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DESIGN THINKING IN TEACHER PROFESSIONAL DEVELOPMENT: A TRANSDISCIPLINARY APPROACH TO CURRICULUM INNOVATION

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ABSTRACT

This research aims to explore the role of a design thinking approach in teacher professional development as a transdisciplinary strategy to foster curriculum innovation. Using a literature review, this research examines various academic sources and empirical studies that discuss the integration of design thinking in educational contexts, particularly in teacher training and capacity development. Findings indicate that design thinking not only enhances teachers' ability to design relevant and creative learning experiences but also fosters cross-disciplinary collaboration, empathy for student needs, and increased flexibility and responsiveness to curriculum change. This approach strengthens teachers' position as adaptive and reflective learning designers in facing the complex challenges of the 21st century. Therefore, adopting design thinking in teacher professional development programs is considered strategic for generating contextual and sustainable curriculum innovation.

Keywords: Design thinking, teacher professional development, curriculum innovation, transdisciplinary approach.

INTRODUCTION

Rapid developments demand fundamental changes in the education system, particularly in the context of teacher professional development. Facing the challenges of globalization, digitalization, and the complex needs of 21st-century students, conventional teaching paradigms are no longer adequate. Teachers are required not only to deliver material but also to be learning designers capable of adapting the curriculum to real-world dynamics (Leonard et al., 2016a). Therefore, the urgency of new approaches to teacher professional development is increasingly pressing. One innovative approach that has gained increasing attention in recent years is design thinking. This approach offers a creative, collaborative, and solution-based way of thinking in designing a curriculum that is relevant and responsive to change.

Design thinking, which initially developed in the world of product and technology design, is now being widely adopted in various sectors, including education. Its essence lies in the ability to understand user needs (in this case, students), explore problems in depth, and create contextual and sustainable solutions (Blundell, 2024a). In the realm of teacher professional development, design thinking offers a framework that encourages teachers to think like designers, placing student needs at the center of curriculum innovation. This approach encourages an iterative process involving empathy, idea exploration, prototyping, and continuous evaluation. Through this process, teachers become not only curriculum implementers but also key actors in designing transformative learning experiences.

The application of design thinking in teacher professional development also paves the way for a transdisciplinary approach to curriculum innovation (Wang, 2024). Transdisciplinarity offers a conceptual and practical foundation for overcoming the

limitations of a single-discipline approach that often limits the exploration of creativity and curriculum flexibility (Seidel et al., 2020a). In the educational context, a transdisciplinary approach encourages cross-disciplinary collaboration, a unification of perspectives, and a more holistic integration of knowledge. When teachers are trained in a design thinking approach within a transdisciplinary framework, they become more open to cross-subject collaboration, the development of real-world problem-based projects, and the development of critical, creative, and reflective thinking skills in the teaching and learning process.

This phenomenon demonstrates that the integration of design thinking and transdisciplinary approaches in teacher professional development is not merely a methodological innovation, but also a strategic strategy for responding to the challenges of 21st-century education (Soto-González et al., 2023). Curriculum developed through interdisciplinary collaboration and designed with a design thinking approach will be better able to meet the needs of students living in a complex, rapidly changing, and uncertain society. Furthermore, teachers will have the capacity to engineer contextual, meaningful, and student-centered learning, rather than simply following rigid and uniform curriculum instructions.

However, adopting this approach is not immediately easy. Many teachers are unfamiliar with design thinking, primarily because professional training has traditionally focused on mastering content and traditional teaching methods. The bureaucratic culture in education also presents a barrier, where innovation is often limited by hierarchical structures and rigid regulations. Furthermore, the transdisciplinary approach is still considered new and has not been systematically explored in the context of curriculum development in formal education settings, particularly at the elementary and secondary levels (Pohl et al., 2020). Therefore, an in-depth and systematic study is needed on how design thinking can be effectively integrated into teacher professional development, particularly through a transdisciplinary approach.

This research is highly relevant in filling the gap in educational literature and practice regarding the synergy between design thinking, teacher professional development, and transdisciplinary curriculum innovation. This study is expected to provide conceptual and practical contributions in developing a teacher training model that focuses not only on improving technical competency but also encourages teachers to become innovative and reflective agents of curriculum change. By placing design thinking as the central framework, teacher professional development can be directed towards building creative, collaborative, and solution-oriented capacities, which will ultimately improve the overall quality of learning.

