

Teachers' Perceptions of Implementing Innovative Learning Models in Senior High School Mathematics

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ABSTRAK

Studi ini mengkaji pandangan guru SMA tentang penerapan model pembelajaran matematika inovatif menggunakan metode kualitatif (wawancara mendalam dan kuesioner). Meskipun tanggapan guru umumnya positif, studi ini mengidentifikasi beberapa tantangan: tidak semua materi cocok, implementasi membutuhkan lebih banyak waktu dan sumber daya, serta terdapat kesenjangan pemahaman dan kesiapan guru yang tidak merata. Oleh karena itu, penting untuk mempertimbangkan studi ini secara saksama sebelum diadopsi sepenuhnya.

Kata kunci: persepsi guru, model pembelajaran inovatif.

ABSTRACT

This study examines high school teachers' views on implementing innovative mathematics learning models using qualitative methods (in-depth interviews and questionnaires). Although teachers' responses were generally positive, the study identified several challenges: not all materials are suitable, implementation

requires more time and resources, and there are gaps in teachers' understanding and uneven readiness. Therefore, it is essential to carefully consider this study before full adoption.

INTRODUCTION

Innovative learning models introduce creative approaches to education, encouraging students to think critically and actively participate in learning ("Innovative Learning Models," 2023). Students develop critical thinking, creativity, and adaptability through project-based methods and technology integration, effectively addressing real-world challenges (Dighliya, 2024). In mathematics education, innovative learning allows students to understand the material much better than memorization. Indirectly, it will improve their ability to solve problems.

Understanding teachers' perceptions is essential, as these views influence how educational innovations are implemented in the classroom environment. According to Karolčík and Marková (2023), teachers' perceptions of innovative learning vary based on their experience: more experienced teachers tend to understand innovation through conventional methods, while younger educators adopt technology-based strategies. Teachers generally perceive innovation as a modern method that increases student engagement through active participation, digital technology, and interdisciplinary approaches, essential for changing traditional teaching and increasing student interest.

Several educational theories support the application of innovative learning in senior high school mathematics. The constructivist theory highlights the importance of students constructing knowledge through direct experience and social interaction, making learning more meaningful and engaging. Additionally, technology-driven instruction employs simulation software to enhance comprehension of complex mathematical concepts, particularly in STEM-related fields such as engineering education (García et al., 2024). The Realistic Mathematics Education (RME) model further strengthens this approach by focusing on contextual learning, ensuring that mathematics is relevant to students' daily lives (Innovation of Mathematics Learning Models and Media in Elementary Schools in Merdeka Belajar Curriculum, 2023).

Previous studies have examined teachers' perceptions of innovative learning models and the factors influencing their implementation. Studies have shown that teachers in the field often prefer traditional approaches, such as lectures, while new educators prefer digital and research-based methods (Karolčík & Marková, 2023). However, teachers also find innovative learning environments quite challenging, and they often do not fully understand the purpose of their implementation. Some teachers even reported challenges with classroom management and security, indicating that training and leadership support are needed for these spaces to be used

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effectively to increase student engagement (Elliot, 2024). Therefore, this study aims to determine or analyze teachers' perceptions of innovative learning models in high school mathematics education.

This study aims to describe teachers' views on innovative learning and analyze the challenges and potentials teachers face regarding innovative methods in mathematics learning at the Senior High School (SMA) level.

METHOD

This study uses a qualitative approach to analyze teacher perceptions. This study allows researchers to explore essential issues from participants' perspectives over time (Merriam & Tisdell, 2016). In education, this method helps understand how individuals absorb knowledge and shape their understanding (Creswell, 2012), so this method is suitable for education.

This study's participants consisted of three mathematics teachers from public and private high schools (SMA). The subjects were selected purposively, with the criterion that teachers had implemented innovative learning models for at least one semester. A small sample size was sufficient, considering that qualitative research emphasizes depth rather than generalization (Patton, 2015). Purposeful sampling ensures that the selected participants have relevant experience to provide rich and meaningful data (Creswell, 2013).

This data collection involved semi-structured interviews and open-ended questionnaires. Interviews helped researchers understand teachers' perspectives thoroughly, including their emotions, thoughts, and reflections (Junaid, M., Martha, R., & Kresno, A., 2023). In addition, this interview also revealed the challenges faced by teachers in adopting innovative learning models.

