adaptations.

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