

# Training and Seminar Needs of Junior High School Science Teachers: Basis in the Formulation of Training Design

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## Abstract

The study focused on identifying the training and seminar needs of junior high school science teachers while also developing a training design based on these findings. Specifically, the respondents consisted of 48 junior high school science teachers from the Department of Education, School Division of Cabanatuan City, and a quantitative research method was employed. In terms of demographics, the respondents' profiles show that the largest age group is 26–31 years old (35.41%), the majority are female (66.67%), and most are in the early stages of their teaching careers, with 41.67% having 6–10 years of experience and 31.25% having 1–5 years; taken together, this indicates that the study primarily reflects the views of newer educators. With regard to training needs, the results revealed that respondents prioritize training and seminars in research and investigatory projects as their top need, while the second most desired area is deepening knowledge of the specific science subjects they teach or work with. In addition, innovative teaching strategies rank third, reflecting a desire to learn new methods to engage students and improve the teaching process, whereas effective assessment methods are the least prioritized, suggesting that respondents feel more confident in their existing assessment skills rather than lacking interest in improving these practices. Furthermore, statistical analysis showed that there is no significant relationship between the teachers' profiles and their ranked topics for training and seminars, as indicated by p-values greater than 0.05, which means that demographic and professional characteristics such as age, gender, and years of teaching experience do not statistically influence their training preferences; consequently, the selection of training topics is independent of these profiles.

**Keywords:** Action Research, Investigatory Project, Statistical Analysis.

## I. INTRODUCTION

Junior high school science teachers play a crucial role in shaping students' understanding of scientific concepts and sparking their interest in science. Their responsibilities go beyond teaching content, as they are also tasked with curriculum delivery in subjects like biology, chemistry, physics, and earth science. In addition, they engage students through interactive methods such as experiments and group projects, and they conduct assessments using quizzes, tests, and laboratory activities to evaluate comprehension. Equally important, effective classroom management ensures a safe and focused learning environment. Moreover, science teachers are committed to continuous professional development in order to stay updated with the latest scientific discoveries and educational practices, thereby enhancing their teaching skills and improving the quality of education.

As the education landscape continues to evolve, teachers must stay abreast of the latest pedagogical approaches, technological advancements, and subject knowledge to effectively educate and inspire their students. This need is especially critical for junior high school science teachers, who play a pivotal role in shaping students' understanding of the natural world and fostering a lifelong love for science.

Beyond their instructional roles, however, teachers also need opportunities for promotion. Such promotion is essential for fostering professional growth and recognition, motivating educators to enhance their instructional practices, pursue continuous professional development, and assume leadership roles within the education system. By acknowledging teachers' contributions and achievements, promotions encourage them to strive for excellence, which ultimately benefits both their personal career progression and the overall

quality of education. In line with this, the criteria for promotion include performance, experience, outstanding accomplishments (meritorious achievements), education, psycho-social attributes, potential, and training, as outlined in DepEd Order No. 7, s. 2023.

The importance of continuous professional development is further underscored by research. For instance, Gonong (2018) found that many teachers expressed a desire for more in-service training opportunities, emphasizing the need to improve their teaching practices and placing professional growth as a top priority. Similarly, Abelardo et al. (2019) identified challenges teachers face, including a lack of sufficient training and seminars on research, heavy teaching loads, unclear roles regarding research responsibilities within schools, and personal life demands.

Although existing studies provide insights into general teacher training, fewer focus specifically on the unique needs of junior high school science teachers. This is a significant gap, considering that their classroom effectiveness depends heavily on their knowledge, skills, and teaching methods. Thus, addressing specific gaps in content knowledge—such as emerging science trends and technological advancements in teaching—together with strengthening pedagogical skills unique to science instruction could substantially improve their teaching effectiveness. Consequently, identifying these training needs through targeted research enables education policymakers and school administrators to develop specialized programs that support science teachers, thereby enhancing the overall quality of science education in junior high schools.

