

Development of Learning Models to Enhance Students' Creative Thinking: A Systematic Literature Review

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Abstract: Creative thinking is an essential component in education that drives innovation, problem-solving, and the development of students' critical thinking skills. This study aims to review various learning models designed to enhance students' creative thinking abilities through a systematic literature review (SLR). Following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework, this research identifies, screens, and evaluates relevant articles from the Scopus database, resulting in eight studies that meet the inclusion criteria. The results indicate that, following innovative learning models such as play-based activities, digital-based virtual classrooms (VCLE), basic movement through play approaches, and project-based mathematics learning are effective in improving creativity, problem-solving, collaboration, and student learning motivation. The integration of technology, STEAM approaches, and creative game design also show positive effects in enhancing students' creative thinking skills. The higher distribution of research at the tertiary education level highlights the need for greater focus on other educational levels, particularly secondary education, to ensure the benefits of learning innovation are evenly distributed. These findings provide practical implications for educators and policymakers, emphasizing the importance of using innovative teaching methods, integrated technology, and the role of teachers as facilitators to develop a conducive learning environment for student creativity. The study also identifies several limitations, including small trial scales and short research durations, indicating the need for further research with larger scales and longer durations. By continually exploring and developing effective learning models, it is expected that students can achieve their maximum potential in dynamic and diverse learning environments.

Keywords: Creative Thinking, Learning Models, Systematic Literature Review

A. Introduction

Creative thinking is a fundamental component in education, significantly contributing to innovation, problem-solving, and the development of students' critical thinking skills. Enhancing students' conceptual understanding and problem-

solving abilities across various academic disciplines is crucial for their current learning and future success. For instance, fostering creative thinking skills among students is essential in preparing them for the challenges of the modern educational landscape (Nuha et al., 2018); (Li et al., 2022); (Musdi, 2024); (Setiawan & Fitriani, 2023).

Various studies emphasize the importance of creative thinking in educational contexts. Creating a creative learning environment significantly enhances students' learning goal orientation, networking, and knowledge sharing, thereby fostering their creativity (Zhan et al., 2024). Additionally, the use of self-regulated learning strategies, such as goal-oriented monitoring and evaluation, ideation planning, and emotional control, has been identified as a key predictor of students' creative thinking levels (Liu et al., 2022).

Effective learning models are crucial in education as they serve as structured approaches to achieving learning objectives efficiently and successfully. Numerous studies highlight the importance of well-designed learning models in improving learning processes and outcomes. For example, the development of Project-Based Learning Models in subjects such as Object-Oriented Programming has been shown to include various essential components such as course learning outcomes, selection of learning materials, and rubric development, all aimed at achieving targeted learning goals (Idris, 2024). Similarly, the effectiveness of blended learning models in vocational high schools demonstrates success in achieving set learning objectives (Utami, 2018).

Moreover, teachers play a vital role in fostering creativity. Particularly during challenging periods like the COVID-19 pandemic, teachers' creativity and well-being are crucial as they guide creative thinking and behavior through regular practice to instill confidence and adaptive attitudes toward creative challenges (Anderson et al., 2021). Furthermore, studies on the impact of transformational leadership on employee creativity indicate that learning orientation acts as a moderator between leadership style and creativity (Jyoti & Dev, 2015).

The integration of technology in education is recognized as a valuable tool for enhancing collaborative creativity. Digital technology serves as a tutor, tool, and medium that can stimulate, model, and support essential co-creative processes among students, thereby enriching collaborative creativity in language education (Sastre et al., 2022). Additionally, web-based applications have been explored as a means to foster students' creativity in specific subjects, such as English for Specific Purposes, particularly in the context of distance learning (Simkova et al., 2021).

Flexible learning environments are crucial in supporting students' creative exploration by providing adaptable and dynamic spaces that encourage creativity

and innovation. Research provides valuable insights into the effectiveness of flexible learning environments in fostering student creativity. For example, (Fan & Cai, 2020) emphasize that creative learning environments value ideas, encourage reasonable risk-taking, and support students in reaching their creative potential by allowing them to make mistakes and explore freely. Furthermore, (Henriksen et al., 2020) explore the concept of mindfulness in digital game-based creative learning, highlighting the importance of mindful learning as a flexible mindset that enhances creativity by promoting active engagement with the present moment and sensitivity to context. This suggests that a flexible mindset can contribute to creative thinking and exploration in learning environments.

