

# Fostering 21st Century Skills in Teacher Training Programs: A Path to Modern Education

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**Abstract.** The demands of 21st century education require teachers to go beyond traditional instructional methods to equip students with essential skills such as critical thinking, communication, collaboration, creativity, and digital literacy. Consequently, teacher training programs must adapt to prepare educators who can meet these new challenges. This study explores strategies for integrating 21st century skills into teacher training, using a qualitative, narrative review approach to synthesize findings from key literature. The research highlights core methods, including experiential learning, reflective practice, digital literacy integration, and collaborative models, which are instrumental in fostering skills that align with the needs of modern educational environments. Additionally, this study identifies challenges that hinder the effective implementation of these skills and offers recommendations for designing teacher training programs that cultivate adaptable, future-ready educators. By embedding 21st century skills into teacher preparation, educational systems can empower teachers to become change agents, inspiring and guiding students to thrive in an increasingly complex, digitally connected world.

**Keywords:** 21st century skills, teacher training program, learning strategies.

## 1 Introduction

Education systems around the world are under pressure to give pupils abilities that go beyond standard academic knowledge in the quickly changing world of today. The demands of a globalized workforce and the emergence of the digital era necessitate a more flexible and adaptive skill set, sometimes known as "21st century skills". These include digital literacy, creativity, critical thinking, collaboration, and cultural awareness which is becoming skills necessary for pupils to prosper in a connected, information-rich society [1] [2]. Teachers play a key role in this change. They provide settings where students can learn how to solve complicated problems, collaborate with others, and adjust to various cultural situations by acting as both information providers and role models. As a result, teachers have a crucial role in developing attitudes that enable students to think critically and solve problems in the actual world in addition to imparting knowledge. It is therefore strategically necessary to incorporate 21st century abilities into teacher preparation programs to guarantee that teachers are not only adequately prepared to impart these skills but also to raise a new generation of skilled, creative learners who are prepared to face an uncertain future [3].

Although these competences have their roots in traditional educational objectives, their use in the current educational environment is unparalleled in both breadth and complexity, primarily because of the quickening pace of technology development and the worldwide interconnectedness that is reshaping contemporary society [2]. The current issue is to prepare teachers for effectively combining these 21st century skills with in-depth subject-matter knowledge, which necessitates a radical departure from conventional educational paradigms that have mostly concentrated on content delivery. In order to meet this need, Darling-Hammond (2006) contends that modern teacher preparation programs need to transcend discrete courses and instead incorporate theory with extensive, practical clinical experiences. By empowering educators to convert theoretical knowledge into practical, classroom-ready techniques, this integrated approach helps close the crucial gap between theory and practice [4]. However, achieving these ambitious goals doesn't come without its difficulties. In addition to aligned assessment techniques that precisely reflect the subtle development in these abilities, creating a really effective framework necessitates consistent, excellent professional development that aids educators in their continuous improvement. Additionally, in order to offer the resources, adaptability, and recognition required to make these changes long-term sustainable, a supportive legislative environment is crucial [5].

Implementing 21st century skills in teacher training is far from a one-size-fits-all process; it demands a nuanced, flexible approach that respects the unique needs and circumstances of diverse educational settings and student populations. Understanding how difficult it is to integrate these skills, researchers stress that policymakers, local communities, and educational institutions must work together to achieve success. This fosters a supportive environment where teachers can develop and improve their practices over the course of their careers [3][6]. The significance of ongoing professional development is also emphasized by this collaborative model, since it is necessary for educators to be adaptable to the swift changes in educational expectations and technological advancements. Furthermore, educator programs that carefully balance subject-matter competence with essential competencies like digital fluency, emotional intelligence, and cultural awareness are encouraged by frameworks like the Partnership for 21st Century Skills. Through fostering the above skills, these programs enable educators to provide a comprehensive education that transcends conventional academic goals and helps students develop into flexible, compassionate, and socially conscious adults. In addition to meeting the immediate needs of contemporary classrooms, this approach to teacher preparation lays the groundwork for a more inventive, inclusive, and resilient educational system that can change to meet the demands of a changing society [7].