## II. RESEARCH OBJECTIVES

### ➤ *General Objective*

To determine the training and seminar needs of junior high school science teachers to improve their teaching practices and enhance student learning outcomes.

### ➤ *Specific Objectives:*

- To determine the profile of the respondents in terms of:
  - ✓ Age;
  - ✓ Sex; and
  - ✓ Years of teaching experience.
- To identify the most preferred topics for training and seminars among junior high school science teachers;
- To evaluate if there are correlations between the profile and the ranked topics for training and seminars among junior high school science teachers and
- To provide relevant and effective training opportunities for junior high school science teachers.

## III. METHODOLOGY

This study employed a descriptive research design, focusing on 48 junior high school science teachers from the Department of Education Schools Division of Cabanatuan City as participants. A survey questionnaire, validated by experts in the field of education, was used for data collection. The assessment utilized a descriptive survey method, distributing hard copies of the survey to all relevant schools. To analyze the data, frequency counts, percentages, ranking, and Spearman's rank correlation coefficient were used as statistical tools to determine the level of needs across the different identified categories.

## IV. ETHICAL CONSIDERATIONS

Respondents were informed about the research's purpose, role, and rights as research subjects. Informed consent was obtained from all participants before data collection. Confidentiality and anonymity were maintained throughout the research process.

## V. RESULTS AND DISCUSSIONS

### A. *Profile of the Respondents*

#### ➤ *Age*

Table 1 Age of the Respondents

Age Range	Frequency	Percentage
20 – 25	3	6.25
26 – 31	17	35.41
32 – 37	14	29.17
38 – 43	5	10.42
44 – 49	3	6.25
50 – 55	5	10.42
56 – 71	1	2.08
Total	48	100

Table 1 presents the distribution of respondents according to age. As shown, 17 or 35.41% of the respondents belong to the age bracket of 26 to 31 years old, while 14 or 29.17% fall within the age bracket of 32 to 37

years old. In contrast, only 5 or 10.42% belong to the age brackets of 38 to 43 years old and 50 to 55 years old. Meanwhile, 3 or 6.25% are in the younger bracket of 20 to 25 years old as well as the bracket of 44 to 49 years old,

and only 1 or 2.08% represents the oldest group aged 56 to 71 years old. Taken together, the data indicate that the majority of the respondents are between 26 and 37 years old, comprising approximately two-thirds of the participants. This suggests that the study primarily reflects the opinions and perspectives of younger to middle-aged individuals, who are typically in the early to mid-stages of their teaching careers.

The implication of this age distribution is noteworthy. Teachers in this age group are often more dynamic, adaptable, and open to learning new approaches in their practice compared to their older counterparts. This is consistent with the findings of Vázquez-Cano et al. (2023), who emphasized that teachers' training needs vary

significantly depending on their age. For instance, younger teachers tend to be more receptive to professional development activities that focus on digital technologies and contemporary pedagogical strategies, as these align closely with their experiences and professional aspirations. Therefore, the age profile of the respondents in this study highlights the importance of designing training programs that integrate technology and innovative teaching methods, which are likely to resonate more strongly with younger educators and address their specific developmental needs.

➤ *Sex*

Table 2 Sex of the Respondents

Sex	Frequency	Percentage
Male	16	33.33
Female	32	66.67
Total	48	100

Table 2 presents the distribution of respondents by sex. As reflected in the data, out of the total 48 respondents, 16 or 33.33% are male, whereas 32 or 66.67% are female. This clearly indicates that many of the respondents are female, showing a two-to-one ratio in favor of women participants.

The predominance of female respondents is not surprising, as several factors contribute to the overrepresentation of women in teaching roles. First, gender stereotypes and societal norms often portray teaching—particularly at the basic education level—as a "women's profession," rooted in traditional views that associate nurturing, caregiving, and child-rearing with women. Second, the teaching profession is often viewed as attractive to women, especially working mothers, because it offers a schedule that may align more closely with family responsibilities and provide opportunities for

a more manageable work-life balance. However, despite this perceived advantage, teaching remains a profession with challenges, including issues of low pay and limited resources, which can discourage retention and advancement (Wong, 2019).

