

UNDERSTANDING SCIENCE TEACHERS' VIEWS ON THE EFFECTIVENESS OF PROFESSIONAL DEVELOPMENT INITIATIVES

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ABSTRACT

This study employed a qualitative research design to explore science teachers' perceptions of the effectiveness of professional development (PD) programs in enhancing teaching skills and science instruction in Region XII, which includes both urban and rural school contexts. The research involved 15 junior and senior high school science teachers selected through purposive sampling. Data were collected using a semi-structured interview guide and open-ended survey questionnaires, with a focus on ethical standards, including informed consent, confidentiality, and voluntary participation. The responses were transcribed, coded, and analyzed to identify emerging themes regarding the effectiveness of PD programs. The analysis revealed four key themes: the relevance and application of PD programs, the need for improvement and sustainability, skill enhancement and strategy exposure, and the role of technology and innovation in PD. Participants highlighted the importance of content-specific, collaborative, and sustained training programs that are contextualized within the science curriculum. However, they noted a lack of continuity and follow-up support in many PD initiatives. PD programs were also recognized for enhancing teachers' instructional strategies, boosting their confidence, and introducing new ways to deliver science content, especially through technology integration and inquiry-based approaches. These findings align with existing literature that underscores the significance of sustained, content-focused PD with ongoing support to enhance teaching quality and improve student outcomes.

Keyword: - Science Teachers, Professional Development.

1. INTRODUCTION

Professional development (PD) is a critical component in enhancing teachers' instructional practices, content knowledge, and student achievement, particularly in science education. As the demands of 21st-century science learning evolve with greater emphasis on inquiry-based learning, technological integration, and interdisciplinary approaches—science teachers must continuously update their skills and pedagogical strategies (Desimone & Garet, 2015; Darling-Hammond et al., 2017). High-quality PD programs are designed to provide sustained, collaborative, and content-focused learning experiences that align with teachers' instructional needs and students' learning outcomes (Darling-Hammond et al., 2017).

Despite the proliferation of PD initiatives, the effectiveness of these programs often depends on how teachers perceive their relevance, quality, and impact on classroom practices. Science teachers' perceptions are crucial because they influence engagement with PD activities and the transfer of new knowledge into practice (Hill et al., 2020). Teachers tend to value PD programs that are closely linked to their content areas, offer active learning opportunities, and provide ongoing support rather than one-time workshops (Kennedy, 2016; Kraft et al., 2018).

Recent research emphasizes that science teachers are more likely to view PD as effective when it fosters collaborative learning communities, promotes reflection on teaching practices, and directly addresses classroom

challenges (Penuel et al., 2022). Moreover, personalized and context-specific PD opportunities that respect teachers' experiences and local teaching environments tend to yield better outcomes (Guskey, 2021).

Given the centrality of teacher perceptions in determining the success of PD programs, it becomes essential to systematically examine how science teachers evaluate the effectiveness of such initiatives. Understanding their views can provide insights into how PD programs can be improved to better support science education reforms and student learning.

Thus, this study investigated the perceptions of science teachers regarding the effectiveness of professional development programs among science teachers in Region XII.

2. METHODOLOGY

This study employed a qualitative research design to explore science teachers' perceptions of the effectiveness of professional development (PD) programs in science. The research was conducted in Region XII, encompassing both urban and rural school contexts to ensure diversity in educational environments. Participants were selected through purposive sampling, involving 15 junior and senior high school science teachers.

Data were gathered using a semi-structured interview guide complemented by open-ended survey questionnaires. The data collection process involved close collaboration with school administrators to ensure ethical standards were upheld, including informed consent, confidentiality, and voluntary participation. Interviews and open-ended responses were audio-recorded, transcribed, and coded for emergent themes.

Analysis began with initial coding to organize responses, followed by focused coding to identify recurrent patterns and themes related to effectiveness of professional development programs. Thematic analysis was conducted to interpret the relationships among these factors, providing rich, contextualized understandings of how professional development influences instructional improvement and student learning experiences.

3. RESULTS AND DISCUSSION

Emerging themes on the Effectiveness of Current Professional Development Programs in Enhancing Teaching Skills and Science Instruction

The analysis of responses from the participants revealed four key themes related to the effectiveness of current professional development (PD) programs in enhancing teaching skills and science instruction. A prevailing theme among the responses was the relevance and application of PD programs, which many participants described as most effective when the trainings are content-specific, collaborative, and sustained over time. Respondents emphasized that the contextualization of PD within the science curriculum made the learning experience more meaningful and impactful.