Pedagogical approaches based on interaction, inquiry, problem-solving, and interdisciplinary methods in flexible and open environments can foster student autonomy, cooperation, and creative thinking skills (Rodríguez et al., 2019). Additionally, flexibility in teaching methods and curriculum design is essential to empower students to explore diverse artistic expressions, collaborate, and engage in creative endeavors (Ummah et al., 2019); (Daud, 2024). These studies emphasize that giving students control over their learning and supporting exploration are crucial steps in nurturing their creative potential.

Teachers play a critical role as facilitators in enhancing student creativity through various behaviors and approaches. Research highlights the significance of teachers' roles in nurturing creativity among students. For example, teachers' fixed and growth creative mindsets significantly influence the maintenance of classroom creativity, underscoring the importance of teachers' beliefs in fostering students' creative potential (Paek & Sumners, 2017). Similarly, creative self-efficacy mediates the relationship between parental and teacher responsiveness and student creativity, emphasizing the impact of supportive teacher feedback and supervisory styles on enhancing students' creative self-efficacy (Zhang et al., 2022).

Teacher behaviors that encourage creativity are important in enhancing students' creative achievements, highlighting the mediation of intrinsic motivation and moderation of openness to experience in this relationship (Du et al., 2019). Moreover, the creative role identity, creative self-efficacy, and teaching for creativity among primary and secondary school teachers show different emphases on aspects of creativity (Huang, 2022). Furthermore, the importance of teachers' roles in facilitating creativity by incorporating teaching elements that promote creativity while achieving educational objectives set by the curriculum (Štemberger & Konrad, 2022). Additionally, the crucial role of teachers in providing emotional support to students and serving as professional role models significantly contributes to students' creative development (Fazal et al., 2023).

In conclusion, facilitating creative thinking in education involves creating conducive learning environments, implementing effective teaching strategies, and leveraging technology to enhance collaborative creativity among students. By prioritizing creativity in education, students can develop essential skills crucial for their academic success and future endeavors. This systematic review identifies and highlights the development of effective learning models to enhance students' creative thinking. Key factors include the use of innovative learning methods, flexible learning environments, teachers' roles as facilitators, and game-based learning and outdoor activities. This review provides empirical evidence supporting the development and implementation of adaptive creative learning models for various educational contexts and emphasizes the need for further research to evaluate the long-term effectiveness of these models.

B. Methods

This study employs the Systematic Literature Review (SLR) methodology, following the framework of the "Preferred Reporting Items for Systematic Reviews and Meta-Analyses" (PRISMA). The steps taken include formulating clear research questions, conducting systematic searches in relevant databases, screening and selecting studies based on predefined criteria, collecting data from the selected studies, assessing the quality of included studies, and integrating the findings (Brouillette et al., 2017); (Moher et al., 2009); (Page et al., 2021); (Walker et al., 2017). By adhering to PRISMA guidelines, this methodology ensures rigor and transparency at every stage of the review, making the process organized and comprehensible. The primary goal of this SLR is to provide a rigorous and transparent synthesis of research related to the development of learning models that enhance students' creative thinking abilities, utilizing principles outlined by (Nandeesh, 2024) and (d'Este et al., 2021). This process not only offers a comprehensive overview of current knowledge but also yields an unbiased summary of existing literature.

Research Procedure

Establishing Inclusion and Exclusion Criteria

Search parameters were set to include journal articles and reviews published in English from 2019 to 2024. This time range was chosen to focus on the latest developments in learning model development related to enhancing students' creative thinking abilities, while the restriction to journal articles aims to ensure that only rigorously peer-reviewed and significantly impactful studies are included. Exclusion criteria were applied to eliminate book chapters, books, and conference proceedings, focusing attention on periodical literature, which often undergoes rigorous peer review. Table 1 details the inclusion and exclusion criteria used in this study.

Table 1. Inclusion and Exclusion Criteria

Type	Criteria Details
Inclusion	Articles published between 2019-2024 Journal articles Keywords: “model development,” “learning,” and “creative thinking” Developmental research articles in English
Exclusion	Book chapters Books Conference proceedings

Search and Screening Procedure

The SLR method was used to identify and highlight the development of effective learning models in enhancing students’ creative thinking abilities. A comprehensive literature search was conducted through the Scopus database to gather literature that meets the specified criteria. The search string used on June 30, 2024, was: `TITLE-ABS-KEY: “development AND models AND learning AND creative AND thinking”`. This search yielded 692 documents.