Thus, the distribution of respondents by sex in this study mirrors broader societal patterns in the teaching workforce, where women continue to dominate. This overrepresentation also suggests that discussions of training needs and professional development must account for the perspectives of female educators, who form the majority in the field and whose professional challenges and aspirations may differ from those of their male counterparts.

➤ *Years of Teaching Experience*

Table 3 Years of Teaching Experience of the Respondents

Years of Teaching Experience	Frequency	Percentage
26 – 30	3	6.25
21 – 25	3	6.25
16 – 20	1	2.08
11 – 15	6	12.50
6 – 10	20	41.67
1 – 5	15	31.25
Total	48	100

Table 3 shows the distribution of respondents according to their years of teaching experience. As presented in the data, 20 or 41.67% of the respondents have 6 to 10 years of teaching experience, while 15 or 31.25% have 1 to 5 years of experience. In comparison, only 6 or 12.50% have been teaching for 11 to 15 years, whereas 3 or 6.25% have accumulated 21 to 25 years and 26 to 30 years of experience. Finally, just 1 or 2.08% of the respondents reported 16 to 20 years of teaching experience. Taken together, these results suggest that the majority of respondents are relatively young in their

careers, with most having between 1 to 10 years of teaching experience.

The predominance of early-career teachers has important implications for understanding their professional needs. According to Admiraal et al. (2023), young educators often encounter considerable challenges during their initial years in the profession. For example, many feel unprepared to address the complexities of classroom management, instructional delivery, and collaboration with colleagues, which can contribute to elevated stress levels and overall dissatisfaction with their

roles. Moreover, this lack of preparedness is frequently compounded by the gap between the theoretical training they receive during pre-service education and the practical realities they encounter in the classroom.

Therefore, the age distribution of teaching experience among the respondents underscores the importance of providing targeted support for early- to mid-career educators. By addressing their specific

developmental needs—such as equipping them with effective classroom management strategies, refining their instructional approaches, and strengthening opportunities for collegial collaboration—school leaders and policymakers can help ensure not only teacher retention but also improved quality of instruction for students.

*B. Training/Seminar Needs of the Respondents*

Table 4 Training/Seminar Needs of the Respondents

Topic	Mean	Rank
A. Research and Investigatory Project	2.02	Highest Priority
B. Subject Matter Expertise	2.31	2nd
C. Innovative Teaching Strategies	2.73	3rd
D. Effective Assessment Methods	2.94	4th

Table 4 presents the training and seminar needs of the respondents, ranked according to priority. As shown in the table, Topic A (Research and Investigatory Projects) emerges as the top priority, with a mean score of 2.02. This finding suggests that respondents strongly desire to improve or expand their skills in conducting research and investigations, reflecting an awareness of the importance of research in enhancing both teaching practices and professional growth. In support of this, Caingcoy (2020) revealed that teachers generally have limited capacity for conducting research and display neutral attitudes toward it. Although many are motivated to engage in research, they often face challenges such as difficulties in the research process and moderate capabilities in action planning. Moreover, the study highlights that mentoring can play a significant role in strengthening research capabilities, as mentoring skills, motivation, and action planning abilities all correlate with research competency. Interestingly, Caingcoy also found a weak negative relationship between research capability and both age and years of service, indicating that younger teachers or those earlier in their careers may show greater motivation and capacity to engage in research. Similarly, Ulla (2018) identified common challenges such as a lack of financial support, heavy teaching loads, insufficient research skills and knowledge, and limited resources, further underscoring why research-focused training is considered a high priority by respondents.

Following this, Topic B (Subject Matter Expertise) is ranked second, with a mean score of 2.31. This indicates that respondents recognize the importance of deepening their understanding of the specific science subjects they teach, such as biology, chemistry, physics, and earth science. This need is consistent with the findings of Peñaflo (2020), who identified knowledge management and analytical and critical thinking skills as key training needs for junior high school teachers. Thus, strengthening subject matter expertise not only enhances teachers' confidence but also ensures that they are well-equipped to address the evolving demands of 21st-century science education.

