

THE ROLE OF TEACHER BELIEFS IN IMPLEMENTING INNOVATIVE PEDAGOGIES

PERAN KEYAKINAN GURU DALAM MELAKSANAKAN PEDAGOGI INOVATIF

Viviana Lisma Lestari¹, Suwarsito²UIN Syarif Hidayatullah Jakarta¹, Universitas Bina Sarana Informatika²*viviana.lisma10@gmail.com¹, suwarsito.swr@gmail.com²

*Corresponding Author

ABSTRACT

This research aims to explore the role of teachers' beliefs about technology in the integration of innovative pedagogy in the classroom. Using a systematic literature review approach, this research analyzes literature related to teachers' views about technology, the factors that influence their beliefs, and its impact on the implementation of technology-based pedagogy. The main findings indicate that teachers' positive beliefs towards technology encourage the adoption of innovative pedagogy, while negative beliefs limit the application of technology in teaching. The implications of this research point to the importance of training and supporting policies to optimize the use of technology in education.

Keywords: teacher beliefs, educational technology, innovative pedagogy, literature review, technology integration

ABSTRAK

Penelitian ini bertujuan untuk mengeksplorasi peran keyakinan guru terhadap teknologi dalam integrasi pedagogi inovatif di ruang kelas. Menggunakan pendekatan systematic literature review, penelitian ini menganalisis literatur terkait dengan pandangan guru tentang teknologi, faktor-faktor yang mempengaruhi keyakinan mereka, serta dampaknya terhadap penerapan pedagogi berbasis teknologi. Temuan utama menunjukkan bahwa keyakinan positif guru terhadap teknologi mendorong adopsi pedagogi inovatif, sementara keyakinan negatif membatasi penerapan teknologi dalam pengajaran. Implikasi penelitian ini mengarahkan pada pentingnya pelatihan dan kebijakan yang mendukung untuk mengoptimalkan penggunaan teknologi dalam pendidikan.

Kata Kunci: keyakinan guru, teknologi pendidikan, pedagogi inovatif, literatur review, integrasi teknologi

1. INTRODUCTION

The integration of innovative pedagogies, such as the use of digital technologies, educational applications, and internet-based resources, has great potential to transform the learning experience in the classroom (Goldhaber, 2021; , Feyzioğlu, 2012; , Donnelly et al., 2011). However, the implementation of these innovative pedagogies is often hampered by teachers' beliefs about technology (Bice & Tang, 2022;Thurm & Barzel, 2020; Salleh et al., 2021). Some teachers may see technology as a new challenge that is difficult to accept, while others may see it as a tool to strengthen existing teaching methods (Bice & Tang, 2022; , Salleh et al., 2021). Teachers who do not believe that technology can improve the learning experience or who feel they do not have the skills to use technology effectively may be reluctant to adopt it (Gözüküçük & Gunbas, 2020; , Thurm & Barzel, 2020). External factors, such as inadequate technology infrastructure or unsupportive education policies, can also exacerbate this situation (Handal et al., 2011; , Mertala, 2019). The irregularities in how teachers use technology create gaps in utilizing the full potential of innovative pedagogy (Bütün & Karakuş, 2021; , Jančaříková et al., 2022).

Researchers have found that teachers' beliefs about the nature of teaching, learning, and the role of technology are closely linked to their decision to integrate technology in the classroom (Kim, 2018; , Scherer et al., 2018; , Biesta et al., 2015). Beliefs that are more student-centered and technology-friendly are more likely to lead to effective integration of

innovative pedagogies (Bice & Tang, 2022; , Thurm & Barzel, 2020). To address this challenge, efforts should be made to understand and address the factors that shape teachers' beliefs about technology, such as their prior experiences, professional development, and institutional support (Boschman et al., 2014; , Mertala, 2019). Interventions that target changing teachers' pedagogical beliefs and improving their technological competence may be effective in promoting the adoption of innovative pedagogies (Cheng et al., 2020; , (Salleh et al., 2021).

Technological developments in the education sector have reached a very significant point, with new tools and learning platforms continuing to emerge and develop. Technologies such as online learning platforms, digital collaboration tools, and AI-based applications provide a variety of opportunities to change the way teaching is conducted. However, technology adoption in education does not occur uniformly. While some teachers quickly adapt to technology and utilize it to improve the quality of teaching, others may feel hampered by a lack of training, resources, or even limiting beliefs about technology. The educational context also greatly influences this adoption. For example, teachers in schools that have a strong technology infrastructure and adequate policy support will be more likely to integrate technology into their pedagogy compared to those working in schools with limited resources.