Screening Process for Inclusion

The authors then reviewed articles published in the last five years. The titles and abstracts of these documents were evaluated to ensure relevance to the research topic. This crucial step involved a thorough assessment of each study’s alignment with the main theme, namely, the development of learning models and the enhancement of students’ creative thinking abilities.

Quality and Eligibility Assessment

Full-text screening was conducted to assess the quality and relevance of the identified studies. A total of 28 studies were eliminated for not aligning with the type of developmental research under review, and one study, although matching the type, was excluded for not being in English. Finally, eight studies were identified as potential candidates for inclusion in this systematic review.

The selected studies were then thematically analyzed to identify key themes and common characteristics in the literature. This methodological approach not only highlights the similarities and differences among the studies but also determines the learning models that have been developed in the field. The thoroughness of the literature search and subsequent analysis process ensures that this systematic review captures a broad spectrum of empirical evidence, providing a deeper understanding of creative thinking in an educational context. The selected studies, meeting

stringent inclusion criteria, provide a corpus of research that supports an objective and structured examination of learning model development to enhance students' creative thinking abilities.

C. Results and Discussion

Study Selection and Screening Process

The selection and screening process in academic research requires systematic and structured methods to ensure that only relevant and high-quality studies are included in the review. The following flowchart illustrates the critical steps taken to identify, screen, and evaluate articles from databases and registers, aiming to compile a comprehensive and reliable literature review.

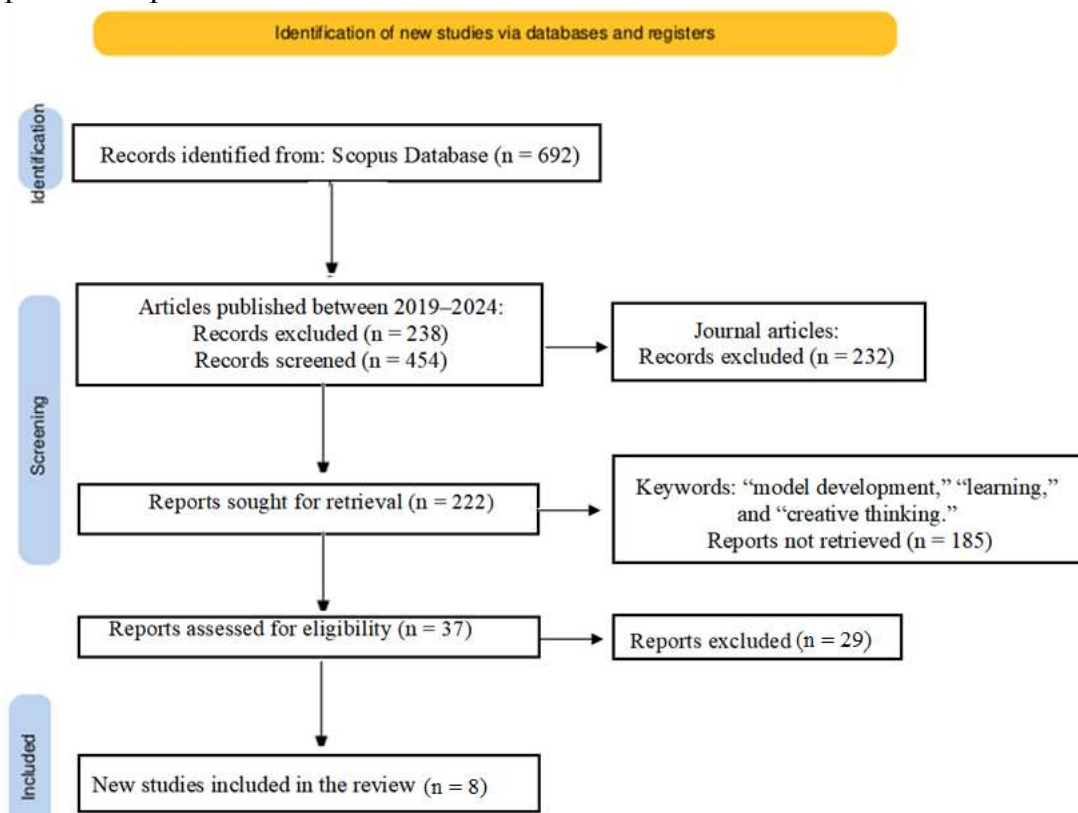


Figure 1. Mapping of the article selection process for systematic review

The process began with identifying 692 articles from the Scopus database. From this number, articles published between 2019 and 2024 were further screened, resulting in 454 articles eligible for evaluation. In this screening step, 238 articles were initially excluded for not meeting the publication year criteria. Next, from the 454 screened articles, 232 journal articles were excluded for not aligning with the required topics. Further screening was conducted based on specific keywords such as “model development,” “learning,” and “creative thinking.” Through these criteria, 222

reports were sought for further retrieval, but 185 reports could not be obtained. After the retrieval stage, 37 reports were successfully obtained and assessed for eligibility. From this assessment, 29 reports were excluded for not meeting the established eligibility criteria. Finally, from the entire process of identification, screening, retrieval, and eligibility assessment, eight new studies were selected and included in the review. This process demonstrates the rigor and precision in selecting relevant and high-quality studies for review, ensuring that the final results are based on the most pertinent and up-to-date information.