Meanwhile, Topic C (Innovative Teaching Strategies) ranks third, with a mean score of 2.73. This demonstrates that respondents are eager to learn new and creative methods of engaging learners and improving the teaching process. In line with this, Ganal et al. (2019) highlighted the importance of professional training in various 21st-century pedagogical skills, including strategies for developing critical and creative thinking, ICT integration, and research-based teaching practices. Therefore, the respondents' interest in innovative strategies reflects a desire to make science education more interactive, relevant, and effective for learners.

Finally, Topic D (Effective Assessment Methods) ranks fourth, with a mean score of 2.94. Although this topic is considered the least prioritized, this does not necessarily imply that assessment is unimportant. Rather, it suggests that respondents feel they already possess a relatively strong foundation in assessment practices compared to the other areas. This observation aligns with Wong (2019), who emphasized that teachers tend to prioritize training that addresses areas where they perceive greater gaps in their skills, while placing less emphasis on domains where they already feel competent.

Overall, the results of this study confirm that research and investigatory projects are perceived as the most pressing training need among junior high school science teachers, followed by subject matter expertise and innovative teaching strategies. These findings highlight the need for professional development programs that focus not only on strengthening teachers' research literacy and skills but also on deepening content knowledge and equipping educators with innovative pedagogical tools. Furthermore, training initiatives should be designed to address the barriers identified in earlier studies—such as heavy workloads, insufficient resources, and lack of mentoring opportunities—so that teachers can confidently integrate research and innovative strategies into their practice. By addressing these needs, education policymakers and school leaders can better support science teachers in enhancing their instructional effectiveness, professional growth, and overall contribution to improving the quality of science education in junior high schools.

C. Correlations between the profile and the ranked topics for training and seminars among junior high school science teachers

Table 5 Correlations Between the Profile and the Ranked Topics for Training and Seminars Among Junior High School Science Teachers

Profile of the Respondents		Research and Investigatory Skills	Subject Matter Expertise	Innovative Teaching Strategies	Effective Assessment Methods
Age	Correlation Coefficient	.056	-.103	.047	.078
	Sig. (2-tailed)	.625	.367	.682	.492
	N	48	48	48	48
Sex	Correlation Coefficient	.273*	-.054	-.209	-.065
	Sig. (2-tailed)	.043	.688	.125	.629
	N	48	48	48	48
Teaching Experience	Correlation Coefficient	.010	-.053	.037	.047
	Sig. (2-tailed)	.931	.645	.746	.679
	N	48	48	48	48

Table 5 presents the results of a correlational analysis between the profile of junior high school Science teachers and the topics they ranked for training and seminars. The analysis revealed no significant relationship, as all p-values were greater than .05, indicating that the teachers' profile variables were not statistically associated with the topics they prioritized for training and seminars.

The study's findings supported by Fronda (2018) found no significant connection between teachers' training needs and factors like gender, marital status, educational attainment, eligibility, years of service, or previous training attended. However, the study recommended a strengthened in-service training program using the Learning Action Cell (LAC) method to enhance instructional quality by focusing on specific teaching strategies. As to Ferlazzo's (2023) and Ansyari & De Witte (2022) findings, demographic characteristics, such as age and sex, generally do not significantly influence teachers' preferences for training topics. Studies have shown that these personal attributes are not strong predictors of the professional development areas teachers prioritize. Moreover, research has consistently demonstrated that years of teaching experience do not directly correlate with the ranked training needs among teachers. For instance, studies have found that both experienced and less experienced teachers tend to prioritize current educational trends and effective teaching methodologies similarly. This suggests a shared understanding of effective instructional practices among teachers, regardless of their years of service (İlğan et al., 2023; Rani, 2023).

