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Perception of Elementary Schools Teachers about Effectiveness of Single National Curriculum in Science Subject at Elementary Level

### Abstract

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### Title

## Perception of Elementary Schools Teachers about Effectiveness of Single National Curriculum in Science Subject at Elementary Level

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### Contents

- [Introduction](#)
- [Research Hypothesis:](#)
- [Methodology:](#)
- [Research Population and Sample](#)
- [Data Collection Tool](#)
- [Reliability and Reliability](#)
- [Data Collection Procedure](#)
- [Data Analysis](#)
- [Ethical Consideration](#)
- [Results](#)
- [Teachers' Demographics and Background](#)
- [Teachers' Perceptions of the Effectiveness of SNC](#)
- [Challenges Faced in the Implementation of SNC](#)
- [Explore Teacher Perceptions and Classroom Challenges](#)
- [Conclusion](#)
- [References](#)

### Abstract

*This study investigates the effects, challenges, and teaching practices related to the implementation of the Single National Curriculum (SNC) in elementary-level science education. Using a mixed-methods approach, data were collected from public and private school science teachers through a structured questionnaire. The results showed broad teacher support for the SNC, recognizing its potential to enhance student engagement through learner-centered methods. However, major challenges included frequent teacher absenteeism ( $M = 4.8$ ), limited laboratory resources ( $M = 4.6$ ), and curriculum rigidity ( $M = 4.4$ ). A significant positive correlation was found between teachers' recognition of the SNC and their satisfaction with it ( $r = 0.68, p = 0.001$ ). While the SNC offers promising opportunities for improving science education, its success hinges on increased curricular flexibility, improved teacher adaptability, and robust capacity-building initiatives.*

**Keywords:** Single National Curriculum (SNC), Science Education, Elementary School Teachers, Curriculum Implementation, Teacher Perception, Educational Reform, STEM Education

### Introduction

Education serves as the cornerstone of social development and forms a state's intellectual, cultural,

and economic future (Lieux, [2021](#)). In order to standardize and improve the quality of education, many countries introduce the national curriculum to



ensure uniformity of the results and opportunities for training (Carney, 2022). Pakistan presented the only national curriculum (SNC) as a comprehensive educational reform that overcomes the differences between various school systems, promotes national unity, and aims to improve the quality of education (De Carvalho et al., 2022). SNC is intended to ensure a standardized basis that provides a fair experience to all students, regardless of socioeconomic origin (Karabassova, 2021). The government, which introduced a single curriculum, eliminated inequality related to the difference in the curriculum and followed public schools, private institutions, and religious seminaries (Shah, 2025). Early-level science education plays an important role in the development of critical thinking, problem-solving skills, and the development of scientific literacy for young students (Quinn, Schweingruber, & Keller, 2011). It presents the basis of high-end scientific knowledge and contributes to the curiosity and innovation necessary for economic and technological progress (Bybee, 2013). Effective scientific guidelines provide students with the basic concepts necessary for higher education and future careers in the STEM area (science, technology, engineering, and mathematics) (Guskey, 2002). Nevertheless, the reform of curriculum, such as SNC, requires continuous support for effective implementation strategies, educational coordination, and teachers to achieve allegations (National Research Council, 2012).

Successful SNC implementation in early levels of scientific entity depends greatly on the teacher's perception, acceptance, and adaptability (Ertmer & Ottenbreit-Leftwich, 2010). The teacher acts as a major broker of knowledge and plays a decisive role in effectively supporting the curriculum contents (Riele et al., 2021). Regarding the effectiveness of the curriculum, their perception affects teaching methods, students' participation, and general learning results (Fullan, 2016). Studies have shown that the successful adoption of curriculum reform depends greatly on teacher's professional preparation, access to resources, and institutional support (Aldridge & McLure, 2023). If the teacher lacks the motivation to adapt to appropriate education, resources, or new educational

strategies, the curriculum may face implementation problems (Alshumaimeri, 2023).

Evaluating the prospect of the effect of SNC in science courses is important to understand the actual impact of the quality of education (Sasson et al., 2022). The curriculum design, resource availability, professional development potential, evaluation method, and curriculum contribute to the formation of these perceptions, including the degree of satisfying various educational demands (Sarkio et al., 2024). In addition, the transition from the previous curriculum to the SNC suggests an adaptation problem for teachers to change the approach to education, class grades, and educational strategies (Campbell, 2024). In this conversion, if you identify potential barriers and promoters, you can provide the idea of improving the training program and solving the gap in the training program of teacher support mechanisms (Schaap & Vanlommel, 2024).

