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Professional Development Skills, Innovative Skills and Pedagogical Competence of Secondary Science Teachers in the Division of Aklan: Basis for Teacher's Teaching Skills Improvement Program

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Abstract

This mixed method research using the explanatory sequential research design for quantitative method and followed by focus group discussion for qualitative method was employed and conducted to determine the Professional Development Skills, Innovative Skills and Pedagogical Competence of Secondary Science Teachers in the Division of Aklan as Basis for a Teacher's Teaching Skills Improvement Program for school year 2024-2025. The participants of the study were the 209 out of total population of 465 secondary Science teachers and 9 secondary Science teachers as discussants in the focus group discussion. The results revealed that Secondary Science teachers in Aklan have high levels of professional development and innovative skills, with very high pedagogical competence overall. Significant differences were observed in pedagogical competence based on levels of professional development and innovative skills. Additionally, there were significant relationships between professional development skills, innovative skills, and pedagogical competence. However, professional development skills did not significantly predict pedagogical competence, whereas innovative skills did. These findings highlight the importance of innovative skills in enhancing teaching effectiveness among these educators. Through Teacher's Teaching Skills Improvement Program for Science Teachers, this initiative is a professional initiative designed to enhance professional development skills, innovative skills and pedagogical competence of secondary Science teachers. This program equips educators with innovative teaching techniques, the integration of technology, and up-to-date methodologies to foster interactive and effective Science learning. Through workshops, peer collaborations, and hands-on activities, they aim to improve teacher confidence, student engagement, and overall academic performance in Science education.

Keywords: Professional development Skills, Innovative Skills, Pedagogical Competence, Teaching Skills Improvement Program

Introduction

Science teachers embody a rich tapestry of professional development, innovative skills, and pedagogical competence. These educators stand at the forefront of fostering intellectual curiosity and scientific literacy among the region's youth. Through continuous professional development initiatives, they sharpen their skills and stay abreast of evolving educational practices and scientific advancements. This commitment to growth not only enhances their teaching effectiveness but also enriches the learning experiences of their students.

As guardians of scientific knowledge and mentors to future scientists, secondary science teachers in Aklan's Division not only impart subject matter expertise but also instill a passion for lifelong learning and a commitment to excellence. Their multifaceted approach in education encourages students to engage deeply with scientific concepts, fostering critical thinking and problem-solving skills. By creating an environment that values inquiry and exploration, these teachers inspire learners to pursue their interests in science beyond the four corners of the classroom.

Science teachers in the Philippines are increasingly recognizing the necessity of professional development skills tailored for online teaching, information technology, and research. This shift is largely driven by the growing integration of technology in educational practices and the heightened emphasis on research-supported teaching methodologies.

Science teachers in the Philippines need professional development skills for online teaching, understanding information technology, and conducting research. This change is likely due to the greater use of technology in education and the increasing importance placed on teaching practices supported by research.

Addressing these research gaps is crucial for developing a comprehensive understanding of how professional development skills, innovative skills, and pedagogical competence can be effectively integrated and enhanced among secondary science teachers. By focusing on the interplay between these skills, the contextual factors influencing their development, and their practical implementation in diverse educational settings, future research can provide the foundation for effective Teacher's Teaching Skills Improvement Programs. These programs will not only improve teaching quality but also positively impact student learning outcomes in science education.

Literature Review

Professional Development Skills of Science Teachers

Science teachers in the Philippines need professional development skills for online teaching, understanding information technology, and conducting research. This change is likely due to the greater use of technology in education and the increasing importance placed on teaching practices supported by research. Science teachers need training and assistance to use online teaching tools effectively, improve their understanding of technology, and develop research skills to enhance their teaching methods (Chin et al., 2022).

Innovative Skills of Science Teachers

Curricula that actively involve students in STEM promote instructional strategies that encourage invention and the innovative skills of teachers. This method necessitates those students utilize their science and math knowledge to tackle engineering challenges with technology. They are required to demonstrate their comprehension of STEM subjects in real-world, work-based scenarios. To facilitate this, teachers must offer standards-based STEM programs equipped with innovative instructional tools. Integrating technology into the classroom's culture, curriculum, teaching strategies, and daily activities is crucial for enhancing learning and making it more relevant (Kennedy & Odell, 2014).

Pedagogical Competence of Science Teachers

The study by Namoco and Zarahudin (2021) emphasized that teachers' pedagogical competence, particularly their beliefs about teaching methods, play a crucial role in their decisions to adopt, select, and utilize various assessment tools. Examining this process through different theoretical frameworks can offer valuable insights into how educators incorporate assessment practices into their teaching and learning activities. Future research could delve into specific technological tools integrated into training programs, providing information that could shape the development of effective teaching methods and strategies in line with teachers' pedagogical beliefs. Such studies should not only rely on qualitative approaches that explore educators' experiences and perspectives but also incorporate quantitative methods to thoroughly understand the impact of technology on teachers' pedagogical beliefs related to assessment practices.