Synthesis of Research on Learning Model Development

The development of effective and innovative learning models is a primary focus in current educational research. Various approaches have been undertaken to enhance creative thinking, problem-solving skills, and learning motivation among students across different educational levels. To understand the various strategies and learning models that have been developed, the following table summarizes several studies related to this topic. The table includes information about the authors, research synthesis, journal index, and publication year, providing a comprehensive overview of the innovations and effectiveness of the implemented learning models.

Table 1. Synthesis of Research on Learning Model Development to Enhance Creative Thinking Skills

No	Authors	Synthesis	Journal Index	Year	Cited
1	(Kusnanik & Winarno, 2019)	This study developed a play-based activity learning model to enhance creative thinking skills in early childhood. Using an Educational Research and Development approach, instrument validation showed that three out of five activities were highly valid. Pre- and post-tests indicated that this model effectively improved creative thinking skills in children aged 4-5 years.	Q1	2019	0
2	(Wannapiroon & Pimdee, 2022)	This study developed a digital-based virtual classroom learning model (VCLE) to enhance creative thinking and innovation skills among STEAM students in Thailand. Through qualitative and quantitative approaches, this study identified five beneficial STEAM-ification steps and three main effective gamification components. Results showed that students learning with the VCLE format achieved significantly higher levels of creativity and innovation compared to traditional teaching methods.	Q1	2022	43
3	(Damanik et al.,	This study developed a basic movement	Q1	2023	0

	2023)	learning model through a play approach to enhance creative thinking skills in elementary school students. Using the Borg and Gall research method, this model demonstrated effectiveness in supporting physical education learning processes. The study highlights the importance of innovation in teaching methods to create more relevant and engaging learning experiences for students.			
4	(Wawan et al., 2023)	This study developed a project-based mathematics learning model integrated with ethnomathematics and technology to enhance problem-solving, creative thinking, collaboration, and student learning motivation. With high validity and reliability, this model proved to be very practical and effective in enhancing students' abilities in various measured aspects. This study provides an alternative solution for teachers in designing new learning cultures and improving the quality of mathematics education.	Q1	2023	0
5	(Sakon & Petsangsri, 2021)	Developed the CREATE learning model for creative packaging design using the STEAM approach. The study results indicated that this model effectively enhanced students' creativity in packaging design.	Q2	2021	6
6	Martínez et al., 2023	This study showed that developing a deep learning model involving students in research development could enhance their creative thinking skills and commitment to their training process.	Q1	2023	0
7	(Wannapiroon & Petsangsri, 2020)	Developed a STEAMification model in a flipped classroom learning environment to enhance students' creative and innovative thinking. The study results indicated that students learning through this model had higher creativity and quality of creative innovation compared to those learning through the normal model.	Q2	2020	11
8	(Md Tap et al., 2021)	Developed a creative game design training model, finding that intelligence, thinking style, motivation, experience, and game genre are essential components. This model was validated with an IRR coefficient of 0.90, indicating high reliability.	Q3	2021	2

The table above summarizes several studies focusing on the development of learning models to enhance creative thinking skills across different target groups. Each entry includes information about the authors, research synthesis, journal index, and publication year. Through this table, we can see how various approaches and

methodologies are applied to create more effective and innovative learning environments.

Data Analysis

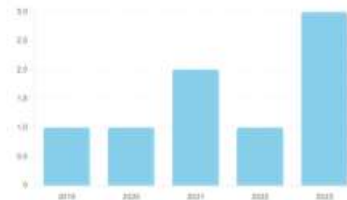


Figure 2. Number of Studies per Year

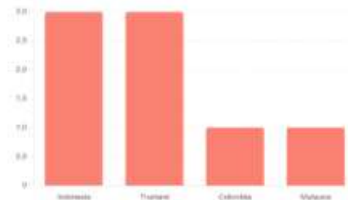


Figure 3. Number of Studies by Country

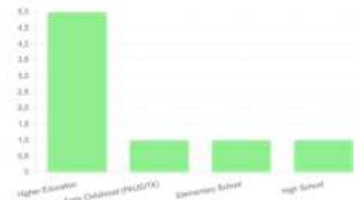


Figure 4. Number of Studies by Education Level

Figure 2 shows the number of studies conducted each year. It can be seen that most studies were conducted in 2023, with the same number in 2019, 2020, 2021, and 2022. This indicates a significant increase in recent research in 2023.