This study aims to study the perception of elementary school teachers on the effects of SNC at the early level. This study will contribute to the explanation of political discussions and training programs by analyzing their experiences, problems, and recommendations. The results will provide valuable results for educational politicians, training program developers, and teacher training programs, and will provide teacher education programs to increase the overall effects of Pakistan's science education in the SNC framework. Including the teacher's problem solution and review of future curriculum will be important for ensuring the long-term success and stability of SNC in Pakistan's educational system.

### Research Hypothesis:

#### Association Between School Type and Curriculum Perception

- Null Hypothesis ( $H_0$ ): There is no significant association between the type of school (public/private) and teachers' perception of the curriculum.
- Alternative Hypothesis ( $H_1$ ): There is a significant association between the type of

school (public/private) and teachers' perception of the curriculum.

### **Differences in Perception Based on Teacher Demographics**

- Null Hypothesis ( $H_0$ ): There is no significant difference in teachers' perception of the curriculum based on their demographic characteristics (gender, experience, education level).
- Alternative Hypothesis ( $H_1$ ): There is a significant difference in teachers' perception of the curriculum based on their demographic characteristics (gender, experience, education level).

### **Relationship Between Curriculum Effectiveness and Teacher Satisfaction**

- Null Hypothesis ( $H_0$ ): There is no significant correlation between teachers' perception of curriculum effectiveness and their overall job satisfaction.
- Alternative Hypothesis ( $H_1$ ): There is a significant correlation between teachers' perception of curriculum effectiveness and their overall job satisfaction.

### **Methodology:**

#### **Research Expansion**

This study used the quantitative design of cross-research to evaluate the perception of elementary school teachers regarding the SNC effects of scientific organizations. The test method was selected from the ability to collect standardized data from a small population, allowing statistical analysis and interpretation.

#### **Research Population and Sample**

The research population consists of 20 elementary school teachers who teach science at Gas Khan Pakistan's Secondary School. Because of the small population, the census sampling method was used, where all 20 teachers were included in the study. This

approach does not need to calculate the sample size and provides a comprehensive expression of the available participants.

### **Data Collection Tool**

The structured questionnaire was developed based on the existing literature and was confirmed by the group of education experts. The questionnaire is divided into five major sections.

1. Population statistical information (age, gender, academic qualification, years of education, school type)
2. Recognition of SNC effects (a measure of clarity, fullness, and measures to assess the coordination of modern education practices)
3. Education practical and resource availability
4. Implementation problem (adaptability of curriculum, need for training, difficulty in evaluation and resources)
5. Public questions (high-quality answers to the proposed improvements and the problems you face)

### **Reliability and Reliability**

The reliability of the content has been modified based on feedback thanks to expert review. Reliability was evaluated in the pilot research framework with five elementary school teachers, and Alpha Cronbach was expected for internal consistency. A coefficient of  $\geq 0.7$  was considered to allow for the reliability of the questionnaire.

### **Data Collection Procedure**

Data collection has been carried out personally. The hard copy was distributed to a separate school with the cooperation of the school administration. I have gained prior consent from all participants who voluntarily participate and privacy.

### **Data Analysis**

The quantitative analysis of the data was performed using the 26.0 version of SPSS (SPSS) and explanatory statistics (average value, standard deviation,

frequency, and interest) to summarize demographic data and response patterns. Study the relationship between the effectiveness of the curriculum and the teacher satisfaction. Using the topic analysis, the public answer was analyzed to classify the repetitive topics and problems mentioned by the teacher.

### Ethical Consideration

The study followed the recommendation of ethical research in accordance with the Helsinki Declaration (2013).

- Institutional approval was obtained from related councils on ethical considerations. Pre-consent was obtained from all participants, along with details on research goals, confidential maintenance, and voluntary participation measures.
- Anonymous performance and confidentiality have been coded and maintained in a state where individual identity is not resolved.
- Data security is guaranteed by storing electronic data on a system protected by a password and limiting access to certified researchers.

### Results

The analyzed data from the questionnaire provides important insights into elementary school teachers' perceptions regarding the SNC in Science Education. The responses have been categorized into different

aspects, including demographic factors, perception of SNC effectiveness, challenges faced during implementation, and correlations between SNC perception and teacher satisfaction.