Teacher's Teaching Skills Program in Science

Teachers often hesitate to teach integrated science due to their non-linear backgrounds in science, a lack of mastery in scientific concepts, and the limited availability of integrated science teaching materials. There is a pressing need for a teacher's teaching skills program in science to support professional development aimed at enhancing their competencies in integrated science instruction, strengthening their understanding of scientific disciplines, and reinforcing the concept of scientific literacy, ultimately better preparing students (Rubini et al., 2019).

Methodology

A mixed-methods research design was used in this study. An explanatory sequential research design for the quantitative method and a focus group discussion for the qualitative method was employed to determine the level of professional development skills, innovative skills and pedagogical competence of secondary science teachers in the Division of Aklan with an output of teacher's teaching skills improvement program. The research utilized a structured questionnaire to gather quantitative data, which was followed by qualitative interviews to validate and expand on the survey findings.

The participants of this study were the 209 from the total population of 465 secondary Science teachers in the Division of Aklan in the school year 2024-2025. Stratified random sampling was done by drawing a sample from the population and then drawing separate random sampling from each stratum (Sullivan, 2008).

Stratified proportional random sampling was employed in determining the required number of secondary Science teachers, while the total number of participants were determined using Taro-Yamane formula. The proportional allocation was used to get the appropriate sample size from various groups or classes of the population involved in the study.

Data collection was carried out through distribution of questionnaires both personally and via Google Forms, allowing participants flexibility in responding. Participants were informed about the voluntary nature of their involvement and the confidentiality of their data, in compliance with the Data Privacy Act of 2012. The questionnaire consisted of four sections: demographic information, Professional Development Skills, Innovative Skills, Pedagogical Competence and an acceptability scale based on a 5-point Likert scale researcher made questionnaire.

The collected data were analyzed using SPSS. For qualitative data, a focus group discussion was conducted with nine (9) Science teachers via Microsoft Teams, moderated by a facilitator. The discussion was recorded and transcribed

to derive meaningful interpretations. All data collected were used solely for the study's purposes, ensuring participant confidentiality and ethical research practices.

Results

Teacher's Profile

In the study, the teachers were surveyed on their profile specifically age, gender, marital status, educational attainment and position. The purpose of the profiling was to collect the key demographic information of the respondents.

Profile	f	%
Sex		
Male	39	18.7
Female	170	81.3
Age		
20-35 yrs old	123	58.9
36-50 yrs old	84	40.2
51-65 yrs old	2	1
Marital Status		
Single	55	26.3
Married	154	73.7
Education		
Bachelor's degree	36	17.2
With MA units	108	51.7
Master's degree	52	24.9
With Doctorate units	12	5.7
Doctorate degree	1	0.5
Position		
Teacher I	79	37.8
Teacher II	34	16.3
Teacher III	81	38.8
Master Teacher I	8	3.8
Master Teacher II	7	3.3
Total	**209**	**100**

The demographic profile of 209 public secondary Science teachers in Aklan reveals that of the 209 public secondary Science teachers in the Schools Division of Aklan in terms of sex, 39 (18.70%) of them were male and 170 (81.30%) were female. In terms of age, 123 (58.9%) were 20-35 years old, 84 (40.20%) were 36-50 years old and 2 (1.00%) were 51-65 years. Old. In terms of marital status, 55 (26.30%) were single, 141 (67.50%) were married and 13 (6.22%) were widowed. In terms of education, 36 (17.20%) were bachelor's degree, 108 (51.70%) were with MA units, 52 (24.90%) were master's degree, 12 (5.7) with doctorate units, and 1 (0.50) were doctorate degree. In terms of position, 79 (37.8%) were teacher I, 34 (16.30%) were teacher II, 81 (38.80%) were teacher III, 8 (3.80%) were master teacher I, and 7 (3.30%) were master teacher II. In terms of length of service, 28 (13.40%) were 5

years and below, 59 (28.20%) were 6-10 years, 69 (33.00%) were 11-15 years and 53 (25.40%) were 16 years and above.