In the global education context, many developed countries have begun integrating design thinking into their teacher training, whether through workshops, learning communities, or ongoing certification programs. The results demonstrate an increase in teachers' ability to design more personalized, adaptive, and project-based learning (Henriksen et al., 2019). In Indonesia, the potential for implementing this approach remains vast, especially when combined with strengthening a culture of innovation within educational institutions. Through the use of design thinking, grounded in a transdisciplinary approach, teachers can be empowered to design contextual and inclusive curricula that address the needs of

students from diverse social, cultural, and academic backgrounds.

This research is also crucial for addressing the need for more meaningful and sustainable teacher professional development. Much current teacher training is trapped in a top-down approach that doesn't allow for creativity and critical reflection. Design thinking, with its empathetic and participatory approach, can revolutionize the way teachers learn and develop in their profession. When teachers are positioned as instructional designers, they are no longer simply implementers of educational policy but rather innovators who continuously evaluate and improve teaching practices based on feedback and classroom dynamics. Thus, design thinking can bridge the gap between meaningful teacher professional development and curriculum innovation that is relevant to current needs.

Ultimately, this research stems from the belief that teachers are the key to educational transformation. Therefore, the design thinking approach is relevant not only as a methodology in teacher training but also as a working philosophy that shapes teachers' thinking and actions in designing learning. By adopting a transdisciplinary approach, this research seeks to demonstrate that curriculum innovation rooted in creativity, collaboration, and empathy can be a long-term solution for improving educational quality. Therefore, it is crucial to conduct an in-depth literature review of best practices and challenges faced in implementing design thinking in teacher professional development. This study is expected to open up new space for the exploration of more progressive and contextual policies, training programs, and professional development models, in line with the direction of global educational transformation and the future needs of the nation's next generation.

LITERATURE REVIEW

The design thinking approach to teacher professional development is gaining increasing attention as a human-centered way to build teacher competency in creating curriculum innovation. Design thinking, with its stages of empathy, problem definition, ideation, prototyping, and iterative testing, facilitates teachers in viewing learning problems from the learner's perspective and designing adaptive and responsive learning solutions (Wrigley & Mosely, 2022). In the context of transdisciplinary education, this approach opens up opportunities for teachers to collaborate across disciplines and with community stakeholders to produce curriculum materials that are more relevant to the real challenges in students' lives (Kandi Trishaank et al., 2025).

Theoretically, design thinking serves as a bridge between transformational pedagogical theory and real-world classroom practice. As a medium for actively implementing constructivism, this approach shifts the teacher's paradigm from being a material deliverer to being a co-learner facilitator in the learning process, with the key to success being metacognitive reflection and collaborative testing of learning prototypes (Avsec, 2023). This implementation is demonstrated in contemporary teacher training, which embraces reflectivity, team collaboration, and interdisciplinary work that addresses 21st-century needs.

Numerous case study studies illustrate the positive outcomes in teacher professional development. For example, an AI curriculum co-design program for grades K-12 demonstrated that teachers needed scaffolded

guidance and active collaboration to integrate AI content into various subjects and foster students' ethical and social reflection in technology learning (Mejía et al., 2023). Similarly, the Einsteinian Physics program for elementary education demonstrated how teacher upskilling through intensive training improved content knowledge and confidence in simplifying modern science curriculum in classroom implementation (Reilly & Reeves, 2023).

Within the context of a transdisciplinary approach, project-based education, or interdisciplinary project-based learning (IPBL), has evolved into design-based learning (DBL), a model that integrates design thinking into a cross-disciplinary curriculum. DBL integrates human-centeredness, prototyping, and iteration into the learning process, fostering creativity, critical thinking skills, and interdisciplinary collaboration (Finch et al., 2021).

Furthermore, this learning transcends the silos between disciplines, enabling students and teachers to create more holistic solutions to complex challenges. Meanwhile, several studies present academic frameworks and courses that connect theory and practice through innovative, cross-disciplinary learning design guidelines. For example, a review of 11 university curricula concluded that a balance between autonomy-supporting and structured teaching styles is essential for the effective implementation of design thinking, especially in interdisciplinary contexts (Wren et al., n.d.). From a teacher professional development perspective, active teacher involvement in collaborative design teams has been shown to strengthen ongoing curriculum innovation and reflective skills. The book, Collaborative Curriculum Design for Sustainable Innovation and Teacher Learning, emphasizes that teacher design teams not only develop contextualized curricula but also build teachers' professional capacity to become agents of institutional and social change through ongoing and reflective practice (ElSayary, 2025).