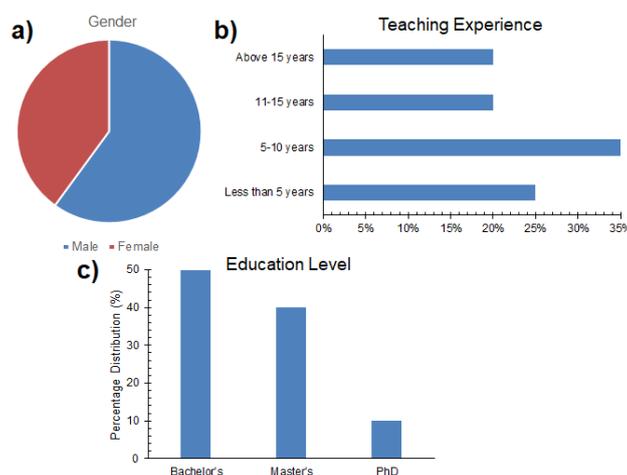
### Teachers' Demographics and Background

According to demographic analysis, 60% of respondents were male and 40% were women, which showed some advantage of men among teachers in the survey (Figure 1A). From the perspective of the professor's experience, 35% of the teachers have gained 5–10 years of experience, the largest group in the sample, followed by 25% in less than five years. On the other hand, 20% of respondents have more than 15 years of work experience and show significant parts of senior teachers (Figure 1B). This difference in educational experience is important to understand how other levels of experience affect SNC's perception.

In the case of educational eligibility, the majority of teachers (50%) received a bachelor's degree, 40% received a master's degree, and only 10% received a Ph.D. in philosophy (Figure 1C). This suggests that most teachers have the appropriate academic experience to evaluate the effects of SNC. The difference in education level can also contribute to the difference in the way SNC is realized and recognized because teachers with higher education can evaluate the strategy of the curriculum in more detail.

**Figure 1**

*Teachers' Demographics and Background information - a): Gender distribution b): Teaching experience c): Education level*



## Teachers’ Perceptions of the Effectiveness of SNC

In order to evaluate the teacher's perception of the effect of SNC, the respondents evaluated various statements on the five-point cut scale (do not agree with the complete consent). The results show that most teachers have positive SNC perceptions in science education (Figure 2).

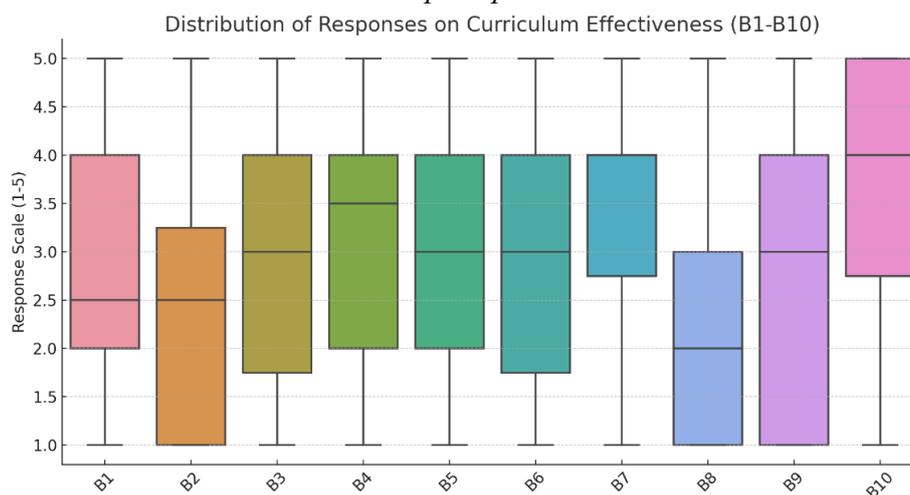
Among the highest statements, the B6 (“SNC allows teachers to adapt to the teaching method”) received an average of 4.5 points (SD = 0.60). This indicates that a large number of teachers believe that SNCs provide a place to change the learning strategy according to their needs. Nevertheless, some teachers expressed concern about the true lack of flexibility. This is because the standardization of the curriculum limits some approaches to learning. Another highly appreciated statement was the B7 (SNC contributes to

the learning approach according to the investigation”). The average score is 4.4 (SD = 0.67). This suggests that most teachers agree that SNCs require students to participate in scientific research and critical thinking, which are important aspects of scientific research and scientific education. This perception consists of modern education accents for learning focused on students and practical knowledge.

On the contrary, the lowest level of application was the B3 (“The SNC content of science is age and it is a student's cognitive ability”). This received an average score of 3.9 (SD = 0.85). This means that some teachers assume that the SNC scientific content can be completely consistent with the student's cognitive development, assuming that a specific concept can be too developed or too simplified by a specific class. This emphasizes the need to adjust the curriculum so that scientific topics are suitable for students.