Table 2. Professional Development Skills of Secondary Science Teachers

Variable	Mean	Description	SD
Professional Development Skills	4.00	High	0.40
Participation on Professional Development Activities	3.93	High	0.51
Extent and Reasons of Participation	4.07	High	0.49

Table 2 shows the result that the level of professional development skills of secondary science teachers in is "High" (M = 4.00, SD = 0.40) as a whole, and in terms of participation on professional development activities (M = 3.93, SD = 0.51) is "High", extent and reasons of participation (M = 4.07, SD = 0.49) is "High". The high level of professional development skills among secondary science teachers demonstrates their strong dedication in improving their teaching abilities and staying up to date with current science education practices. These teachers regularly attend workshops, seminars, and online courses to learn new teaching methods and to better understand the science curriculum. Zhang et al. (2015), which revealed that teachers sought professional development skills for diverse reasons, including personal growth, student needs, and adapting to curricular changes.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about professional development skills. They confirmed and supported the findings of this study.

As stated by Discussant 1*:*
I can rate myself four, because we aim to develop ourselves and so as much as possible, I make myself available to attend trainings initiated by the division. However, there are times due to personal reasons, such as having a child, which makes it challenging to attend trainings.

Furthermore, Discussant 2 said that:
I also rate four, for several reasons. One significant factor is that I sometimes cannot attend professional development programs offered by the Department of Education (DepEd), even though I try to participate. This lack of attendance represents an area for improvement in my professional growth.

The high level of professional development skills in terms of participation in professional development activities among secondary science teachers implies that their dedication to enhancing their skills and effectiveness in science education. This high participation shows that teachers are not only attending relevant training sessions, workshops, and seminars but also actively applying what they learn to improve their teaching. Science teachers believe that professional development boosts their teaching effectiveness, enhances their understanding of the science curriculum, and helps them use technology effectively in their lessons.

The results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about professional development skills in terms of participation in professional development activities. They confirmed and supported the findings of this study.

As stated by Discussant 4:
In terms of participation, I would rate it a five because I believe that all teachers are willing to engage in professional development opportunities. However, there are circumstances that may prevent them from attending. The willingness to participate is evident among teachers, and I believe that for us to improve our professional development, we must all be open to training. While various factors may hinder a teacher's attendance at specific sessions, the overall readiness to attend training and seminars for professional growth is certainly present.

The results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about professional development skills in terms of extent and reasons of participation. They confirmed and supported the findings of this study.

As stated by Discussant 7:
It would rate it 5 because, in every activity designed for science teachers in our division, we are eager to participate if given the opportunity. Our division offers various programs and activities that encourage all of us to engage. Our EPS in Science is very proactive in providing training and workshops that enhance our teaching skills. However,

participation from some teachers is often limited. Sometimes the district coordinator, attends these training and they will ensure that the information is reechoed to the other teachers.

In addition, Discussant 9 said that:
I think it is also five, because everyone seems willing to participate in these training sessions. These opportunities allow us to gain valuable insights, knowledge, and skills that significantly enhance our professional development as teachers.

The high level of professional development skills in terms of extent and reasons of participation among secondary science teachers, demonstrates their strong commitment to continuously improving and advancing in their careers. These teachers actively seek out opportunities to develop their skills, whether through online courses, webinars, mentoring, or collaborations with colleagues. They recognize the importance of professional development for their long-term success and make it a priority to stay updated with new instructional strategies and advancements in science education. Science teachers are motivated to participate in professional skills development not only to enhance their teaching practices but also to advance their careers.

Table 3. Innovative Skills of Secondary Science Teachers

Variable	Mean	Description	SD
Innovative Skills	3.95	High	0.43
Environmental Innovativeness	3.97	High	0.40
Personal Innovativeness	3.91	High	0.57

Table 3 shows the result of the level of innovative skills of secondary science teachers in the Division of Aklan is "High" (M = 3.95, SD = 0.43) as a whole and in terms of environmental innovativeness (M = 3.97, SD = 0.40) is "High", and personal innovativeness (M = 3.91, SD = 0.57) is "High". The high level of innovative skills among secondary science teachers implies that most of secondary science teachers frequently incorporate hands-on experiments, project-based learning, and real-world applications into their lessons, making science more engaging and relevant for students. They adapt their teaching methods to address diverse learning styles, promote critical thinking and problem-solving, and encourage students to take an active role in their own learning. In addition, these teachers are proactive in staying updated with the latest research and innovations in science education. The results of the study supported the investigation of Kwangmuang et al. (2021), which stated that students' higher-order thinking skills significantly improved after experiencing the innovative skills introduced by their teachers.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about innovative skills. They confirmed and supported the findings of this study.

According to Discussant 1:
For innovative skills, I rate myself four. While some teachers tend to be traditional, it is important to practice innovativeness in school. However, there are times when certain topics require alternative methods of presentation. We are doing our best to be innovative and to share this skill with our students.