In general, the principle of transdisciplinarity allows teachers to blend academic disciplines with non-academic perspectives, creating curricula that are more responsive to social challenges. Transdisciplinarity goes beyond interdisciplinary collaboration; it also involves communities in co-design, a strategic asset for real innovation in local and global educational contexts (Morales, 2025). In conclusion, this literature review demonstrates that the integration of design thinking into teacher professional development, coupled with a transdisciplinary approach, theoretically and empirically supports effective, reflective, and responsive curriculum innovation to the challenges of 21st-century education. This approach expands the role of teachers to become co-designers of knowledge and facilitators of solutions, while enriching students' learning experiences in a creative, critical, collaborative, and meaningful way.

METHOD

The research method used in this study is a qualitative literature review, with the aim of exploring and analyzing the concept of design thinking in teacher professional development and its relevance to curriculum innovation within a transdisciplinary approach. This study was conducted through a systematic search of various scientific sources, such as academic journals, books, research reports, and relevant education policy documents. The researcher used content analysis techniques to identify patterns, themes, and key ideas related to the

integration of design thinking in the context of teacher training. This approach allows for an in-depth understanding of how design thinking is applied in sustainable teacher capacity development and how transdisciplinary principles can enrich the curriculum innovation process.

The literature review process was conducted using strict inclusion and exclusion criteria to ensure the relevance and quality of the sources analyzed. The primary focus was on literature that explicitly discussed the relationship between design thinking, teacher professional development, and curriculum innovation in various educational contexts. After the sources were collected, the data were analyzed using a thematic approach to explore the theoretical and practical contributions of design thinking to educational practice. Through this method, this study aims to formulate a comprehensive and transformative conceptual framework as a basis for developing an innovative and adaptive teacher training model to the dynamics of curriculum change in the modern era.

RESULTS AND DISCUSSION

Implementation of Design Thinking in an Educational Context

The application of design thinking in an educational context is a transformative approach capable of addressing the challenges of the 21st century, where creativity, collaboration, empathy, and the ability to solve complex problems are core competencies (Retna, 2018). In recent decades, this concept has not only been adopted in the business and technology worlds but has also begun to be widely applied in educational reforms in various countries. The strength of design thinking lies in its iterative, user-centered process, specifically students, and its systematic approach that encourages innovation through empathy, in-depth problem exploration, and continuous solution testing. Its application in education has not only transformed the way teachers teach but also shifted the learning paradigm from a passive model to a more active, participatory, and reflective one (Cassim, 2013).

Several case studies from around the world demonstrate how design thinking has successfully leveraged innovation in education. In the United States, the Stanford d.school is a pioneer in integrating design thinking into higher education and teacher training. Through programs like the K12 Lab, Stanford has developed design thinking-based curricula and training programs used in thousands of schools across the United States (Guaman-Quintanilla et al., 2023). In Colombia, design thinking was used to redesign a university's language curriculum, encouraging active student participation and cross-faculty collaboration to create more relevant learning experiences. Meanwhile, in Japan, a project-based education program in the city of Kashiwa integrated design thinking into solving social and environmental problems. The learning process involved field exploration, interviews with residents, and the creation of concrete solutions, which were then tested and refined through group reflection. In Vietnam, Hanoi Pedagogical University developed a teacher training curriculum that incorporated design thinking as part of its teaching methodology, resulting in significant improvements in prospective teachers' abilities to design innovative learning (Rusmann & Ejsing-Duun, 2022). These studies demonstrate that the successful implementation of design thinking depends not only on cultural context or resources, but

also on the institution's commitment to building a framework that enables sustainable collaborative and experiential processes.

Integrating design thinking into teacher training is key to the widespread dissemination of this approach. Teachers are the primary agents of change in the classroom, and purely theoretical training is insufficient to foster a deep understanding of the philosophy and practice of design thinking (Rösch et al., 2023). Therefore, integration strategies must begin with hands-on experience, where teachers experience the design thinking process themselves through project-based training. Effective training typically begins with an empathy stage, where teachers learn to listen deeply to students' needs, then formulate a concrete learning problem, explore various solutions, create prototypes, and test them in real-life classroom situations. This approach requires trainers to not only provide conceptual knowledge but also facilitate reflection and mentoring. Another proven effective strategy is building a learning community among teachers, where they can share experiences, receive feedback, and continuously experiment with new methods in the learning process.