Figure 2

Boxplot showing the correlation between teachers' perceptions of SNC effectiveness.



## Challenges Faced in the Implementation of SNC

Despite the generally positive perception of SNC effects, several issues have been reported to interfere with successful implementation (FIG. 3). This problem is a key barrier that affects the ability of teachers to effectively apply curriculum in science classes.

The most commonly mentioned problem was the "lack of training" with the highest rating of 4.8 (SD = 0.42). Many teachers say they have not received proper professional education on how to implement SNC in science education, which complicates the adjustment of the teaching methodology. This means that teachers and seminar education programs that need to improve SNC are greatly needed. The second

main work was "lack of resources, especially science laboratory and equipment," an average of 4.7 points (SD = 0.51). Teachers said that the inability to access appropriate science laboratories, experimental tools, and educational materials complicated the effective training of science. Since SNC emphasizes actual practical training, it is weakened without laboratory and educational resources. This emphasizes the urgent necessity of developing infrastructure at schools to support science education.

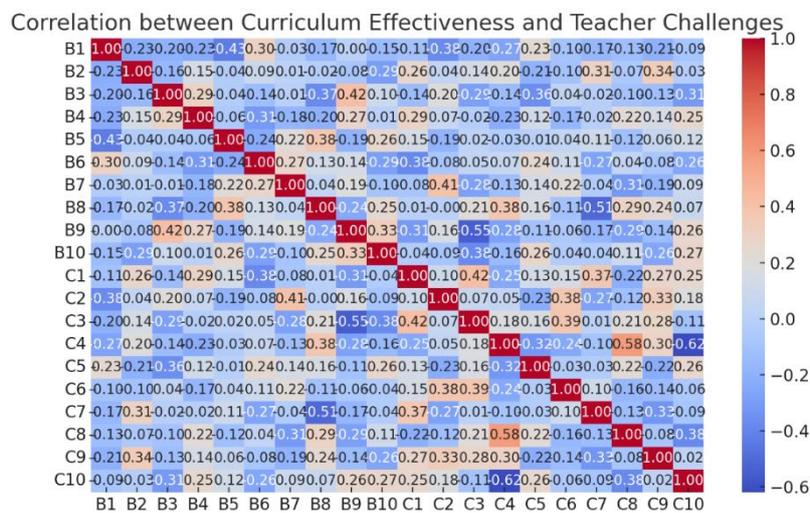
Another noticeable problem was the "difficult structure of the curriculum" which received an average score of 4.6 (SD = 0.55). Some teachers expressed their disappointment that SNC does not allow flexibility in changing the class plan according to the student's learning level or individual needs. This rigidity makes it difficult to place students with

various learning skills, so you can study the gap between science education.

In addition, the increase in workloads in the additional plans of classes is estimated to be an average score of 4.5 (SD = 0.60). Many teachers said that the work volume increases significantly because SNC requires a wide range of class plans. This additional burden reduces the time available for dialogue and attractive teachings and affects teachers' welfare and students' participation. Finally, "the transition from the previous curriculum to the SNC" received an average score of 4.3 (SD = 0.63). Many teachers struggled to adapt to SNC, especially teachers who were familiar with the previous structure of the curriculum. This suggests that the strategy of gradual transition may be more effective, not a sharp change in the curriculum.

Figure 3

Heatmap showing the correlation between teachers facing challenges in implementing SNC and SNC effectiveness



Statistical Associations and Correlations

Logical statistical analysis was performed to further understand the influence of various factors on SNC's perception (FIG. 4). The High Guard Test was used to determine whether the school type (public or individual) perception of SNC teachers was affected. The results were statistically meaningful ( $\hat{\alpha}^2 = 8.75$ ,  $p = 0.04$ ), and the state and private school teachers have different views on SNC. Teachers in private schools generally recognize SNC, and perhaps the greater

autonomy of private institutions provides a more flexible adaptation of the curriculum. On the contrary, public school teachers, strictly connected by the high-ranking principles of SNC, can be recognized as necessary improvements in standardization.