D. Proposed Training Design

➤ *Training Program Title:*

Accelerated Research Skills Development: Action Research, Investigatory Projects, Statistical Analysis, and ICT Tools

➤ *Rationale:*

The result of the Professional Development Needs Survey for Junior High School Science Teachers indicating a need for a seminar on action research and investigatory projects can be justified by several factors.

Firstly, students in junior high school are at a crucial stage in their academic development and need teachers who are equipped with the skills and knowledge to provide them with a high-quality education. By engaging in action research, teachers can identify and address specific classroom learning needs and challenges. This approach allows for the implementation of evidence-based teaching practices, improving student outcomes.

Additionally, investigatory projects are integral to science education as they encourage students to develop critical thinking skills, problem-solving abilities, and a deeper understanding of scientific concepts. By providing teachers with training in this area, they will be better able to guide students through the process of conducting their research projects, thereby fostering a culture of inquiry and curiosity within the classroom.

Furthermore, training workshops on action research and investigatory projects can enhance the professional development of teachers, enabling them to stay current with best practices in science education and continuously improve their teaching methods. These training workshops can also help teachers to effectively collaborate with their peers, share resources and knowledge, and create a supportive learning community within the school.

As the College of Education remains committed to prioritizing local responsiveness, this training workshops program will play a significant role in advancing SDG 4, which aims to comprehensively enhance the quality of education. Hence, the significance of this webinar cannot be overstated.

➤ *Target Audience: Junior High School Science Teachers*

➤ *Training Duration: 3 days (8 hours per day)*

➤ *Learning Objectives:*

By the end of this training, participants will be able to:

- Understand the principles and process of action research.
- Develop and conduct investigatory projects.
- Apply statistical methods for data analysis.

- Utilize ICT tools and software to enhance research efficiency.

➤ *Flow of the Training:*

- *Day 1: Action Research and Investigatory Projects*

- ✓ Morning Session (4 hours):

- *Session 1: Introduction to Research and Action Research*

- ✚ Overview of Research Methodologies: Understanding qualitative, quantitative, and mixed-method approaches.

- ✚ Principles of Action Research: Differentiating between action research and traditional research.

- ✚ The Action Research Cycle: Steps including planning, acting, observing, and reflecting.

- ✚ Activity: Small group discussion on potential action research topics relevant to participants' contexts.

- *Session 2: Designing Action Research*

- ✚ Identifying Research Problems: Techniques for pinpointing areas for improvement.

- ✚ Formulating Research Questions and Objectives: Crafting clear, actionable research questions.

- ✚ Selecting Methods and Tools: Choosing appropriate research methods and tools for data collection.

- ✚ Activity: Workshop on developing a mini-action research proposal, including identifying a problem and drafting research questions.

- ✓ Afternoon Session (4 hours):

- *Session 3: Introduction to Investigatory Projects*

- ✚ Definition and Importance: Understanding the role of investigatory projects in scientific inquiry.

- ✚ Components of an Investigatory Project: Hypotheses, objectives, and methodologies.

- ✚ Examples of Successful Investigatory Projects: Case studies from various disciplines.

- ✚ Activity: Brainstorming session to identify potential investigatory project topics.

- *Session 4: Planning and Conducting Investigatory Projects*

- ✚ Developing Hypotheses and Research Design: How to create testable hypotheses and design experiments.

- ✚ Data Collection and Experimentation: Best practices for gathering data through experiments, surveys, and observations.

- ✚ Ensuring Ethical Standards: Overview of ethics in research, including consent and data privacy.

- ✚ Activity: Group work on drafting a basic investigatory project plan, focusing on hypotheses and methods.

- *Day 2: Statistical Treatment of Data*

- ✓ Morning Session (4 hours):

- *Session 1: Introduction to Statistical Concepts*

- ✚ Role of Statistics in Research: Understanding why statistics are essential for research.

- ✚ Basic Statistical Terms and Concepts: Mean, median, mode, variance, and standard deviation.

- ✚ Types of Data and Measurement Scales: Nominal, ordinal, interval, and ratio scales.