Data collection involved Semi-structured interviews lasting approximately 20–30 minutes, while open-ended questionnaires explored teachers' views on innovative learning models, particularly the use of open-ended questions in mathematics instruction. Additionally, the questionnaires aimed to identify practices and challenges encountered in implementation (Karaman & Büyükkıdık, 2023). Combining these methods produces a deep and comprehensive understanding of teachers' experiences and difficulties when implementing innovative learning models.

This study analyzed data using the interactive model of Miles and Huberman (1994), which has three stages: data reduction, data presentation, and conclusion. In data reduction, researchers select and summarise the results of interviews and questionnaires according to the research focus. Furthermore, the data is presented through descriptive narratives and direct quotes from sources grouped by theme. Finally, conclusions are drawn by looking for patterns and tendencies in the interview results to answer the research problem.

RESULT AND DISCUSSION

The following is a summary of the interview results with three mathematics teachers regarding their perceptions of implementing innovative learning models at the high school level. The table below summarizes their views on applying this learning model in mathematics teaching.

TABLE 1. Interview table

No	participants	Result	Quotation
1	Teacher A	According to Teacher A, using blended learning models helps students become more involved and motivated. However, he also admits that this method is unsuitable for all materials, especially abstract and challenging to explain. One of the obstacles is the limitation of technology, so Teacher A sometimes prefers	"This model can increase student engagement and motivation, as its approach is more interesting and varied than traditional methods."

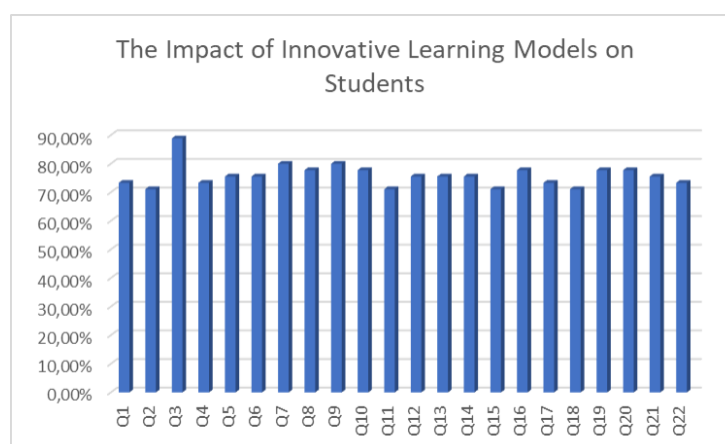
		manual methods and flexible plans.	“Not all math materials are suitable for this model, especially abstract materials that require direct explanations from the teacher.”
2	Teacher B	Teacher B supports the problem-based learning (PBL) model because it increases student engagement and understanding of mathematics with real-world problems. However, this model requires a lot of preparation and can be more challenging in classroom management. The solution offered is thorough planning and collaboration among teachers.	“Project-Based Learning (PBL) models make students more engaged and understand the material contextually because they face real problems relevant to everyday life. However, PBL preparation takes time, and classroom management can be more difficult.
3	Teacher C	Teacher C supports a creative and contextual learning model that helps increase students’ interest and confidence. The main challenges are longer preparation time and a lack of teacher training. The suggested solution is professional training for teachers and careful planning.	“This model helps improve students’ interest and confidence because its approach is more creative and contextual, which can make students more engaged in learning mathematics.”

			"One of the main challenges is the longer preparation time, as well as the lack of training for some teachers in effectively implementing this model."
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This method crucially improves students' mathematical understanding by inviting them to actively participate in learning. In addition to increasing creativity, knowledge, and skills, the main challenges of this method are limited technology, student readiness, and the time needed to implement it. Schools provide support through training, although facilities and budgets are often constrained. Teachers have overcome these challenges using manual methods when technology is unavailable and finding creative solutions. Teachers are also advised to start with small steps, choose the learning model that best suits their needs, and build collaboration with fellow educators. Overall, innovative learning approaches have shown effectiveness in improving student understanding and linking mathematics materials to everyday life contexts. However, successful implementation still requires ongoing support and strong commitment from schools and teachers.