Educational policies that lead to the use of technology in the classroom also play an important role. In some countries or regions, technology-based education is regulated in policy, provides training for teachers, and provides the necessary hardware and software. However, in other places, these policies may be minimal, and teachers are not encouraged to use technology in their teaching. In addition, the level of education also influences the way technology is applied. At the elementary level, technology may be used more for entertainment purposes or light educational activities, whereas at the higher education level, technology is often more intensively used for research-based learning or content development. Although technology is believed to have great potential to improve the effectiveness of pedagogy, there is no clear consensus regarding how teachers believe about technology's role in this process. In some cases, teachers may feel unprepared or even reluctant to adopt technology, arguing that it could disrupt traditional teaching methods that have been proven successful. On the other hand, teachers who believe that technology can improve learning tend to be more proactive in trying various digital tools that support innovative pedagogy.

It is important to understand whether these teachers' beliefs influence their ability to integrate technology into their teaching practices, whether they limit or accelerate the adoption of innovative pedagogies. Therefore, understanding the factors that influence these beliefs and how they interact with external factors are critical to identifying appropriate ways to increase the application of technology in education. This research focuses on key questions: What role do teacher beliefs about technology play in the integration of innovative pedagogies in classrooms? The main aim of this research is to explore in depth how teachers' beliefs about technology influence the way they integrate technology in more innovative learning. By answering this question, it is hoped that we can find the main patterns and factors that influence technology adoption in the classroom. This research was motivated by the need to understand the complex relationship between teachers' beliefs about technology and the successful integration of innovative pedagogy. Although technology is often thought to be able to revolutionize education, the reality is that many teachers still face challenges in using it effectively. This research aims to identify the factors underlying teacher beliefs, both positive and negative, and how these influence innovative teaching and learning processes.

Through this understanding, research also provides useful insights for policy makers, educators, and training providers to design more effective training strategies, thereby improving teacher readiness and skills in better integrating technology. The specific objectives of this research include three main things. First, identify and analyze how teachers' beliefs about technology influence the adoption and implementation of innovative pedagogy in the classroom. Second, it presents insights that can be used to design better educational policies,

curricula, and training programs to increase the use of technology in classrooms. Third, explore external factors, such as educational policies and technological infrastructure, that can support or hinder the process of integrating technology in innovative pedagogy.

This research is expected to provide a significant contribution both theoretically and practically. From a theoretical perspective, this research enriches the literature with an in-depth understanding of the relationship between teacher beliefs and technology integration in innovative pedagogy. The results of this study provide a new perspective on the influence of psychological and social factors on technology adoption. Meanwhile, from a practical perspective, the findings of this research can help policy makers in designing educational policies that better support teachers to be more open to technology. In addition, these findings can also be used to design training programs that are relevant and appropriate to teacher needs, as well as provide practical recommendations for teachers in increasing the use of technology in their teaching. By understanding the dynamics of the relationship between teacher beliefs and technology integration, this research also opens up opportunities for further research to explore other factors that can accelerate technology adoption in education.

2. METHODS

This research uses an approach systematic literature review (SLR) to explore relevant literature regarding the relationship between teachers' beliefs about technology and the use of innovative pedagogy. Systematic literature review is a method used to identify, evaluate, and interpret all research relevant to a particular topic objectively and systematically. This approach is very useful to gain a more comprehensive understanding of a topic, especially in a very dynamic and developing context such as the integration of technology in education.

SLR allows researchers to:

1. Analyze key patterns emerging from existing literature, such as how teacher beliefs can influence technology adoption in innovative pedagogy.
2. Evaluate existing findings to ensure that the results obtained are not based on just one perspective or methodology, but are based on evidence from a variety of relevant studies.
3. Develop stronger and more reliable conclusions regarding the influence of teacher beliefs on technology integration in the classroom, which will become the basis for education policy and professional training.

This approach will identify various factors that influence teachers' confidence in using technology, such as cultural factors, educational policies, professional training, as well as limited infrastructure and resources. By using this method, this research aims to provide more in-depth and evidence-based insight into the challenges and opportunities faced by teachers in implementing innovative technology-based pedagogy.