- ✚ Activity: Interactive exercise to match statistical terms with real-world examples.

- *Session 2: Descriptive and Inferential Statistics*

- ✚ Descriptive Statistics: Techniques for summarizing data.

- ✚ Inferential Statistics: Introduction to hypothesis testing, p-values, and confidence intervals.

- ✚ Choosing Appropriate Statistical Tests: Guidance on selecting tests based on data type and research questions.

- ✚ Activity: Guided practice with sample datasets to calculate descriptive statistics and perform basic inferential tests.

- ✓ Afternoon Session (4 hours):

- *Session 3: Hands-on Statistical Analysis with Software*

- ✚ Introduction to Statistical Software: Overview of SPSS, R, and Excel for data analysis.

- ✚ Data Entry and Cleaning: Techniques for preparing data for analysis.

- ✚ Basic Statistical Analysis: Hands-on practice with common tests (e.g., t-tests, chi-square, ANOVA).

- ✚ Activity: Computer lab session where participants analyze a dataset using statistical software, applying concepts learned.

- *Session 4: Interpreting and Reporting Statistical Results*

- ✚ Interpreting Results: Understanding outputs from statistical software.

- ✚ Presenting Data Visually: Best practices for creating charts, graphs, and tables.

- ✚ Writing Up Statistical Findings: How to communicate results in research papers and reports.

- ✚ Activity: Workshop on creating visual data presentations and writing a short report based on analyzed data.

- *Day 3: ICT Tools and Software for Research*

- ✓ Morning Session (4 hours):

- *Session 1: Overview of ICT Tools in Research*

- ✚ Importance of ICT in Research: How technology enhances research processes.
- ✚ Tools for Literature Review and Reference Management: Introduction to tools like Mendeley, Zotero, and EndNote.
- ✚ Survey and Data Collection Tools: Overview of Google Forms, SurveyMonkey, and other data collection software.
- ✚ Activity: Hands-on practice with reference management software and creating surveys.

- *Session 2: Data Analysis and Visualization Tools*

- ✚ Data Analysis Software: Overview of tools like NVivo for qualitative data analysis.
- ✚ Visualization Tools: Introduction to Tableau, Power BI, and Excel for data visualization.
- ✚ Activity: Practical session on creating data visualizations and analyzing qualitative data using provided datasets.

- ✓ *Afternoon Session (4 hours):*

- *Session 3: Integrating ICT Tools in Research Workflow*

- ✚ Collaborative Research Tools: Using Google Workspace, Microsoft Teams, and other platforms for collaborative research.
- ✚ Data Management and Security: Best practices for managing data securely and ethically.
- ✚ Automating Research Tasks: How to use scripts and tools to automate repetitive research tasks.
- ✚ Activity: Group activity to develop a research workflow integrating various ICT tools.

- *Session 4: Developing a Research Plan and Presentation*

- ✚ Synthesizing Learning: Review of key concepts from action research, investigatory projects, statistics, and ICT tools.
- ✚ Developing a Research Plan: Participants create a detailed research plan incorporating all elements learned.
- ✚ Final Presentations and Feedback: Participants present their research plans and receive peer and instructor feedback.
- ✚ Activity: Individual presentations followed by Q&A and feedback session.
- ✚ Training Evaluation and Feedback:
- ✚ Pre- and Post-Training Assessments: To measure participants' knowledge gain.
- ✚ Participant Feedback Surveys: To evaluate the effectiveness of the training.
- ✚ Certificates of Completion: Awarded to participants who complete all sessions and activities.

- ✓ *Resources Needed:*

- Training materials and handouts
- Computers with statistical and data analysis software
- Internet access for ICT tool demonstrations

- Presentation equipment (projector, screen, etc.)

- ✓ *Trainer Qualifications:*

- Experienced researchers with expertise in action research, investigatory projects, statistics, and ICT tools for research.
- Proficiency in using statistical software and ICT tools for research.
- This 3-day training program is designed to provide a condensed yet comprehensive introduction to essential research skills.