Teachers' Views on the Application of Innovative Learning Models in Mathematics Learning. There is a growing awareness among educators that novel instructional models in mathematics are proving instrumental in fostering not just analytical prowess but also genuine originality in students. A substantial body of research indicates a growing adoption by educators of models that promote heightened student engagement and the refinement of problem-solving proficiencies—attributes deemed indispensable for contemporary schooling. The following section will explain the main points of view on how teachers view these innovative approaches. Teachers are aware of various innovative learning models, such as problem-based learning, STEAM, and more realistic mathematics education (RME)(Rini & Prabawanto, 2021)("Innovation of Mathematics Learning Models and Media in Elementary Schools in Kurikulum Merdeka Belajar," 2023). Most teachers responded positively to these models, believing they could enhance students' critical thinking and creativity(Alkhatatneh, 2024).

The following is an overview of the relevance of innovative learning models. The results of the questionnaire indicate how this model enhances students' understanding, the quality of learning, and their engagement.



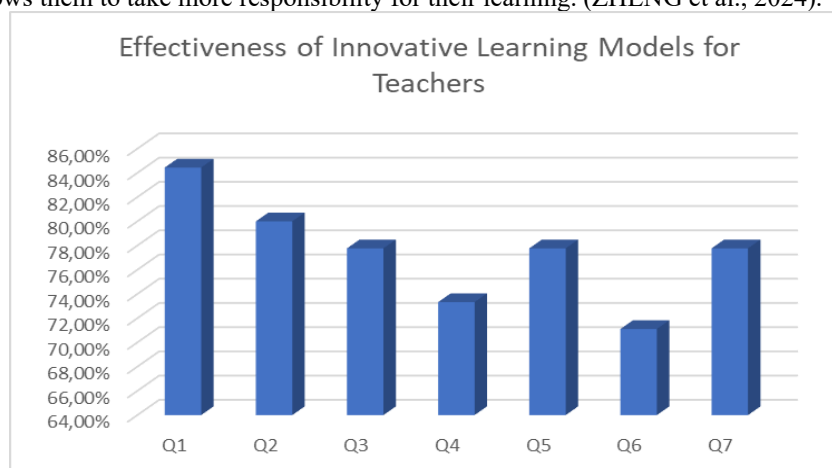
Data results The Impact of Innovative Learning Models on Students

The questionnaire data analysis of 22 statements showed that the average teacher perception of the impact of innovative learning models was 75.66%, which is included in the highly positive category. Several prominent indicators, including improvements in students' understanding of mathematical concepts and critical thinking skills, reached percentages above 88%.

In addition, active involvement, learning motivation, and relevance of the material to real life also received positive responses, with a rate above 75%. Roughly 71% of students had trouble making their learning feel personal or using tech well. Points to our need to boost support, especially by training teachers better, finding more flexible ways to manage classrooms, and ensuring we have enough good facilities and infrastructure. In

general, these data show that innovative learning models significantly positively impact the quality of mathematics learning in high school, both in terms of students' understanding, attitudes, and social interactions.

The Impact of Innovative Learning Models on Students. Modern teaching methods—like solving problems, playing educational games, and doing hands-on projects—get students involved, build their confidence, and help them do better in school. These ways of learning make students more excited and better at thinking critically, which leads to them learning more. Integrating technology and learner-centered approaches has transformed traditional educational practices, fostering a more dynamic and interactive learning environment. Techniques such as gamification and blended learning have been linked to increased motivation and participation in classroom activities (Mandot, 2023) ("Innovative Learning Models and Their Impacts on the Transformation in Education," 2023). Students feel more confident when using innovative methods because this allows them to take more responsibility for their learning. (ZHENG et al., 2024).