Design thinking integration is also strengthened by the use of collaborative technologies, such as digital boards, learning simulation rooms, and portfolio evaluation platforms, which allow design thinking processes to be documented and accessible across time and place (Aflatoony, 2015). In some cases, schools even form innovation teams consisting of teachers from various subjects to develop integrated learning models based on design thinking, which not only enhances teacher creativity but also encourages collaboration between subject areas.

Despite its great potential, implementing design thinking in education is not without complex challenges. One major challenge is the cultural resistance of educational institutions to change. Many schools remain fixated on traditional learning patterns oriented toward content mastery and standardized test scores. Therefore, approaches that emphasize process and failure as part of learning are often considered inefficient (Rösch et al., 2023).

Teachers accustomed to conventional methods also often feel anxious about open-ended and non-linear approaches like design thinking. Time constraints for teacher training and high administrative burdens are other obstacles that make it difficult for teachers to consistently implement this approach. Furthermore, implementing design thinking often requires additional resources, whether in the form of prototype materials, supporting technology, or flexible learning spaces all of which are not always available in all schools, especially in areas with limited infrastructure.

Furthermore, the lack of an assessment system capable of measuring the success of the design thinking process holistically also presents a challenge. Evaluations that focus too much on the end result often overlook the value of the exploration, reflection, and collaboration that are at the heart of design thinking. Therefore, a systemic approach is needed in integrating design thinking in education, which not only touches on aspects of teacher training, but also reforms to curriculum policies, assessment systems, school culture, and leadership support.

Transdisciplinarity in Curriculum Innovation

Transdisciplinarity in curriculum innovation is a progressive approach that challenges traditional boundaries in

education. This approach goes beyond simply integrating various disciplines, but rather creates a new space where knowledge is contextually and collaboratively reconstructed to address the complexity of real-world problems in society (Singh & Kaunert, 2024). In this context, curriculum innovation is no longer designed in a linear and fragmented manner, but rather is sought to be the product of a dynamic synergy between various disciplines, practical experiences, and social needs. Transdisciplinarity enables the creation of curriculum designs that are more relevant, adaptive, and reflective of current challenges, particularly in equipping students with 21st-century competencies such as critical thinking, collaboration, creativity, and digital literacy (Milena et al., 2024).

Synergy between disciplines in curriculum design is at the heart of the transdisciplinary approach (Atkinson-Toal, 2024). This process involves more than simply combining content from various disciplines; it also demands in-depth epistemological and methodological integration. For example, in designing a curriculum for global issues such as climate change, curriculum developers need to incorporate insights from environmental science, economics, sociology, technology, and ethics. This requires intensive dialogue among experts from diverse backgrounds who not only contribute their individual perspectives but are also willing to create new understandings that transcend traditional scientific boundaries. In this process, curriculum design becomes an arena for cross-border knowledge engineering, not simply transferring information but also forming new, transformative frameworks for thinking for students.

Cross-disciplinary collaboration between educators, curriculum designers, and stakeholders is crucial to the success of a transdisciplinary approach (Dieleman & Juarez-Najera, 2015). Teachers are no longer merely implementers but also act as co-designers of the curriculum, alongside academics, industry experts, policymakers, local communities, and even the students themselves. This collaborative approach strengthens the connection between the world of education and the realities of life, ensuring that the designed curriculum is contextual, applicable, and responsive to societal needs. For example, in developing a social entrepreneurship-based curriculum, the involvement of MSMEs, social organizations, and regional stakeholders can significantly contribute to defining competency needs, developing project-based learning modules, and connecting students with hands-on practice in the field. This indirectly encourages a reorientation of the role of educational institutions as catalysts for social innovation.

A study of the implementation of a transdisciplinary curriculum based on design thinking demonstrates how an innovative framework can strengthen the application of transdisciplinary principles in education. Design thinking, with its stages ranging from empathy, problem definition, ideation, prototyping, and testing, enables educators and curriculum designers to explore learning needs in depth and context. In its implementation, design thinking encourages interdisciplinary collaboration through learning projects that integrate various fields of study to solve real-life problems. In several innovative schools in Finland, for example, a phenomenon-based curriculum has been adopted, emphasizing interdisciplinary,

project-based learning structured with design thinking. Students are encouraged to design solutions to environmental or social problems in their communities by developing projects involving knowledge from science, technology, art, mathematics, and ethics (Wyse et al., 2015).