As shared by R1, *"Those that incorporate active learning, focus on specific content areas, promote collaboration, and extend over time have shown to significantly enhance teaching skills and improve student outcomes in science instruction."*

Similarly, R3 noted that while PD sessions are generally helpful, their effectiveness is largely dependent on their alignment with actual classroom needs.

Another significant theme that emerged was the need for improvement and sustainability of PD initiatives. Several respondents observed that while initial training sessions are often well-organized, they lack continuity, follow-up support, and adaptability to teachers' specific contexts.

R2 articulated this gap, stating, *"The effectiveness... is still insufficient, because there are still many things to establish and to consider especially when it comes to the educational system."*

Likewise, R15 pointed out that many programs *"may not meet the individual teacher's need... lack of follow-up support and insufficient time and resources would also hinder the effective implementation."* This highlights the necessity for long-term planning and mentoring support to ensure the transfer and sustainability of professional learning.

The third theme, skill enhancement and strategy exposure, underscored the positive impact of PD programs in enriching teachers' instructional strategies and confidence. Many respondents expressed that these trainings allowed them to discover new and innovative ways of delivering science content.

R6 shared, *"It provided me with new strategies and techniques for teaching science... how to integrate technology into my lesson and design inquiry-based activities."*

In the same vein, R10 emphasized the contribution of PD to teacher capability, stating, “*The current professional development program helps teachers enhance their skills/ability to help the learners to be active in their academic performance.*”

Lastly, the theme of technology and innovation in PD emerged, particularly highlighting the role of modern methods and digital tools in transforming science instruction. Trainings that introduced higher-order thinking skills (HOTS) and inquiry-based approaches were considered highly effective in engaging students and enriching science lessons.

R5 reflected on a recent experience, saying, “*Recently we undergo the HOTS-PLP training program which enhances one’s potential to revolutionize the way science is taught in secondary level.*”

R12 added, “*The professional development programs are very effective... using more advanced technologies as instructional materials makes us more effective in teaching.*”

These findings are consistent with recent literature that emphasizes the importance of sustained, content-focused, and collaborative professional development in improving teaching practice.

According to Darling-Hammond et al. (2017), effective PD is characterized by its active learning design, coherence with curriculum standards, and integration of technology and innovative strategies. More recent studies reaffirm that ongoing support and responsiveness to teacher needs significantly impact instructional quality and student achievement (Guskey & Yoon, 2021; Avalos-Bevan, 2023).

Table 1. Emerging themes on the Effectiveness of Current Professional Development Programs in Enhancing Teaching Skills and Science Instruction.

Emerging Themes	Frequency	Core Ideas
Relevance and Application of PD Programs	<i>General</i>	PD is more effective when content-specific, sustained, collaborative, and contextually relevant.
Need for Improvement and Sustainability	<i>Typical</i>	Many programs lack follow-up support, long-term continuity, and adaptability to specific teacher needs.
Skill Enhancement and Strategy Exposure	<i>General</i>	PD programs introduce new instructional strategies, improve content delivery, and boost confidence.
Technology and Innovation in PD	<i>Typical</i>	Use of technology and innovative methods (e.g., HOTS, inquiry-based learning) enhance effectiveness.
General	50% and above of the responses	
Typical	25% of the responses	
Variant	24% of the responses	

4. CONCLUSIONS

The findings suggest that for PD programs to be most effective in enhancing science instruction, they must be relevant, sustained, and adaptable to the specific needs of teachers. PD initiatives that provide content-specific training, support the ongoing development of teachers through follow-up sessions, and integrate innovative teaching methods and technology are most likely to lead to meaningful improvements in instructional practices and student engagement in science. To maximize the effectiveness of PD programs, education policymakers and PD providers should focus on creating continuous, contextually relevant, and collaborative professional development opportunities that foster long-term growth for teachers and improve overall student learning outcomes.

5. RECOMMENDATIONS

School administrators, PD providers, and educational policymakers may collaborate to design and implement content-specific, flexible, and sustainable professional development programs for science teachers. These programs should focus on integrating modern teaching methods, such as inquiry-based learning and technology, while ensuring ongoing support through mentoring and follow-up sessions. Additionally, the programs should foster collaboration among teachers and be adaptable to individual professional growth needs, ensuring long-term improvements in teaching practices and student outcomes. Regular feedback from teachers should be used to continuously refine and enhance the effectiveness of PD initiatives.

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