For many educators, particularly those working in resource-limited settings, the shift towards integrating 21<sup>st</sup> century skills necessitates access to robust and contextually relevant professional development tools. These tools are essential for fostering reflective practice, adaptability, and culturally responsive teaching methods that can meet the varied needs of today's diverse student populations. Effective professional development empowers teachers to adapt their approaches to different classroom contexts, thereby creating an inclusive educational environment that acknowledges and celebrates the unique experiences, cultures, and perspectives of each student [8]. Furthermore, by promoting creative, flexible approaches that can close resource gaps, training that prioritizes responsiveness and adaptability gives teachers the tools they need to overcome typical obstacles in low-resource environments, like restricted access to technology or instructional materials. As suggested by Kim et al. (2019), resources such as the Teacher Instructional Practices and Processes System (TIPPS) provide useful feedback mechanisms that enable teachers to continuously evaluate and improve their methods of instruction. These tools encourage a cycle of improvement by integrating real-time insights

on instructional success. They assist teachers in developing a supportive, learner-centered classroom environment where all students feel appreciated and involved, in addition to improving their pedagogical abilities [3].

Finally, the study was aimed to identify the strategy or approach that implement in teacher education programs to enhance teachers' 21st century skills. To achieve this objective, the study delved into various instructional strategies implemented across teacher education programs. The examination will be emphasized on both traditional and innovative approaches, it sought to uncover methods that not only emphasize content knowledge but also integrate critical 21st century skills such as problem-solving, digital literacy, collaboration, and adaptability. Ultimately, this study aspires to contribute to the development of teacher preparation programs that empower educators to foster a transformative learning experience for their students, preparing them to thrive in a rapidly changing world.

## **2 Research Method**

The purposes of this study are identifying the strategy or approach that used in teacher education programs to enhance teachers' 21st century skills. This study is conducted by using qualitative approach with the typical Narrative review, in which the study attempt to conduct well-structured overview towards several previous study that present a theoretical and contextual perspective. Through this method, the study aims to synthesize findings from previous research that offer both theoretical insights and contextual perspectives on best practices in teacher preparation. By analyzing diverse sources, the review seeks to capture a broad understanding of the pedagogical frameworks, instructional models, and professional development techniques that have been most effective in cultivating essential 21st century competencies among educators.

The analysis was conducted by examining several previous articles and research which obtaining from Google scholars databases. The study were included in the analysis process is the study that contain several keywords including *Teacher education program*, *Teacher training*, *pre-services teacher training*, and *21<sup>st</sup> century skills for educators*. The information was analyzed through several step including: (1) a wide selection of studies was gathered using keywords, and a screening process ensured that only relevant and high-quality studies were included. This involved reviewing abstracts, methodologies, and results to confirm each study's focus on embedding 21st-century skills in teacher education; (2) the second stage is including the selection process of relevant studies through an open coding process identified recurring themes and strategies. Each theme was analyzed to understand its role in enhancing 21st-century skills, noting any differences in implementation across various contexts. This helped clarify how different strategies could complement each other to build comprehensive skills for educators; (3) Finally, the findings were organized into a narrative that highlights the most effective strategies for developing 21<sup>st</sup> century skills in teacher training.

### 3 Result and Discussion

#### 3.1 The Strategies used to promote 21st Century Skills in Teacher Training Program

Teacher training programs are putting more of an emphasis on giving teachers the fundamental 21st century abilities they need to meet the changing demands of contemporary education. Teachers need to assist pupils develop these abilities so they can succeed in a world that is changing quickly. In order to accomplish this, teacher preparation programs need to implement focused strategies that go beyond conventional teaching techniques, placing a strong emphasis on experiential learning, reflective practice, and technological integration. The various frameworks and strategies used to incorporate 21st century skills into teacher preparation are examined in this section, along with how they produce teachers who are not only knowledgeable about their subjects but also adept at creating a welcoming, creative, and student-centered learning environment.