A transdisciplinary curriculum based on design thinking not only reforms teaching and learning methods but also transforms the way we think in education. It bridges the gap between theory and practice, between formal education and real-world needs. This approach can produce a curriculum that is not rigid, but dynamic and evolving with the times. By aligning various disciplines, opening up collaboration between stakeholders, and adopting innovative frameworks such as design thinking, transdisciplinarity in curriculum innovation is the answer to the need for a more inclusive, adaptive, and meaningful education in this era of disruption.

Design Thinking-Based Teacher Professional Development Model

The design thinking-based teacher professional development model is an innovative approach that transforms the traditional paradigm of teacher training into a more collaborative, reflective process centered on the real needs of students and teachers themselves (Blundell, 2024b). The design of this model is based on the assumption that teachers are not merely recipients of training materials but also designers of creative and contextual solutions to address classroom learning challenges. This model integrates design thinking principles—empathy, problem definition, ideation, prototyping, and testing—into a systematic teacher training cycle (Goldman & Zielezinski, 2016). In this context, the design of the model includes adapting the training curriculum to enable teachers to explore educational issues from the student's perspective, explore transformative solutions, and develop adaptable learning interventions iteratively.

The first stage of this model begins with cultivating empathy as a fundamental foundation (Gessala et al., 2025). Through observation, interviews, and reflection on students' learning experiences, teachers are trained to deeply understand the needs, aspirations, and obstacles faced by students in the learning process. Empathy encourages teachers to move beyond narrow thinking and allows for emotional, social, and cognitive considerations that influence learning outcomes. This stage also strengthens the affective dimension of teacher professionalism by fostering awareness of the importance of emotional connections in designing learning strategies (Geitz & de Geus, 2019). Once empathy is established, teachers are facilitated to formulate the core problems they face in the classroom, not simply as complaints, but as innovative opportunities that can be addressed with a solution-oriented approach.

Continuing to the ideation and prototyping stage, training focuses on developing various possible learning solutions that can be implemented in the classroom (Woraphiphat & Roopsuwankun, 2023). In this session, teachers are encouraged to be creative, explore ideas without fear of failure, and design simple yet meaningful learning intervention prototypes. The prototypes developed can be learning scenarios, teaching tools, assessment strategies, or experimental interaction approaches. This model emphasizes the principle that failure is not an iteration—teacher trying, evaluating, and ending—but rather part of the continuous

learning and improvement process. Through the process, they refine their prototypes based on feedback from students and colleagues. This iterative approach makes the teacher professional development process more dynamic and contextual, while also creating a learning culture open to change and improvement.

Evaluation of the effectiveness of this model is conducted not only with quantitative instruments but also with a qualitative approach that captures changes in teacher behavior, attitudes, and competencies in teaching (Albay & Eisma, 2025). The success of this model is reflected in the increased capacity of teachers to independently identify and resolve learning problems, the improved quality of interactions between teachers and students, and the formation of a community of practitioners who support each other in professional development. Furthermore, other indicators of success include increased teacher motivation, creativity in designing learning, and a willingness to continuously learn and innovate (Orgaer, 2024). This model indirectly creates a collaborative and reflective learning ecosystem, where teachers no longer rely on top-down training but actively create and adapt solutions to local needs.

Thus, the design thinking-based teacher professional development model is not only relevant to the needs of 21st-century education but also addresses the challenges of the rigidity of conventional teacher training approaches. Through the integration of empathy, prototyping, and iteration, teacher training becomes a vibrant, creative, and sustainable process. Teachers are not only required to understand content and pedagogy but also to possess design skills that are adaptive to social and technological changes. In the long term, this model has the potential to strengthen the resilience of the education system, build reflective teacher professionalism, and deliver a more meaningful learning transformation that has a direct impact on student development.

Implications for Curriculum Innovation

The implications of curriculum innovation in today's educational context are no longer limited to changes in learning content, but also encompass a paradigm shift in designing more contextual, creative, and meaningful learning experiences (Leonard et al., 2016b). An approach oriented toward student needs, social dynamics, and technological developments has given rise to demands for a more flexible and adaptive curriculum. The curriculum is no longer understood as a static document, but rather as a dynamic construct that continually evolves with changing times. Therefore, curriculum innovation has become a strategic instrument in realizing a relevant and transformative education system. The implications of this innovation are evident in learning designs that increasingly emphasize contextual relevance to students' real lives, strengthen the role of teachers as creative facilitators, and encourage cultural transformation within the school environment as a whole.