2.1. Search Strategy

To do systematic literature review, the literature sources searched include articles published in international journals, books, and research reports that are relevant to the themes of technology, innovative pedagogy, and teacher beliefs. Some databases that will be used to search for literature include:

1. Google Scholar: Is the main source for finding relevant academic journal articles and theses. Google Scholar provides broad access to articles published in academic journals and international conferences.
2. JSTOR: A database that provides access to various academic journals in the fields of education and technology. JSTOR offers a collection of articles that can help in finding theories and studies related to the influence of teacher beliefs on technology use.

3. ERIC (Education Resources Information Center): A very important resource in education, especially in searching for literature related to educational research, including studies on educational technology and innovative pedagogy.
4. Scopus: This is a very useful database for finding high quality peer-reviewed journal articles. Scopus allows searches with various filters, making it easier for researchers to find articles that are highly relevant to the research topic.
5. PubMed: Mainly used for health and education research, but can be useful in finding articles about educational psychology and the influence of beliefs about technology.
6. SAGE Journals: Provides journal articles focused on educational research and teaching innovation.

During the search, researchers will use relevant keywords, such as "teacher beliefs about technology", "innovative pedagogy", "technology integration in education", "teacher perceptions of technology", and "pedagogical beliefs". The search process will be carried out using a combination of broader and more specific keywords to ensure more holistic and comprehensive results.

2.2. Inclusion and Exclusion Criteria

Developing inclusion and exclusion criteria is very important to ensure that the selected literature is truly relevant to the research topic. The following are the criteria that will be used:

2.2.1. Inclusion Criteria:

1. Focus on Teachers: Studies that focus on the role of teachers in the use of technology in education, both at primary, secondary and tertiary levels.
2. Qualitative and Quantitative Studies: Research that uses qualitative, quantitative, or mixed approaches that addresses teachers' beliefs about technology and how they influence the implementation of innovative pedagogy.
3. Scope of Formal Education: Studies that focus on formal education, whether at schools, colleges, or other relevant educational institutions.
4. Innovative Pedagogy and Technology: Studies that address the application of innovative, technology-based pedagogy in education, such as the use of digital tools, online learning platforms, and other technology-based teaching techniques.

2.2.2. Exclusion Criteria:

1. Studies outside formal educational contexts: Studies that are not related to formal educational contexts, such as non-formal education or teaching in non-academic contexts (e.g., corporate training or informal education), will be excluded.
2. Studies that are not relevant to technology: Studies that discuss innovative pedagogy but do not integrate technology in teaching will be ignored.
3. Articles with low methodological quality: Studies that use very limited or unreliable methodology, such as articles that are solely opinion pieces without empirical evidence, will be excluded.
4. Studies that do not focus on teachers' beliefs: Research that does not investigate teachers' beliefs or perceptions of technology or does not link such beliefs to the adoption of innovative pedagogy will be excluded.

These inclusion and exclusion criteria aim to ensure that only relevant and high-quality research will be included in the analysis, ensuring valid and reliable results.

2.3. Data Analysis

To analyze data obtained from relevant literature, this research will use the method thematic synthesis. This method is an approach that is often used in systematic literature

reviews to identify and organize the main themes that appear in the literature. The analysis process involves the following steps:

1. **Data Coding:** The researcher will read and categorize the main findings of each selected study. This coding will focus on aspects related to teachers' beliefs about technology, its influence on technology adoption, and the use of innovative pedagogy.
2. **Identify Themes:** Once the data has been coded, the researcher will identify major themes that appear frequently throughout the study. This theme can include factors such as trust in technology, perceived usefulness of technology, the influence of training on teacher beliefs, and barriers faced by teachers in using technology.
3. **Thematic Synthesis:** Using thematic analysis, the researcher will organize these themes into a narrative that explains the relationship between teacher beliefs and the application of technology in innovative pedagogy. This synthesis will also take into account various external factors such as educational policies and technological infrastructure that influence technological integration.
4. **Conclusions and Recommendations:** Based on the findings from the thematic synthesis, the researcher will draw conclusions regarding how teachers' beliefs influence the use of technology in innovative pedagogy and provide recommendations regarding implementation, teacher training, educational policies, and teaching practices that can improve technology integration in the classroom.

By using a thematic synthesis approach, this research will be able to present more holistic findings and provide practical and evidence-based recommendations to support the integration of technology in innovative pedagogy in the classroom.