Also, Discussant 2 said that:
Sometimes we just don't notice that we are using innovative skills in our lesson, like the inquiry-based, critical thinking, and project-based learning are ways of innovative teaching, it is just sometimes we are unaware. Innovation can be in any part of our lesson.

The high level of innovative skills in terms of environmental innovativeness secondary Science teachers implies a strong commitment to making science education dynamic, engaging, and relevant for students. Most of science teachers regularly incorporate hands-on experiments and demonstrations, encouraging students to explore and investigate through project-based learning. They make effective use of technology, such as simulations and virtual labs, to bring scientific concepts to life and provide students with interactive learning experiences.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about innovative skills in terms of environmental innovativeness. They confirmed and supported the findings of this study.

According to Discussant 4:
Since we are science teachers, I believe we have a heightened awareness of our environmental innovativeness. This is evident through our embrace of innovative teaching methods, our engagement in continuous professional

development, and our integration of environmental themes into our curricula. We understand the implications of our actions and possess the knowledge necessary to educate our students, applying this understanding not only in the classroom but also in various contexts outside of it.

Also, Discussant 5 said that:
I believe one of the key characteristics of being a teacher is resourcefulness. When we relate this to environmental innovativeness, it means utilizing the available resources from our environment to enhance our teaching. By making use of these resources, we can help learners understand concepts more effectively.

The high level of innovative skills in terms of personal innovativeness observed among secondary science teachers a strong willingness to embrace and implement unconventional ideas, technologies, and creative solutions in their teaching practices. These teachers are not only open to experimenting with innovative teaching strategies but actively seek opportunities to enhance their instructional methods to improve student learning outcomes. Their flexibility in adapting to changes and incorporating new technologies shows a readiness to evolve with the ever-changing educational landscape. Additionally, their engagement with online resources, digital tools, and collaboration with colleagues reflects a commitment to enhancing their teaching practices through continuous professional development and knowledge-sharing.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about innovative skills in terms of environmental innovativeness. They confirmed and supported the findings of this study.

According to Discussant 7:
It is highly evident that teachers innovate even in simple ways in our classrooms. We find various ways to incorporate innovative practices, that is why science teachers in the Division of Aklan are particularly notable for their efforts.

Also, Discussant 8 said that:
I also agree that the innovative skills of secondary science teachers in Aklan are highly evident. This is because we think of creative ways to make our discussions more engaging and to impart our lessons clearly in the minds of our learners.

The result was affirmed by the study of Jong et al. (2014), which stated that the innovative skills by investigating the Go-Lab federation, which provides access to virtual labs (simulations), remote labs (real equipment accessible remotely), and data sets from physical lab experiments, collectively known as "online labs," for broad educational use. This platform supports inquiry-based learning, enabling students to develop deep conceptual knowledge and inquiry skills while fostering interest in science careers. Teachers can enhance their innovative skills by creating and customizing inquiry learning sequences and guidance through a simple wiki-like interface, incorporating scaffolds and tools with a drag-and-drop feature.

Table 4. Pedagogical Competence of Secondary Science Teachers

Variable	Mean	Description	SD
Pedagogical Competence	4.26	Very high	0.33
Content Knowledge	4.33	Very high	0.43
Teaching Skills	4.27	Very high	0.28
Classroom Management	4.24	Very high	0.50

Table 4 shows the result that the level of pedagogical competence of secondary science teachers in the Division of Aklan is "Very High" (M = 4.26, SD = 0.33) as a whole and in terms of content knowledge (M = 4.33, SD = 0.43) is "Very High", teaching skills (M = 4.27, SD = 0.28) is "Very High", and classroom management (M = 4.24, SD = 0.50) is "Very High".

The "Very High" level of pedagogical competence among secondary science teachers implies their exceptional abilities across various dimensions of teaching. This competence is demonstrated in their strong grasp of both content knowledge and teaching practices, which enables them to effectively teach and inspire students. The study's findings supported the investigation done by Namoco and Zarahudin (2021) emphasized that teachers' pedagogical competence, particularly their beliefs about teaching methods, play a crucial role in their decisions to adopt, select, and utilize various assessment tools. Examining this process through different theoretical frameworks can offer valuable insights into how educators incorporate assessment practices into their teaching and learning activities.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about pedagogical competence. They confirmed and supported the findings of this study.

Discussant 1 stated that:
I will rate my level of pedagogical competence as a science teacher at 4, It's because I know that knowledge and skills, and even attitude that needs to be cultivated. But since I am already on my 10th year in DepEd I have gathered enough experience and knowledge even based on rating by my other peers and my head. But I know, I need to learn more.