Contextual and creative learning designs are a direct result of this innovative curriculum approach. The learning process is no longer limited to one-way delivery of material, but rather directed toward exploration, collaboration, and problem-solving based on concrete situations experienced by students (Seidel et al., 2020b). Teachers encourage students to connect knowledge to their own life experiences, integrating cognitive, affective, and

psychomotor aspects into the learning process. Innovation in learning design also encourages cross-subject integration, project-based approaches, and the use of digital technology as a medium for expression and exploration. Within this framework, teacher creativity is key, requiring them to design learning activities that stimulate critical thinking, communication skills, and social empathy in students. This broadens the definition of learning success, from mere academic achievement to developing holistic competencies as individuals prepared to face future challenges.

Furthermore, curriculum innovation provides space for strengthening teachers' reflective and solution-oriented skills (Zafeirakopoulos & Van Der Bijl-Brouwer, 2018). In traditional curriculum systems, teachers tend to act as conveyors of information and controllers of the classroom. However, innovative curriculum approaches position teachers as designers of dynamic and sustainable learning experiences. This role requires teachers to critically reflect on their teaching practices, evaluate the effectiveness of strategies used, and boldly experiment with new approaches that are more relevant to students' needs. Reflective skills enable teachers to identify challenges and seek contextual solutions collaboratively, both with colleagues and other educational stakeholders. This process also opens up space for the continuous improvement of teachers' professional capacity, where curriculum innovation becomes a means of self-actualization in more meaningful pedagogical practices. Teachers become not only implementers of the curriculum but also agents of change, actively responding to social and technological changes through renewed learning approaches.

An equally important implication of curriculum innovation is the potential for a comprehensive transformation of school culture. When the curriculum is designed and implemented with a collaborative, reflective, and contextual approach, the values instilled in the school environment also undergo changes (Tassone et al., 2018). Schools become spaces that are more open to dialogue, appreciative of diversity, and encourage the active participation of all members of the school community. A rigid bureaucratic culture is gradually replaced by an organic learning culture, where teachers, students, principals, and parents collaborate to create a supportive educational ecosystem. This cultural transformation is also marked by a growing collective awareness of the importance of innovation and continuous learning. Schools become not only places of formal learning but also communities of learners that continuously innovate and evolve with the changing times.

Thus, curriculum innovation has broad and profound implications, not only for learning methods but also for the development of teacher character and the school's institutional culture. Contextual and creative learning designs provide more meaningful learning experiences for students, while strengthening teachers' reflective and solution-oriented skills ensures a continuous process of improving the quality of learning. Furthermore, the transformation of school culture strengthens the institutional foundation that supports an adaptive, collaborative, and visionary educational ecosystem. All these aspects form a unity that encourages the realization of education that is not only relevant to current demands, but also able to equip future generations with the competencies to face the future in a more empowered and humane manner.

SIMPULAN

The conclusion of the study "Design Thinking in Teacher Professional Development: A Transdisciplinary Approach to Curriculum Innovation" confirms that the design thinking approach can be an effective catalyst for improving teachers' professional competence, particularly in the context of transdisciplinary curriculum innovation. This approach encourages teachers to think critically, collaboratively, and creatively in designing learning that is relevant to the needs of students in an era of constant change. Design thinking not only strengthens teachers' pedagogical skills but also facilitates iterative and empathetic problem-solving that is oriented towards students' learning experiences.

Furthermore, the application of design thinking in teacher professional development encourages cross-disciplinary engagement, enriching the curriculum innovation process. A transdisciplinary approach enables teachers to transcend the traditional boundaries of their fields of study, creating curricula that are more holistic, contextual, and responsive to real-world challenges. This opens up space for collaboration between educators, academics, and other education stakeholders to create more sustainable and impactful solutions.

Thus, this study demonstrates that the integration of design thinking in teacher professional development not only contributes to improving individual teacher capacity but also serves as a transformational strategy for curriculum renewal. The implications of this approach include the need for a paradigm shift in teacher training that is more flexible, participatory, and innovative. Therefore, educational institutions and policymakers are expected to adopt this approach more widely to encourage sustainable positive change in the education system.

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