3. RESULTS

In this section, the main findings from the reviewed literature will be presented regarding the relationship between teachers' beliefs about technology and the implementation of innovative pedagogy. These findings are based on the results of analysis of various studies that have been selected through a systematic literature review approach. These results include teachers' views on technology, factors that influence teacher beliefs, the impact of beliefs on the implementation of innovative pedagogy, as well as differences between teachers with open and conservative beliefs in adopting technology.

3.1. Teachers' Views on Technology (Positive vs Negative)

One of the main findings that emerged from the literature analysis was the diversity of teachers' views regarding the use of technology in learning. In general, these views can be grouped into two main categories: positive and negative.

3.1.1. A Positive View of Technology

Teachers who have a positive view of technology believe that technology can enrich the learning experience while speeding up the teaching process. They see technology as a tool that can increase student engagement, expand access to educational resources, and facilitate more personalized learning. For example, some teachers report that using online learning platforms such as Google Classroom or Moodle allows them to deliver material more flexibly while monitoring student progress in real-time. Teachers with positive beliefs towards technology tend to be more open to adopting technology-based pedagogical approaches, such as blended learning and gamification, in their teaching. These teachers experience immediate benefits from technology, including increased collaboration between students and the development of essential 21st century skills.

3.1.2. Negative Views of Technology

On the other hand, there are a number of teachers who have a negative view of the application of technology in education. They often feel that technology tends to distract students, widens access gaps between students with different resources, and can ultimately worsen the quality of learning. For example, some teachers complain that students' dependence on technology actually reduces face-to-face interaction in the classroom. Teachers with a negative view of technology worry that digital devices can weaken students' social skills and reduce their engagement in traditional learning activities. Apart from that, these teachers also often feel that technology is not always relevant to the curriculum they teach or experience difficulties in understanding how to use technology effectively in the teaching and learning process. Such negative views indicate significant challenges in optimally integrating technology in the classroom.

3.2. Factors Influencing Teacher Confidence

Various factors can influence how teachers form their views and beliefs about technology. Some of the main factors found in the literature are as follows:

1. Teaching Experience

Teaching experience is an important factor that influences the way teachers view and use technology in teaching. Teachers with long teaching experience and limited exposure to technology tend to be more conservative in adopting new technology. They often feel comfortable with traditional methods that they have used and proven to be effective. On the other hand, teachers who are newer to the profession are usually more open to the use of technology, as they have been familiar with advanced technological tools throughout their education. This creates differences in attitudes toward technology based on level of experience, which can ultimately influence how technology is integrated into the learning process.

2. Professional Training and Development

Training and professional development have an important role in shaping teachers' beliefs about technology. Teachers who receive effective technology training tend to feel more confident and skilled in using these tools in the classroom. Adequate training gives them a deep understanding of how to integrate technology with innovative teaching strategies. On the other hand, teachers who do not receive adequate training or support from educational institutions often feel anxious or lack confidence in using technology. This can prevent them from trying and integrating technology into the learning process, so that the potential of technology to improve the quality of education is not fully exploited.

3. Education Policy

Educational policy plays an important role in shaping teachers' perceptions and beliefs towards technology. Policies that encourage the use of technology in the classroom are often accompanied by adequate infrastructure support and relevant training, making it easier for teachers to understand the benefits of technology in the learning process. This kind of policy also provides recognition of the importance of technology as an integral part of modern education. On the other hand, unsupportive policies, such as minimal budget allocation for technological devices or teacher training, can hinder teachers' interest and ability to adopt technology. A conducive policy environment can help create positive attitudes of teachers towards technology and encourage them to integrate digital tools into teaching.

4. Infrastructure Technology

Adequate technological infrastructure is a crucial factor in shaping teacher confidence in the use of technology in the classroom. Teachers working in schools with limited access to technological tools, such as unstable internet or a lack of computers, often find technology

difficult to implement or even irrelevant to their learning needs. This condition can reduce their interest in integrating technology in teaching. In contrast, teachers who work in environments with good technological infrastructure tend to believe more in the potential of technology to improve the teaching and learning process. The availability of devices, internet networks and other supporting resources provides confidence and convenience for teachers to adopt technology in their teaching activities.