Also, Discussant 3 said that:
I think four because, I believe that in every school year you adjust yourself to new students then therefore you are going to apply also different teaching strategy. If I master the strategy for this type of student it might not be applicable to the other one, so meaning to say we must be flexible. So, I rate myself four because there is always this thing that we call adjustment. We cannot say that it is perfect because every time you meet new students, you adjust yourself to it. But we are trying our best to teach them well.

The "Very High" level of pedagogical competence among secondary science teachers in terms of content knowledge by secondary science teachers highlights their profound mastery of both the subject matter and the effective delivery of science education. Almost of Science teachers consistently utilize relevant instructional teaching techniques, ensuring that their lessons are both informative and engaging. Their understanding of the interdisciplinary nature of science allows them to connect concepts across various scientific fields and other subjects, providing students with a holistic learning experience.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about pedagogical competence in terms of teaching skills. They confirmed and supported the findings of this study.

Discussant 7 stated that:
I believe that the teaching skills of science teachers here in the Division of Aklan are highly evident because we are given opportunities to attend training sessions related to teaching skills and strategies that we can employ effectively.

In addition, Discussant 8 said:
I agree that, as educators specialized in science, we are well-aligned in our approach. The training we receive is tailored to our context, which enables us to implement strategies that facilitate effective learning.

The "Very High" level of pedagogical competence among secondary science teachers in terms of classroom management reflects their exceptional ability to create and maintain an effective and supportive learning environment. Almost of the teachers established clear expectations and rules for behavior, ensuring that students understand what is required of them and promoting a sense of discipline and responsibility.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about pedagogical competence in terms of classroom management. They confirmed and supported the findings of this study.

Discussant 1 stated that:
I think 4. As facilitators of learning, we must know how to manage our classrooms effectively. Since we are dealing with diverse learners, it is essential to ensure that each student receives equal attention.

In addition, Discussant 2 said:
I think my classroom management skills is also four. Each year, we work with different students, and we discover unique qualities in each of them, which means there is no one-size-fits-all approach. However, we ensure that we maintain order, respect, and an engaging environment for all learners.

The study's findings supported the investigation done by Namoco and Zarahudin (2021) emphasized that teachers' pedagogical competence, particularly their beliefs about teaching methods, play a crucial role in their decisions to adopt, select, and utilize various assessment tools. Examining this process through different theoretical frameworks can offer valuable insights into how educators incorporate assessment practices into their teaching and learning activities

Table 5. Relationship among Professional Development Skills, Innovative Skills and Pedagogical Competence of Science Teachers

Variables	r	Sig
Professional Development Skills and Innovative Skills	0.836*	0.000
Professional Development Skills and Pedagogical Competence	0.674*	0.000
Innovative Skills and Pedagogical Competence	0.811*	0.000

Table 5 shows the result of the Pearson r among professional development skills, innovative skills, and pedagogical competence of science teachers in the Division of Aklan. As can be seen from the data in the table, there is a significant relationship between professional development skills and innovative skills, r= 0.836*, p > 0.000; between professional development skills and pedagogical competence, r= 0.674*, p > 0.000, and between innovative skills and pedagogical competence, r= 0.811*, p > 0.000. The results indicate that there is a significant relationship between professional development skills and innovative skills of science teachers. This clearly implies the importance of continuous training and learning in improving creativity and effective teaching practices. Professional development skills equip teachers with new pedagogical strategies, up-to-date scientific knowledge, and an understanding of current educational trends, all of which directly enhance their ability to innovate in the classroom. The findings supported the study of Darling-Hammond et al. (2020), who observed that professional development initiatives focusing on innovation directly impact teachers' pedagogical competence. It highlighted that science teachers who continuously develop their skills and embrace innovative practices exhibit greater effectiveness in facilitating student-centered learning environments.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about the difference in the pedagogical competence among the levels of professional development skills that they possessed. They confirmed the findings of this study.

As stated, Discussant 3 that:
The pedagogical competence of a science teacher if enhanced would also reflect on his or her professional development skills. The way you appreciate teaching more then you will be able to improve your teaching skills. I believe if you have that heart in your if you have that heart for teaching, you will do your best gaining all the knowledge you will try your best to perform well and be able to enhance your teaching skills.

Furthermore, Discussant 4 said:
To have a successful teaching career, you need to both possess both skills pedagogical and professional. So as a teacher, if you want to be better you need to professional development upgrade.

The study's findings were supported by Desimone (2019), who emphasized that professional development directly influences teachers' ability to implement effective pedagogical strategies, suggesting that teachers with higher levels of professional development exhibit more advanced pedagogical competencies. This aligns with findings by Villegas-Reimers (2003), who reported that targeted professional development programs significantly improve instructional practices and student engagement.