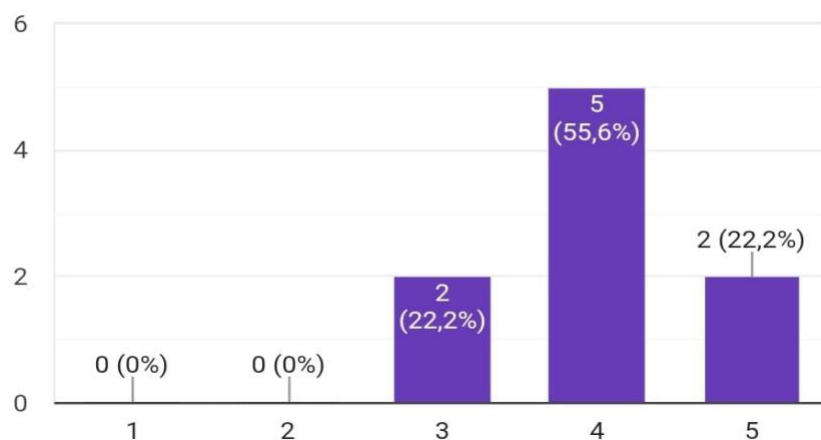
Data results Effectiveness of Innovative Learning Models for Teachers

Most teachers view innovative learning models positively because they improve learning quality, simplify classroom management, facilitate material adjustments, and provide helpful feedback.

Although there are challenges in planning and initial readiness (the lowest value is 71.11%), this model effectively supports teacher performance, pedagogical competence, and the ability to teach mathematics more professionally in high school.

Effectiveness of Innovative Learning Models for Teachers. The effectiveness of innovative learning models has made teachers increasingly recognized as something that can bring about significant changes in the world of education. These models focus on using technology, teaching methods that focus on students, and learning activities that make students active. All of which have been proven to help teachers teach more effectively and improve student learning outcomes. Innovative learning models, such as project-based and active learning, are related to increased student engagement and improved learning outcomes (Rivas & Klügl, n.d.). The following section will explain the key points about these models' effectiveness. Research shows that these models can foster critical thinking and enthusiasm for learning in students, which ultimately leads to better learning outcomes (Mandot, 2023).

Relevance of Innovative Learning Models to Today's Student Needs



Data results Relevance of Innovative Learning Models to Today's Student Needs

Based on the results of a Likert-scale questionnaire on one question regarding the relevance of innovative learning models to current student needs, Most respondents gave positive answers. As many as 55.6% of respondents agreed, 22.2% strongly agreed, while the remaining 22.2% were neutral. No respondents disagreed or strongly disagreed. This finding indicates that innovative learning models are considered quite relevant to the needs of today's students. The dominance of agreeing responses indicates good acceptance of a more adaptive and contextual learning approach in responding to the challenges of modern education.

Relevance of Innovative Learning Models to Today's Student Needs. Innovative learning models are increasingly relevant to the needs of today's students because they overcome the limitations of traditional educator-centered approaches. These learning models focus on student engagement, personalizing learning, and using technology. Instead of just sitting and listening, students take part in their learning. The following parts will explain the main ideas behind these new ways of learning and why they matter. Things like project-based learning and games in class help students work together and think critically — skills that are super important nowadays (Gampala, 2023). With the help of tech, personalized learning makes it easier to meet each student's needs and gives them a more customized learning experience (Fan, 2024).

CONCLUSION

The study's results indicate that the innovative learning model has a significant positive impact on the process and results of mathematics learning at the high school level. Based on the analysis of questionnaire data on 22 statements, the average teacher perception was 75.66%, which is included in the high positive category. Key indicators: Several prominent indicators, including improvements in students' mathematical concepts and critical thinking skills, reached percentages above 88%. In addition, active involvement, learning motivation, and relevance of the material applied to everyday life always give positive results.

The interview results also support the findings from qualitative data, which show that innovative learning can invite students to actively participate, deepen understanding, and make the material more relevant. Even so, some challenges remain, including limited access to technology, unprepared teachers, and the need for better time management and planning. To deal with these issues, teachers often adjust their teaching methods, work with fellow educators, and choose approaches that match the real conditions and needs of the school. Overall, this study answers the problem formulation that the innovative learning model effectively improves the quality of mathematics learning, both from the cognitive, affective, and social aspects. These findings recommend the importance of institutional support in the form of ongoing training and the provision of infrastructure to optimize the implementation of this model.

The results of this study are not only relevant to mathematics learning but also useful for other teaching. This approach helps students get more involved, especially when technology is used wisely. It also supports better communication and critical thinking. Teachers are encouraged to adjust these innovative methods by looking at what the material needs and how ready the students are so the class feels more alive, interactive, and meaningful.

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