3.3. The Impact of Teacher Beliefs on the Implementation of Innovative Pedagogy

Teachers' confidence in technology has a direct impact on the implementation of innovative pedagogy in the classroom. Teachers who have a positive view of technology tend to be more open to integrating digital tools into their teaching methods, such as flipped classrooms, collaborative learning, and project-based learning. They leverage digital education platforms, online quizzes, and learning management systems (LMS) to create more interactive learning experiences. In fact, some progressive teachers are adopting cutting-edge technologies such as gamification, augmented reality, or virtual classrooms to increase student engagement and motivation. In contrast, teachers with a more skeptical view of technology often stick to traditional approaches, such as lectures, face-to-face discussions, and paper-based assessments. This option, although proven effective in some contexts, can limit innovation in teaching. The lack of technology adoption by this group of teachers can reduce students' opportunities to gain more modern and relevant learning experiences in the digital era.

3.4. Differences between Teachers with Open Beliefs and Teachers who are Conservative in Adopting Technology

The differences between teachers with open beliefs towards technology and conservative teachers are reflected in the way they adopt innovative pedagogy. Teachers with open beliefs towards technology tend to be more flexible and enthusiastic in integrating new technology into their teaching strategies. They utilize various digital tools and platforms to create more active, interactive learning and provide opportunities for students to carry out independent exploration. For example, they can use learning videos, online discussion forums, or project-based learning approaches equipped with technology tools such as Padlet or Trello, which allow students to collaborate online.

In contrast, teachers with conservative beliefs about technology are more limited in their application. They tend to use technology only as an additional tool without deep integration into the learning process. Technology may be used only for presentation purposes, such as using a projector or PowerPoint, or for computer-based assessments, without actively involving students in interactive learning or online collaboration. This shows that confidence in technology greatly influences the extent to which teachers can utilize the potential of technology to create innovative learning experiences. With these findings, this research can provide further insight into the importance of identifying teacher beliefs as a key factor in the integration of innovative technology-based pedagogy in the classroom.

4. DISCUSSIONS

This section aims to discuss the findings obtained in this research, connecting them with a research question: What role do teacher beliefs about technology play in the integration of innovative pedagogies in classrooms? The existing findings show that teachers' beliefs in technology play a crucial role in adoption and implementation of innovative pedagogy in the classroom. The following is a more in-depth discussion about the role, impact, factors, influences, and challenges in the integration of technology in learning, and how this is relevant to this research.

4.1. The Role of Teacher Beliefs in Technology Use

Teachers' beliefs about the potential of technology to enhance learning play a central role in the successful integration of technology into their pedagogy (Vongkulluksn et al., 2020; , Leem & Sung, 2018; , Bice & Tang, 2022). Teachers who have positive beliefs about technology are more likely to adopt and integrate innovative pedagogies that leverage technology, such as blended learning, gamification, or virtual classrooms (Vongkulluksn et al., 2020; , Bice & Tang, 2022). In contrast, teachers who have negative or skeptical beliefs about technology are more reluctant to use it in their teaching and tend to prefer traditional methods that do not involve intensive use of technology (Vongkulluksn et al., 2020; , Salleh et al., 2021). Research has shown that teachers with positive views about technology are more likely to adopt student-centered learning techniques, such as project-based learning or flipped classrooms, which rely heavily on technology tools to support active and collaborative learning experiences (Vongkulluksn et al., 2020; , Thurm & Barzel, 2021). On the other hand, teachers who are unsure about the effectiveness of technology in learning often only use technology as an aid, for example, only for presentations or computer-based assessments, without involving technology in the teaching process more deeply (Vongkulluksn et al., 2020; , Salleh, 2016).

Teachers' beliefs about the nature of mathematics, learning, and teaching mathematics can also influence their use of technology in the classroom (Kim, 2018; , Misfeldt et al., 2016). Beliefs about the potential benefits of technology use and beliefs about the time requirements of implementing technology may outweigh the importance of teachers' beliefs about negative effects of technology use (Thurm & Barzel, 2021). Overall, the literature suggests that teachers' beliefs about technology, their self-efficacy for technology integration, and their attitudes towards technology play a critical role in determining whether and how they choose to use technology in their teaching (Luik & Taimalu, 2021; , Rigi, 2015; , Giles & Kent, 2016). Positive beliefs and high self-efficacy are necessary for effective integration of technology in the classroom (Whole & Karakuş, 2021; , Giles & Kent, 2016).