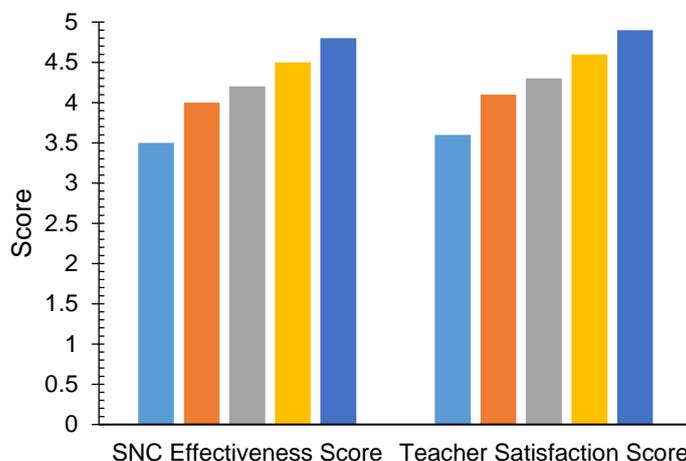
Independent T-tests were performed to determine whether SNC recognition affects the floor. The result is not a significant difference between male and female teachers ( $T = 1.12$ ,  $p = 0.28$ ), which

indicates that both men and women have similar opinions on the efficiency and problems of SNC. Pieron's correlation test studied the relationship between the general satisfaction of SNC efficiency teachers' perception and work. This analysis shows a strong positive correlation ( $r = 0.68, p = 0.001$ ), which

indicates that teachers who recognize SNC as effective are more likely to be satisfied with their work. This conclusion suggests that improving the implementation of SNC can improve the general moral spirit and the motivation of teachers.

**Figure 4**

*Bar graph showing the correlation between scores of teachers' satisfaction and SNC effectiveness*



### Qualitative Insights from Open-ended Responses

Teachers' open-ended responses provided additional qualitative insights that complement the statistical data (Figure 5).

**Lack of Professional Development** Teachers emphasized the need for structured training programs to help them effectively implement SNC.

**Resource Shortages** Many teachers pointed out the unavailability of laboratories, textbooks, and

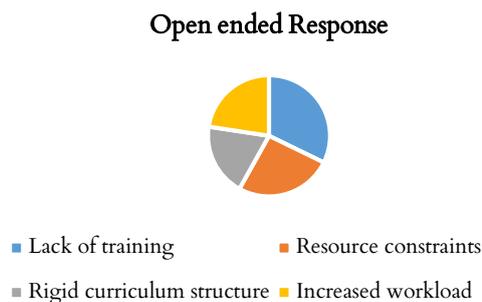
digital learning tools, which hinder the practical application of SNC.

**Rigid Curriculum Framework** Some teachers suggested that SNC should allow modifications to accommodate diverse student needs.

**High Workload** Several teachers reported that lesson planning has become more time-consuming, reducing their ability to focus on student engagement.

**Figure 5**

*Pie chart showing the Qualitative Insights from Open-ended Responses*



## Discussion

The results of this study provide valuable information on the teacher's perception of SNC's implementation in science education. The answer is generally positive about the effect of SNC. However, some problems interfere with real implementation. These results consist of the standardization of education, the curriculum reform, and the previous study of scientific education, and emphasize both the advantages and obstacles related to such reforms.

Most teachers of this study recognized that SNC encouraged scientific thinking and practical experiments and encouraged access to learning based on investigation. This observation is consistent with previous studies that emphasize the importance of learning based on science education research [(Abd-El-Khalick et al., 2004), (Qablan et al., 2024)]. Studies have shown that the curriculum-oriented education program is based on research to improve conceptual understanding and contribute to problem-solving techniques (Grigioni Baur, Bumbacher, & Debernardi, 2021; Mat Noor, 2024). Teachers' positive response in this study suggests that SNC supported these educational achievements and made science education more dialogue and attractive (Adie et al., 2025).

Nevertheless, the fear of age evaluation of SNC content consists of a previous report that standardized curriculum is often unable to adapt to cognitive development stages of various stages (Bransford, Brown, & Cocking, 2000), (Blatt-Gross, 2023). Teachers of this study expressed uncertainty about whether SNCs with the cognitive abilities of students are completely consistent, indicating that the curriculum must be clarified based on child psychology and cognitive development models (Ariani, Krismayanti, & Putri, 2024).

One of the most important issues identified in this study is the lack of training in the teacher, consistent with the previous study of the failure of the curriculum. Studies show that teachers need constant professional development to effectively adapt to the new curriculum (Ariani, Krismayanti, & Putri, 2024; Brown, 2023). In the current study, the high average score of 4.8 for this task emphasizes the significant

difference in teacher learning programs related to SNC. Without proper learning, teachers can do their best to effectively interpret and implement new educational strategies (Moussaoui, 2021; Desimone, 2009). As a result, structured initiatives for building the potential of the teacher should be prioritized to ensure the implementation of SNC as claimed (Ayoola & Oyeromi, 2024).