Several studies have been conducted by experts to identify effective approaches and strategies used in teacher training programs to foster 21st century skills. The previous study shows several strategy that commonly used in teacher training program including experiential learning, reflective practice, digital literacy integration, collaborative teaching models, problem-based learning (PBL), adaptive expertise development, etc (Table 1). In response to the increasing demand for teachers to successfully traverse intricate, technologically advanced learning settings, teacher preparation programs worldwide have implemented a variety of techniques to integrate 21st century skills into their curricula. Effective teacher training, according to Darling-Hammond (2006), should go beyond disjointed coursework and support experiential learning that enables teachers to immediately apply theoretical discoveries in the classroom [4]. This method not only improves teachers' material understanding but also their capacity to foster in students the critical thinking, creativity, and problem-solving abilities that are essential for success in a modern classroom.

**Table 1.** The Strategies used in Teacher Training Program to promote 21st Century Skills.

Strategy	Description	Source
Experiential Learning	Emphasizes hands-on practice, encouraging teachers to apply theoretical knowledge in real-world scenarios.	Darling-Hammond (2006) [4]
Reflective Practice	Uses tools like TIPPS to provide feedback and encourage self-assessment, helping teachers refine their techniques.	Kim et al. (2019) [3]
Digital Literacy Integration	Focuses on developing teachers' ICT skills to incorporate technology effectively in the classroom.	Kim et al. (2012) [9]
Collaborative Teaching Models	Encourages teamwork among teachers to foster skills like communication and adaptability through shared practices.	Valli et al. (2014) [10]
Problem-Based Learning (PBL)	Engages teachers in solving complex, real-life problems to build critical thinking and problem-solving skills.	Windschitl (2009) [12]
Adaptive Expertise Development	Combines efficiency with innovation, enabling teachers to adjust their methods and adopt new ideas in teaching.	Kim et al. (2012) [9]

4C's Approach (Critical Thinking, Creativity, Communication, Collaboration)	Focuses on the core competencies necessary for the modern educational environment.	Astuti et al. (2019) [11]
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In teacher education, reflective practice has also become a potent instrument. According to Kim et al. (2019), the Teacher Instructional Practices and Processes System (TIPPS) is a useful tool for encouraging ongoing self-evaluation and development, particularly in settings with limited resources. With the help of TIPPS's structured feedback, educators may assess and improve their teaching strategies, fostering flexibility and critical thinking. Two qualities that are essential for meeting the needs of a wide range of students and fostering professional development [3]. This feedback-based method is a prime example of how organized reflection can transform routine teaching experiences into worthwhile educational opportunities, strengthening instructors' capacity for adaptation and highlighting the significance of self-directed professional growth.

The study also suggests a number of strategies to develop 21st century abilities, particularly in the area of education digitalization. The development of digital literacy has emerged as a key component of teacher preparation in response to the digitization of education. According to Kim et al. (2012), instructors can better engage students and improve access to a variety of educational materials by integrating technology in relevant ways when they have developed their ICT competencies [9]. This change is part of a larger movement to prepare teachers to be digital facilitators who can easily integrate technology into a variety of teaching methods in addition to being topic specialists. Teachers can better prepare their pupils for a digital society where technical fluency is becoming more and more important by providing them with digital literacy training.

Another essential component of teacher preparation programs in the twenty-first century is collaborative teaching approaches. In order to promote communication, flexibility, and a common ability to solve problems, Valli et al. (2014) support team-based learning and peer collaboration among educators. Teachers can exchange ideas, create networks of support, and create comprehensive teaching strategies that take advantage of many viewpoints by using collaborative practices [10]. In addition to enhancing teacher effectiveness, this model teaches students how to collaborate with others, fostering a collaborative and respectful learning environment.

Furthermore, Astuti et al. (2019) have promoted the 4Cs framework, which has become popular as a fundamental method in pre-service teacher education. By highlighting higher-order thinking abilities, this framework motivates educators to design student-centered classrooms that value inquiry, creativity, and participation. By emphasizing these skills, teacher preparation programs give teachers the means to encourage critical thinking, intellectual curiosity, and group projects. All of which are crucial for preparing students for the challenges of the future. When taken as a whole, these tactics show a comprehensive approach to teacher preparation for the twenty-first century that strikes a balance between theoretical understanding and real-world application, ongoing feedback, and cooperative learning. Through a combination of experiential learning, digital literacy training, reflective practice, and a focus on the 4Cs, teacher training programs can prepare educators to thrive in dynamic educational contexts. Ultimately, these programs cultivate not only subject-matter experts but also adaptable, innovative teachers who can lead classrooms that inspire creativity, critical thinking, and resilience in their students [11].