4.2. Impact of Teacher Confidence

Research has shown that teachers' beliefs about the effectiveness of technology in education significantly influence their decisions to adopt more innovative pedagogical techniques (Vongkulluksn et al., 2020; , Opre, 2022; , Bice & Tang, 2022). Teachers with more positive beliefs about technology tend to use it to support more creative and student-centered teaching methods, which encourage students to be more actively involved in the learning process (Vongkulluksn et al., 2020; , Bice & Tang, 2022; , Lai et al., 2022). For example, teachers who believe that technology can enhance learning may use digital simulations, virtual reality, or interactive learning software to make the subject matter more engaging and relevant to students' real-life experiences (Vongkulluksn et al., 2020; , Bice & Tang, 2022). Conversely, teachers with negative beliefs or a lack of beliefs about technology may be less likely to explore technology-based learning methods, even though research has shown that technology can improve the quality of teaching (Bice & Tang, 2022; , Salleh et al., 2021). Several studies have found that teachers' pedagogical beliefs, self-efficacy, and technological knowledge are key factors in determining their technology integration practices (Caner & Aydin, 2021; , Ramnarain, 2023; , Thurm & Barzel, 2020). Positive beliefs about the value and usefulness of technology, as well as confidence in one's ability to use it effectively, are associated with greater technology integration in the classroom (Caner & Aydin, 2021; , Ramnarain, 2023).

Contextual factors, such as school culture, professional development, and access to technical support, can also shape teachers' beliefs and influence their technology integration (Ifinedo et al., 2020; , Nguyen & Tran, 2022; , Abedi et al., 2023). For example, a lack of technical support has been identified as a barrier to technology adoption, as teachers may feel less confident in using technology if they do not have access to adequate support (Kamau et al., 2018). In summary, the research indicates that teachers' beliefs about the value and

effectiveness of technology in education are a critical factor in determining their technology integration practices. Positive beliefs are associated with more innovative and student-centered teaching methods, while negative beliefs or a lack of beliefs can hinder the use of technology-based learning approaches, even when the technology has been shown to be beneficial (Vongkulluksn et al., 2020; , Bice & Tang, 2022; , Caner & Aydin, 2021).

4.3. Factors Influencing Teacher Confidence

4.3.1. Personal Experience

Teachers' personal experiences with using technology greatly shape their beliefs about its benefits and applications in the classroom (Rich et al., 2017; , Ruggiero & Mong, 2015; , Kim et al., 2013). Teachers who have had positive experiences with technology tend to be more confident and open to integrating it into their teaching (Rich et al., 2017; , Ruggiero & Mong, 2015). Conversely, teachers with negative or limited experiences may be more skeptical about the value of technology (Rich et al., 2017; , Ruggiero & Mong, 2015).

4.3.2. Professional Training

Adequate and ongoing professional development and training in educational technology is essential for shaping teachers' beliefs and confidence in using technology for teaching and learning (Tessema & Belihu, 2023; , Lekhu, 2019; , L. et al., 2022). Research has shown that training programs can increase teachers' self-efficacy and encourage them to use it more frequently in their classrooms (Tessema & Belihu, 2023; , Lekhu, 2019).

4.3.3. School Policies and Technology Infrastructure

Schools with strong technology infrastructure and supportive policies that facilitate technology integration are more likely to have teachers who hold positive beliefs about the use of technology in education (Goldhaber, 2021; , Austin & Hunter, 2013; , Zagami et al., 2018). Clear policies that provide devices, internet access, and other resources make it easier for teachers to effectively integrate technology into their teaching (Goldhaber, 2021; , Austin & Hunter, 2013). In summary, teachers' personal experiences, professional training, and the technology-related policies and infrastructure at their schools are key factors that shape their beliefs about the role and value of technology in the learning process (Rich et al., 2017; , Ruggiero & Mong, 2015; , Tessema & Belihu, 2023; , Lekhu, 2019; , Goldhaber, 2021; , Austin & Hunter, 2013).

4.4. Challenges and Opportunities

In the process of integrating technology in the classroom, there are several challenges which need to be faced as well as opportunities which can be utilized to accelerate technology adoption. Teacher Challenges in adopting technology in the world of education cover various aspects. Limited access to hardware and a stable internet connection is a major obstacle, especially in schools located in rural or developing areas. In addition, the lack of adequate training for teachers also worsens the situation, because without sufficient knowledge, teachers often find it difficult to integrate technology effectively in their teaching. Apart from that, cultural barriers are also a significant factor, where some educational cultures still prioritize traditional teaching methods, so that technology integration is considered less important or even irrelevant to implement.