Table 6. Pedagogical Competence Between Professional Development Skills and Innovative Skills of Science Teachers

	Unstandardized Coefficients	Standardized Coefficients		
Variables	**B**	**Beta**	**t**	**Sig.**
(Constant)	1.806		13.199	0.000
Professional Development Skills	-0.011	-0.013	(-)0.18^{ns}	0.857
Innovative Skills	0.633	0.822	11.08*	0.000

Table 6 shows the result that professional development skills is no a significant predictor of pedagogical competence t = (-)0.18^{ns}, p < 0.857. While, Innovative skills is a significant predictor of pedagogical competence t = 911.08**, p < 0.000 among secondary science teachers. The result showed that there is no significant predictor of pedagogical competence between professional development skills among secondary science teachers in the Division of Aklan. This implies that the professional development skills being offered may not be adequately influencing teachers' ability or not the sole determent predictor to improve their pedagogical competence.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about the difference in the pedagogical competence among the levels of innovative skills that they possessed. They confirmed the findings of this study.

As stated by Discussant 6:
I believe so because if you have that confidence that pedagogical skill you will be able to plan your lessons well, integrate learning styles that will make learners easy to understand the lesson, make them interact with you. You will also look for other means that will make them easily understand your lesson and that's where the innovativeness of a science teacher comes from. So, I believe they go together with the logical competence and innovative skills.

Moreover, Discussant 8 added:
I agree that a high level of pedagogical competence, which stems from our specialization, training, and experience, makes it easier to innovate in our teaching practices. When we have mastered not only our subject matter but also the context in which we teach and the needs of our students, we are better equipped to implement new ideas and strategies effectively.

This study's findings support (Mahajan, 2022), which stated that teachers with advanced innovative skills are more likely to implement student-centered approaches, effectively engaging learners in active inquiry and critical thinking. This finding underscores the link between innovation and the ability to design meaningful learning experiences.

Table 7. Relationship among Professional Development Skills, Innovative Skills and Pedagogical Competence of Science Teachers in the Division of Aklan

Variables	r	Sig
Professional Development Skills and Innovative Skills	0.836*	0.000
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There is a significant relationship between professional development skills and innovative skills of science teachers in the Division of Aklan. This implies that as professional development skills increase the innovative skills of science teachers also increases or vice versa meaning that each of the factors is correlated to one another. This clearly implies the importance of continuous training and learning in improving creativity and effective teaching practices. Professional development skills equip teachers with new pedagogical strategies, up-to-date scientific knowledge, and an understanding of current educational trends, all of which directly enhance their ability to innovate in the classroom. This, allows them to integrate modern teaching tools, employ student-centered methods, and design engaging lesson plans that address diverse learning styles.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared by the teacher - discussants about the relationship between professional development skills and innovative skills they experienced. They confirmed and supported the findings of this study.

As stated by Discussant 6:
I believe so because if you have that confidence that pedagogical skill you will be able to plan your lessons well, integrate learning styles that will make learners easy to understand the lesson, make them interact with you. You will also look for other means that will make them easily understand your lesson and that's where the innovativeness of a science teacher comes from. So, I believe they go together with the logical competence and innovative skills.

For instance, Discussant 8 stated that:
And I and I agree, since the level of the pedagogical competence is high which is due to our specialization and trainings and experience. So, it is easier to innovate because you just master the field but also the context and our students too.

The findings supported the study of Darling-Hammond et al. (2020), who observed that professional development initiatives focusing on innovation directly impact teachers' pedagogical competence. Their study highlighted that

science teachers who continuously develop their skills and embrace innovative practices exhibit greater effectiveness in facilitating student-centered learning environments.

There is a significant relationship between in professional development skills and pedagogical competence of science teachers in the Division of Aklan. This implies that professional development skills increases and pedagogical competence also increases or vice versa which means that they directly affect towards each other.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about the relationship between professional development skills and pedagogical competence they experienced. They confirmed and supported the findings of this study.

As stated by Discussant 2:
Yes, continuous professional development skills then of course you will be also able to enhance your planning for a lesson, interacting with students, manage your classroom, assessment with students and by creating a learning environment, then those skills would really matter a lot.

For instance, Discussant 3 stated that:
High pedagogical is high pedagogical competence so we need to upgrade our professional development skills to provide high quality instruction.

The study's findings were aligned to the study of Opfer and Pedder (2018), which argued that professional learning opportunities focused on reflective practice enable teachers to critically evaluate and refine their pedagogical methods. This reflective process strengthens teachers' ability to create meaningful and engaging learning experiences, further establishing the link between professional development and pedagogical competence.