Figure 3 shows the number of studies conducted in various countries. Indonesia and Thailand are the countries with the most studies, each with four studies. Colombia and Malaysia each contributed one study. This reflects the significant contributions of Indonesia and Thailand in this field of education.

Figure 4 shows the number of studies conducted at various educational levels. Higher Education has the most studies with six studies. Other education levels such as Early Childhood and Elementary School as well as High School each have one study. This shows a strong focus on improving education at the higher education level.

These diagrams provide a clear picture of the distribution of studies by year, country, and education level, helping to understand trends and focus in current educational research. The above graph is a horizontal bar chart depicting various learning models outlined in the research, along with their results. Each bar on the chart represents one learning model, and the length of the bar indicates the number of models described (all units). Each learning model displayed in the graph has positive research results, demonstrating the effectiveness and reliability of the models in enhancing various student skills, such as creative thinking, innovation, and problem-solving.

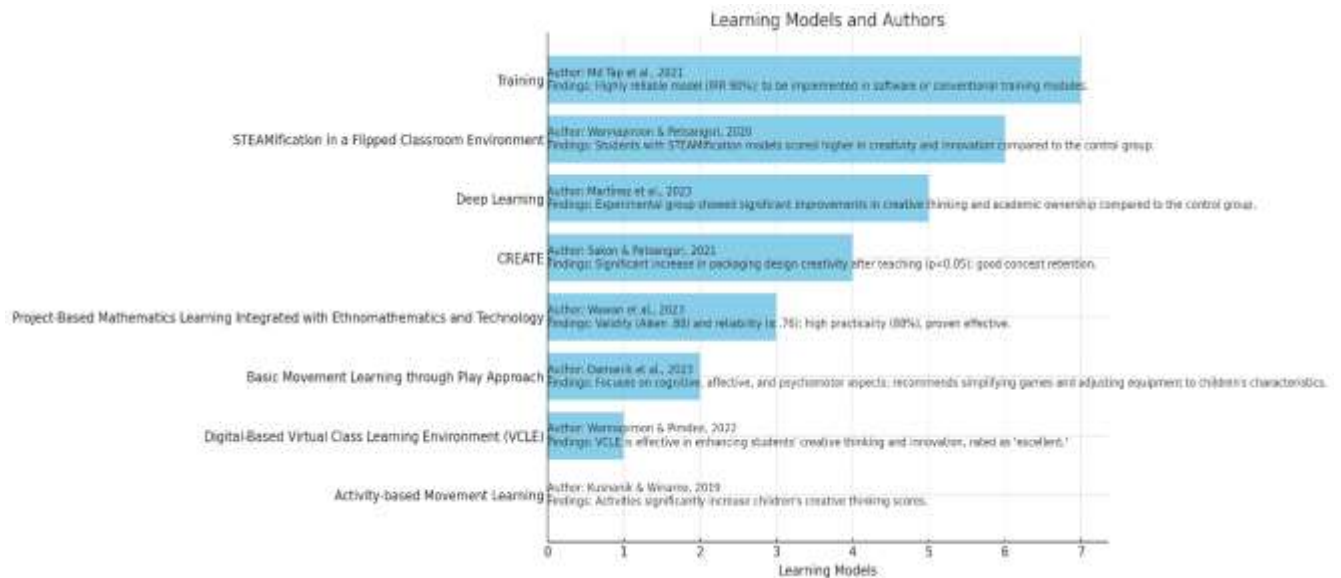


Figure 5. Learning Models to Enhance Creative Thinking: Authors and Main Findings

Figure 5 provides a comprehensive view of various learning approaches that have been tested, showing the diversity of methods used to enhance creative thinking and other aspects in the educational context. The presented research findings demonstrate the effectiveness and practical potential of each model, providing insights for educators and researchers in developing innovative learning strategies.