Opportunities to increase technology adoption in education are wide open through various strategic steps. One of the main opportunities is improving teacher training that focuses more on technology and pedagogical innovation, so that teachers feel more confident and ready to integrate technology in teaching. In addition, education policies that support the provision of technological infrastructure and continuous training can speed up the process of adopting technology in the classroom. Collaboration between schools and technology

providers is also a great opportunity to provide the necessary devices while providing adequate training to maximize the potential of technology in learning.

In the context of this research, understanding these challenges and opportunities is very relevant to identify strategies that can help teachers overcome barriers and take advantage of existing opportunities to increase the use of technology in their teaching.

5. CONCLUSION

5.1. Summary of Findings

This research shows that Teachers' beliefs about technology plays a very important role in the extent to which technology can be integrated in innovative pedagogy in the classroom. Teachers who have positive beliefs about technology tend to be more open and ready to adopt more innovative and creative technology-based teaching methods. They see technology as a tool that can enrich students' learning experiences and improve learning outcomes. For example, they are more likely to apply engineering flipped classroom or blended learning, which requires the use of a variety of technology tools to support collaboration and independent learning.

In contrast, teachers who hold negative beliefs or are skeptical of technology are often more cautious about integrating technology into their teaching. They may see technology as a distraction or as a tool that does not suit their educational needs. Teachers with these views are more likely to stick with more traditional teaching approaches, such as lectures or face-to-face class discussions, and are less likely to exploit the full potential offered by technology in enhancing student learning.

These findings are critical to answering the main research questions: What role do teacher beliefs about technology play in the integration of innovative pedagogies in classrooms? The results of this study confirm that teachers' beliefs about technology have changed their direct influence to have addressed their ability to integrate innovative pedagogy in the classroom. Teachers with positive beliefs about technology are more able and more willing to explore and implement technology-based teaching methods, which in turn can support more effective and holistic learning.

5.2. Practical Implications

The findings of this research have several practical implications that can be applied in the field. One of the main recommendations is the need for a teacher training program which is designed to change negative beliefs And strengthen positive beliefs about the potential of technology to improve learning. These training programs should not only teach technical skills in using technology tools, but should also focus on changes in teacher perceptions towards technology. Teachers must be convinced that technology is not just a tool for supporting teaching but it can also be the main driver in more personalized, collaborative and interactive learning. Besides that, supportive education policies are indispensable to strengthen technology adoption in classrooms. The government and educational institutions must ensure that infrastructure technology adequate provisions are available to all schools, as well as supporting ongoing training for teachers. Education policy that introduces provision of technological devices, stable internet access, And technical support can reduce the barriers often faced by teachers who want to integrate technology in their teaching.

It is also important for educational institutions to create an environment that supports a culture of innovation. For example, encouraging collaboration between teachers in using technology and sharing experiences about technology-based teaching techniques can strengthen teachers' beliefs in the benefits of technology. By creating a professional learning community that focuses on pedagogical innovation, schools can increase teachers' readiness and enthusiasm for integrating technology in their teaching.

5.3. Future Research Directions

This research provides some important insights, but there is still room for further research in this area. One future research direction that can be taken is to explore other factors which affect the relationship between teacher confidence and the use of technology in teaching. For example, how school culture And education policy can strengthen or hinder teachers' adoption of technology. Research can explore whether school policy those who support technology are more successful in influencing teachers who have negative beliefs compared to those who have positive beliefs. Apart from that, collaboration between teachers is also an interesting area for further research. How collaboration between teachers in planning and implementing technology in the classroom can strengthen teachers' confidence and encourage them to be more courageous in trying innovative pedagogies? Research can also explore how a professional community technology-based can help teachers develop their technology skills and share innovative resources and ideas.

Next, research can explore differences in teacher views at various levels of education, such as primary, secondary and higher education. Do differences in teachers' experience and training at each of these levels influence their confidence in technology and adoption of innovative pedagogy? This could be a particularly relevant area for enriching understanding of the relationship between teacher beliefs and technology use in broader contexts. By digging deeper into the factors that influence penerln terms of technology, future research can provide more detailed recommendations on how education systems can support teachers on their journey to make the most of technology in their teaching.

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