A comprehensive approach that blends conventional teaching techniques with cutting-edge approaches is necessary to successfully promote 21st century abilities in teacher education

programs. Conventional methods, like direct instruction, are still useful for establishing fundamental knowledge, but they need to be complemented by innovative approaches that foster creativity, critical thinking, and flexibility. Utilizing project-based learning and collaborative teaching techniques, which place an emphasis on problem-solving, teamwork, and the practical application of information, is one important strategy. Teacher training programs can set an example for the kinds of cooperative abilities students need to succeed in the modern world by creating learning settings where students collaborate on multidisciplinary projects. It's also critical to incorporate digital literacy into the curriculum. Teachers need to be ready to educate students how to utilize technology for communication, learning, and problem-solving in addition to being proficient in its use. In order to address the varied requirements of their students in dynamic ways, teachers must integrate technology tools that encourage creativity, individualized learning, and interactive participation.

Additionally, experiential learning which gives instructors the chance to implement theoretical ideas in authentic classroom environments is emphasized heavily in teacher preparation programs. Teachers gain the adaptability and reflective abilities necessary to modify their teaching methods to fit the needs of varied student demographics and dynamic classroom settings thanks to this hands-on training. Simulations, teaching internships, and group projects in the classroom are examples of experiential learning that push educators to use their knowledge while receiving insightful feedback. Moreover, fostering a climate that supports teachers' continuous development, peer collaboration and mentorship are essential. Through encouraging cooperation between educators, these initiatives contribute to the development of a community of practice where educators can exchange ideas, hone their methods, and make constant progress. Teachers are guaranteed to stay up to date on new technologies, changing best practices, and educational trends through ongoing professional development. Reflective practice, experience learning, and ongoing development enable teachers to stay flexible, perceptive, and responsive to the individual needs of their pupils.

In, conclusion, in order to prepare teachers for the complex, digital, and collaborative learning environments of today, teacher preparation programs must take a comprehensive strategy that incorporates both theoretical and practical methodologies in order to nurture 21st century abilities. Research continuously emphasizes the value of digital literacy, reflective practices, experiential learning, and adaptable expertise as fundamental tactics in teacher preparation. Teacher preparation programs assist educators in going beyond standard coursework to actively foster critical thinking, problem-solving, creativity, and teamwork in their students by highlighting these areas and giving teachers practical, immersive learning experiences. This method not only gives educators the skills they require, but it also gives them the ability to design engaging educational environments that set up students for success in a world that is becoming more interconnected and changing quickly.

### **3.2 The Fostered Skills for Each Strategies**

As teacher training programs evolve to suit up to the demands of the 21st century, a variety of strategies have emerged, each designed to cultivate specific skills essential for modern education. These strategies, including experiential learning, reflective practice, digital literacy integration, and collaborative teaching models, aim to equip educators with both foundational competencies and adaptive abilities. Each approach fosters a unique set of skills, from critical thinking and problem-solving to digital fluency and teamwork, aligning with the broader goals

of preparing teachers to lead dynamic, student-centered classrooms. This section examines the particular 21st century skills promoted by each strategy, offering insights into how these methods contribute to the holistic development of educators ready to navigate and shape contemporary educational landscapes.