Discussion and Implications

Effectiveness of Learning Models

This study underscores the diverse innovative approaches in the development of learning models designed to enhance students' creative thinking skills. The play-based activity learning model developed by (Kusnanik & Winarno, 2019) showed a significant increase in early childhood creative thinking skills. This research used the Research and Development (R&D) methodology and concluded that integrating physical activities into learning not only boosts creativity but also provides adequate physical stimulation, making it an effective method for early childhood education.

The digital-based virtual classroom learning model (VCLE) developed by (Wannapiroon & Pimdee, 2022) highlights the importance of using technology in learning. This study shows that gamified learning environments can enhance creative thinking and innovation skills among STEAM students. By integrating qualitative and quantitative approaches, this research demonstrates that the VCLE method is effective in enhancing students' skills compared to traditional teaching method.

The basic movement learning model developed by (Damanik et al., 2023) uses a play approach to enhance creative thinking skills in elementary school students. The results of this study emphasize the importance of innovation in physical education teaching methods, which not only make learning more engaging but also support cognitive and motor development in students.

The research by Wawan et al., (2023) developed a project-based mathematics learning model integrated with ethnomathematics and technology. This study shows that this approach is effective in enhancing problem-solving skills, creative thinking, collaboration, and student learning motivation. The high validity and reliability of this model provide an alternative solution for teachers in improving the quality of mathematics education.

Geographic Distribution and Educational Levels

The distribution of research by country shows that Indonesia and Thailand have significant contributions to the development of innovative learning models. Research conducted in these two countries demonstrates various approaches that can be adapted to their local contexts, providing tangible examples for other countries aiming to improve their education systems.

Figure 3 shows that the majority of research focuses on higher education, with little research conducted at the primary and secondary education levels. This indicates that although there is much innovation in higher education, there is still a need for more research at other educational levels, especially secondary education. The lack of research at the junior high school level indicates a gap that needs to be addressed to ensure that all educational levels benefit from proven effective learning innovations.

Practical Implications

The results of this research have significant practical implications for educators and policymakers. The developed learning models show that the use of technology, integration of physical activities, and project-based approaches can effectively enhance students' creative thinking skills. Researchs by Sakon & Petsangsri (2021) and (Wannapiroon & Petsangsri, 2020) show that STEAM education integrated with learning methods such as flipped classrooms and creative packaging design can significantly enhance student creativity.

The use of deep learning models involving students in research development, as shown by Martínez et al., (2023), provides evidence that this approach can enhance students' creative thinking skills and commitment to their training process. This

emphasizes the importance of giving students opportunities to engage in real research projects as part of their curriculum.

The creative game design training model developed by Md Tap et al., (2021) shows that various components such as intelligence, thinking style, motivation, and experience play important roles in successful game design. This research offers new insights into the importance of creativity in game design and supports the development of effective training methods for educating creative and innovative game designers.

Limitations and Recommendations

Although these studies show positive results, several limitations need to be considered. Many studies are conducted in limited geographic contexts, primarily in Indonesia and Thailand, which may not reflect the situation in other locations. These geographic limitations mean the findings may not be universally applicable, as educational systems, cultural contexts, and available resources can significantly vary between regions, affecting the implementation and outcomes of the learning models. Therefore, further research in diverse geographic locations is needed to ensure the generalizability of the findings. Studies conducted in different regions can help identify context-specific factors that influence the effectiveness of learning models.

Most studies also have small trial scales and short durations. To obtain more comprehensive and representative results, it is recommended to expand the trial scale and increase the duration of the research. Long-term studies will help assess the sustained impact and retention of skills developed through learning models.

Another limitation is the focus on one curriculum subject, which limits the application of the research findings to other subjects. Conducting research that covers various curriculum subjects will help test the effectiveness of learning models in a broader context.

Some studies also rely on technology that may not be widely available in all educational institutions. Therefore, it is important to develop learning models that consider technology accessibility so they can be applied more widely.

Overall, these studies provide valuable insights into how various innovative learning models can be used to enhance students' creative thinking skills. By understanding the strengths and limitations of each model, educators and policymakers can take appropriate steps to implement the most effective methods in their respective contexts. These findings also pave the way for further research to explore and develop better learning models, which can help students achieve their maximum potential in dynamic and diverse learning environments.

D. Conclusions

This study confirms that innovative learning models, such as play-based activities, digital classrooms, and project-based approaches, effectively enhance students' creative thinking across different educational levels. However, there remains a gap in research at the secondary education level, indicating the need for further exploration. To maximize the potential of these models, future studies should address limitations such as small sample sizes and short study durations, ensuring broader application and deeper insights for educators and policymakers.

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