In addition, the lack of laboratory resources and science equipment has become the main barrier. This conclusion is consistent with previous studies that emphasize the role of the laboratory in the effective education of science (Hofstein & Lunetta, 2003), (Grancharova, 2024). Studies have shown that students are best -learned thanks to experimental research work (2005), which is often limited to resources (Hofstein & Hugerat, 2021). Without a laboratory in many schools, the possibility of actual experiments is reduced, so it is difficult for teachers to fully realize training goals based on SNC surveys (Hawkins, Hunter, Sanger, & Phelps, 2021).

Teachers also reported that the strict structure of SNC restricts the ability to adapt classes based on students. This problem is repeated by the conclusions of Darling Hammond, who insisted that an excessively standardized curriculum cannot meet the needs of various training, which leads to flexibility of training (Parcerisa et al., 2022; Daramola, 2024). Research shows that the permission of teachers that change the contents of the curriculum according to the results of the students leads to improvement in the results of education (Stornaiuolo et al., 2023). In this study, the SNC rigidity recognized by teachers suggests that the curriculum requires greater adaptability of the curriculum while maintaining the national education standard (Nickow et al., 2023).

Effective Teacher SNC's perceptions of the recognition and study of the general satisfaction ( $r = 0.68$ ,  $p = 0.001$ ) emphasize the main aspects of the reform of the curriculum. Studies have shown that the change in the curriculum has a direct impact on the teacher's motivation and professional implementation (Kraft & Lyon, 2024). When teachers feel that the curriculum is effectively supported and recognized, they show high satisfaction with work and

participation (Berkovich, 2021). However, facing problems related to curriculum, such as increased work and insufficient training, increases stress and exhaustion levels (Polatcan et al., 2023; Kaplan, 2023). The results of this study confirm the necessity of a well-structured support system for educational programs to improve teacher satisfaction and quality of training (Collins & Reckhow, 2024).

A significant difference in SNC recognition among state and private school teachers ( $\hat{\alpha}^2 = 8.75$ ,  $p = 0.04$ ) consists of previous studies that reforms of educational programs for Raznoy affect state and private institutions (Nadeem, Khan, & Rafiq-uz-Zaman, 2024). Teachers in private schools with greater autonomy in educational design can be recognized as a restriction on the established methodology. On the contrary, a public school teacher who follows the main principles of the curriculum destined for the state can consider SNC as a means of standardizing the quality of education (Mehmood, Mahmood, & Hussain, 2023). These various prospects suggest that SNC implementation strategies should consider institutional differences and provide greater flexibility to private institutions while maintaining major education standards.

### **Recommendations for Successful SNC Implementation in Science Education:**

#### **Investigate the Impact of Targeted Teacher Training Programs**

Future research should focus on assessing the effectiveness of structured professional development programs tailored to SNC requirements. These training programs should integrate educational technologies and hands-on workshops to equip science teachers with both the pedagogical and technical skills needed for effective curriculum delivery.

#### **Evaluate the Role of Science Laboratory Infrastructure**

A detailed inquiry is needed into how the availability and quality of science laboratory infrastructure

influence the achievement of SNC learning outcomes. Research should explore the gap between current laboratory facilities and the practical experimentation demands outlined in the SNC framework.

#### **Examine Curriculum Flexibility and Differentiated Instruction**

Studies should examine how flexible curriculum design supports differentiated teaching strategies under the SNC. Research can identify how adaptable lesson planning helps meet diverse student needs and promotes improved science learning outcomes.

#### **Assess the Effectiveness of a Progressive Implementation Strategy**

Research should evaluate the outcomes of implementing SNC through a step-by-step, phased approach. This includes collecting and analyzing continuous teacher feedback to determine how gradual integration impacts teacher readiness, curriculum adoption, and student performance in science education.

#### **Explore Teacher Perceptions and Classroom Challenges**

Further qualitative studies are recommended to understand teacher perceptions regarding SNC implementation challenges. Insights from classroom experiences can inform policymakers on how to refine the curriculum and provide appropriate support mechanisms.

### **Conclusion**

The results of this study provide valuable information about how teachers recognized SNC in science education. Teachers generally recognize the effects of SNC, but they face important problems in implementation. Solutions to problems such as teacher training, resource availability, and flexibility of curriculum can greatly improve the successful adoption of SNC in primary science education.

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