In the FGD session conducted, the results of the study were also supported by the ideas and experiences shared and narrated by the teacher - discussants about the relationship between innovative skills and pedagogical competence they experienced. They confirmed and supported the findings of this study.

As stated by Discussant 5:
Yes, as per experience, I was able to participate in the gamification seminar workshop that was given by the division, and I have tried it in the classroom, and I can see the improvement of my students. And they were happy and were able to participate well and understand the lesson well. So, if innovation skills of a teacher are higher than the pedagogical competence is improved. There are a lot of beautiful things innovation can do in a classroom but being limited lack of equipment, but there are other means of innovation that does not need equipment in classroom.

Added by Discussant 6 stated that:
Yes, it does help, our students, attention span is limited but when you bring innovation to your class, they empower teacher's teaching strategies and pedagogical skills and interactions among students. So, in my case, I also apply gamification which makes teaching and learning process better.

The results of the study supported in the study of Kang et al. (2015), which showed that science teachers who demonstrated high levels of innovative skills were found to exhibit greater pedagogical competence. These teachers were able to transform abstract scientific concepts into relatable and interactive learning experiences, using tools like simulations, virtual labs, and collaborative platforms.

Discussion

Teacher's Profile

The finding in Table 1, provides a comprehensive overview of their characteristics. Sex distribution shows a majority of females at 81.30%, with males making up 18.70%. Age-wise, most teachers are between 20-35 years old (58.9%), followed by those aged 36-50 years (40.20%). In terms of marital status, 67.50% are married, 26.30% are single, and 6.22% are widowed. Educationally, 51.70% have MA units, 24.90% hold a master's degree, and 17.20% have a bachelor's degree. Positions include 37.8% as Teacher I, 38.80% as Teacher III, and 16.30% as Teacher II. Length of service ranges from 13.40% with 5 years or less to 25.40% with 16 years or more.

This profile highlights a predominantly female workforce with a strong educational background, particularly in advanced degrees. The age distribution suggests a mix of younger and more experienced teachers, which can contribute to dynamic teaching environments. The marital status and length of service indicate stability and commitment among the teaching staff. Overall, these teachers are well-equipped to provide quality education in secondary Science, reflecting a strong foundation for educational programs.

Professional Development Skills of Secondary Science Teachers

The findings in Table 2, illustrate that high level of professional development skills in terms of participation and extent and reason in professional development activities implies that their dedication to enhancing their skills and effectiveness in science education. This high participation shows that teachers are not only attending relevant training sessions, workshops, and seminars but also actively applying what they learn to improve their teaching. Science teachers believe that professional development boosts their teaching effectiveness, enhances their understanding of the science curriculum, and helps them use technology effectively in their lessons. Many feel that these activities are essential for their growth, as they gain new strategies for assessing student learning and differentiating instruction for diverse learners. Additionally, they feel more confident in their teaching and are motivated to continue growing professionally. Participation in professional development also strengthens their collaboration with colleagues, as they frequently share insights and resources, creating a supportive learning environment. Lastly, they are well-equipped to meet student needs and contribute to the ongoing improvement of science education in their schools. The result of the study agreed with the investigation of Zhang et al. (2015), which revealed that teachers sought professional development skills for diverse reasons, including personal growth, student needs, and adapting to curricular changes.

Innovative Skills of Secondary Science Teachers

The findings in Table 3, shows that the high level of innovative skills in terms of personal and environmental innovativeness of secondary science teachers implies a strong commitment to making science education dynamic, engaging, and relevant for students. Most of science teachers regularly incorporate hands-on experiments and demonstrations, encouraging students to explore and investigate through project-based learning. They make effective use of technology, such as simulations and virtual labs, to bring scientific concepts to life and provide students with interactive learning experiences. These teachers also show flexibility in their teaching methods, adapting them to meet the needs of diverse learners and promoting critical thinking and problem-solving in their science lessons. By integrating real-world examples and interdisciplinary approaches, such as STEM, into the curriculum, they make science more relatable and meaningful for students.

Pedagogical Competence of Secondary Science Teachers

The findings in Table 4, revealed that the "Very High" level of pedagogical competence in terms of content knowledge, incorporating various learning theories into their practice, adapting to different learning styles, and effectively using technology to enhance the learning experience teaching skills and classroom management highlights their profound mastery of both the subject matter, teaching strategies and the effective delivery of science education. Almost of Science teachers consistently utilize relevant instructional teaching techniques, ensuring that their lessons are both informative and engaging. Their understanding of the interdisciplinary nature of science allows them to connect concepts across various scientific fields and other subjects, providing students with a holistic learning experience. By offering achievable tasks aligned with lesson content, they ensure that students are challenged appropriately, helping them build a solid foundation of scientific knowledge. Their ability to stay updated with the latest developments and research in the field ensures that their lessons are current and reflect the most recent advancements in science.