## VI. CONCLUSION

Based on the findings of this study, the following conclusions are drawn:

The study's respondents are primarily younger to middle-aged adults, with the majority falling within the age brackets of 26 to 31 years old (35.41%) and 32 to 37 years old (29.17%), comprising approximately two-thirds (64.58%) of the participants. Additionally, most respondents are female, making up 66.67% of the total, while males account for 33.33%. This gender distribution indicates that the study mainly reflects female perspectives, which could affect the generalizability of the findings, especially concerning gender-related differences. Furthermore, the majority of respondents have relatively early teaching careers, with 41.67% having 6 to 10 years of experience and 31.25% having 1 to 5 years, suggesting that the study primarily captures the views of newer educators. In contrast, fewer participants have longer teaching experiences, with only small percentages represented in the higher experience brackets. Overall, the study's findings are more representative of younger, female teachers with less teaching experience.

The respondents prioritize training and seminars in the areas of research and investigatory projects, with Topic A emerging as the top priority. This suggests a strong interest among the respondents in enhancing their skills in conducting research and investigations. Topic B, focusing on science subjects, is the second most desired area, indicating that the respondents are interested in deepening their knowledge of the specific science subjects they teach or work with. Innovative teaching strategies (Topic C) rank third in priority, reflecting a desire to learn new methods to engage students and improve the teaching process. Effective assessment methods (Topic D) are the least prioritized, which may suggest that respondents feel more confident in their existing assessment skills compared to other areas rather than a lack of interest in improving assessment practices. Overall, the data highlights a preference for professional development that enhances research skills, subject knowledge, and teaching innovation.

There is no significant relationship between the profile of junior high school Science teachers and the topics they ranked for training and seminars, as indicated by p-values greater than 0.05. This result suggests that the

teachers' demographic and professional characteristics, such as age, gender, and years of teaching experience, do not statistically influence their preferences for training and seminar topics. Therefore, the selection of training topics appears to be independent of the teachers' profiles.

## RECOMMENDATION

Given the conclusions, the following recommendations are hereby offered:

Based on the study's demographic distribution, it is recommended to consider a more balanced representation of participants in future research to enhance the generalizability of the findings. Efforts should be made to include a wider range of age groups and more male respondents to capture a broader spectrum of perspectives. Additionally, incorporating teachers with varying lengths of experience, particularly those with more extensive teaching backgrounds, would provide a more comprehensive understanding of the needs and preferences of educators across different career stages. This diverse representation would help ensure that the research outcomes are more applicable to the entire population of junior high school Science teachers.

To address the priorities identified by the respondents, it is recommended that professional development programs focus on several key areas. Given that research and investigatory projects are the top priority, offering additional training and seminars in advanced research methodologies, data analysis, and project management is essential. As science subjects are the second priority, programs should provide in-depth content knowledge and updates through subject-specific workshops and collaborations with experts. Innovative teaching strategies, ranked third, should be incorporated into training to include methods for engaging students, integrating technology, and exploring creative pedagogical approaches. While effective assessment methods are the least prioritized, targeted training in this area is still necessary, focusing on advanced techniques and new tools to enhance assessment practices. Overall, professional development should align with respondents' interests by emphasizing research skills, science subject expertise, and innovative teaching methods while also addressing assessment practices.

Given that the analysis reveals no significant relationship between the junior high school Science teachers' profiles and their preferences for training topics, it is recommended to adopt a broad-based approach when designing professional development programs. Since training preferences are not influenced by demographic or professional characteristics, programs should cater to a wide range of interests and needs rather than targeting specific profiles. This approach ensures that all teachers, regardless of age, gender, or experience level, have access to relevant and valuable training opportunities. Additionally, periodic assessments of training needs should be conducted to ensure that the programs remain

aligned with evolving educational trends and teacher interests.

## ➤ Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper. The authors have no financial, professional, or personal relationships that could have appeared to influence the work reported in this study.

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