Teacher's Teaching Skills Improvement Program

The results indicating high levels of professional development skills and innovative skills and a very high level of pedagogical competence among secondary science teachers in the Division of Aklan implies a solid foundation for implementing an enhanced Teacher's Teaching Skills Improvement Program. Such a program could focus on refining and expanding existing strengths while addressing potential areas for growth in adapting to emerging educational trends.

For instance, professional development initiatives could prioritize advanced strategies in technology integration, collaborative teaching, and specialized content delivery methods that align with 21st-century education goals. Similarly, innovative skill-building activities could focus on fostering creativity in lesson design and enhancing the ability to use interactive tools effectively.

Leveraging the very high pedagogical competence already demonstrated, the program could aim to build leadership capabilities among teachers, enabling them to mentor peers and lead initiatives that further enrich science education in Aklan. This personalized approach ensures sustained professional growth and a progressive impact on students' learning experiences.

Conclusion

The findings of this study emphasize the strong dedication of secondary Science teachers to continuously improve their teaching skills and advance their careers, leading to more effective teaching practices and a collaborative educational environment. These teachers actively engage in professional development, enhancing their content

knowledge, teaching methods, and classroom management skills, which directly impacts student learning outcomes and overall educational success in Science. Continuous training equips them with up-to-date pedagogical strategies and fosters a culture of innovation.

The importance of innovative skills in enhancing pedagogical competence is also highlighted, as teachers with strong innovative skills are more likely to incorporate diverse, creative teaching methods and adapt to new technologies, leading to a more dynamic and engaging classroom environment. This integration encourages critical thinking and collaboration among students, enriching their learning experiences. Fostering these innovative skills enables teachers to design student-centered lessons and apply active learning strategies, which not only improves student outcomes but also creates a more relevant and engaging learning environment.

However, it's also suggested that current professional development offerings may not always lead to substantial improvements in teaching competence, possibly due to misalignment with teachers' specific needs or a lack of follow-up. Therefore, while ongoing professional development can strengthen pedagogical competence, there is a need for an integrated approach that incorporates multiple factors beyond professional development skills to enhance teaching quality and better meet the diverse needs of students in Aklan's Science classrooms. A well-designed Teacher's Teaching Skills Improvement Program can refine teaching strategies and foster an engaging environment.

Teacher's Teaching Skills Improvement Program presents a vital opportunity for educators to enhance their pedagogical competence and adapt to the evolving demands of modern education. By focusing on continuous professional development, teachers can refine their teaching strategies, integrate innovative approaches, and foster an engaging learning environment for their students. It is crucial that this program be designed to address the specific needs of teachers, encouraging active participation in workshops, technology integration, and the adoption of student-centered learning methods. Additionally, providing teachers with adequate support, resources, and follow-up initiatives will ensure the effective implementation of newly learned skills. Ultimately, this program will not only elevate the quality of Science education but also empower teachers to meet the diverse needs of their students, thereby contributing to the overall improvement of educational outcomes.

Recommendations:

Based on the aforementioned findings, the following recommendations are proposed to further enhance the quality of Science education and support the ongoing development of its secondary Science teachers.

1. Science teachers may consider setting up a "Professional Development Sharing Session" each month were teachers can briefly share key takeaways from recent workshops, courses, or seminars they attended.
2. Science teachers may consider creating an "Innovation Reflection Journal" where they document successful innovative practices, challenges encountered, and any feedback from students.
3. Science teachers may form a "Professional Learning Circle" within their school or district, where teachers meet regularly to share effective pedagogical strategies, classroom management techniques, and assessment practices.
4. Science teachers may enhance pedagogical competence, set a goal to attend at least one professional development workshop or seminar each semester, focusing on areas like inquiry-based learning, technology integration, or classroom management.
5. Science teachers may enhance innovative teaching skills, regularly experiment with one new teaching strategy each term, such as project-based learning or incorporating interdisciplinary links (e.g., connecting Science with math or technology).
6. Science teachers may regularly participate in workshops or training sessions that focus on both content-specific advancements and innovative teaching techniques, such as student-centered learning, inquiry-based approaches, or technology integration.
7. Science teachers may actively seek to align professional development opportunities with their specific needs and classroom challenges.
8. Science teachers may take an active role in shaping their own teaching skills improvement by setting specific, measurable goals that align with their teaching challenges and aspirations.

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