Integrating 21st century competencies into programs for teacher preparation equips teachers to inspire these competencies in their pupils in addition to preparing them for the demands of contemporary classrooms. Every tactic used in these programs works to impart particular abilities that tackle the complex nature of today's educational issues (**Table 2**). For instances, (1) experiential learning actively places educators in settings where they must use their theoretical knowledge to negotiate dynamic classroom environments, going beyond simply exposing them to real-world circumstances. This practical method develops resilience and adaptability, which are critical traits for handling unforeseen circumstances and cultivating a flexible, responsive teaching mentality [4]; (2) Reflective practice, supported by tools like TIPPS, extends beyond self-assessment, encouraging educators to engage in ongoing, iterative cycles of reflection and improvement. Such practices not only enhance instructional techniques but also reinforce a growth mindset among teachers, promoting an openness to change and adaptation in response to diverse student needs and evolving educational contexts. This approach aligns with lifelong learning principles, empowering teachers to continually refine their skills and remain relevant in an era marked by rapid technological and social change [3]; (3) According to Kim et al (2012), including digital literacy is another essential element. Teachers need to be tech-savvy to provide compelling, tech-enabled learning experiences in a world where technology is ingrained in almost every part of life. Beyond teaching students the fundamentals of ICT, digital literacy training focuses on incorporating technology into teaching in a meaningful way so that students may become adept at handling and evaluating information [9]. By teaching students to explore, assess, and synthesize information from a range of digital sources, this emphasis on digital fluency not only gets them ready for their future employment but also develops critical thinking skills; (4) Collaborative teaching models further strengthen essential interpersonal skills such as communication and teamwork, which are crucial for fostering inclusive, cooperative learning environments [10]. These models not only enhance teacher collaboration but also model teamwork for students, encouraging a classroom culture grounded in mutual support and shared learning. Such environments are particularly beneficial for promoting empathy, cultural awareness, and social skills, all of which are essential in a globally connected world; (5) Problem Based Learning (PBL) gives educators the tools they need to support learning through real-world problems, encouraging critical thinking and creative problem-solving skills. PBL environments educate students how to analyze, hypothesize, and apply knowledge in real-world scenarios by guiding them through challenging issues. Because kids learn to approach challenges from many perspectives and try out creative solutions, this method is very successful in helping pupils develop resilience and tenacity [12]; (6) Adaptive expertise development. According to Kim et al. (2012), the idea of adaptive expertise offers a dual emphasis on productivity and creativity, stressing the value of being proficient at normal tasks while keeping an open mind to new ideas. Teachers may adjust their methods to suit different learning situations thanks to this balance of stability and flexibility, which promotes the growth of flexible, adaptive teachers who can succeed in any kind of educational environment. Additionally, adaptive knowledge assists educators in striking a balance between creative pedagogy and material delivery, guaranteeing that sessions are both educational and captivating [9]; and (7) Lastly, Astuti et al. (2019) promote the 4Cs framework, which summarizes the fundamental skills of critical thinking, creativity, communication, and teamwork. Students are encouraged to ask questions, come up with new ideas, and collaborate

well in a holistic learning atmosphere that fosters high-order thinking. By emphasizing these skills, teacher preparation programs equip teachers to foster autonomous thinkers and cooperative learners who can succeed in challenging, dynamic situations in addition to teaching knowledge [11].

**Table 2.** The fostered skills for each strategies

<b>Strategy</b>	<b>Fostered 21st Century Skills</b>	<b>Source</b>
Experiential Learning	Critical Thinking, Adaptability, Problem Solving	Darling-Hammond (2006) [4]
Reflective Practice	Self-Evaluation, Continuous Improvement, Adaptability	Kim et al. (2019) [3]
Digital Literacy Integration	Digital Fluency, Technological Literacy, Information Management	Kim et al. (2012) [9]
Collaborative Teaching Models	Collaboration, Communication, Teamwork Skills	Valli et al. (2014) [10]
Problem-Based Learning (PBL)	Critical Thinking, Problem Solving, Innovation	Windschitl (2009) [12]
Adaptive Expertise Development	Flexibility, Innovation, Transferable Knowledge	Kim et al. (2012) [9]
4Cs Framework (Critical Thinking, Creativity, Communication, Collaboration)	Higher-Order Thinking Skills, Collaboration, Creativity, Effective Communication	Astuti et al. (2019) [11]

These tactics work together to create a unified strategy for teacher development in the twenty-first century. Teacher training programs guarantee that teachers are prepared to overcome the wide range of demands of contemporary classrooms by fostering a variety of talents. In the end, these all-inclusive programs enable educators to design dynamic, inclusive, and progressive classrooms that encourage kids to develop into resilient, imaginative, and socially conscious adults.

## 4 Conclusion

To sum up, preparing teachers for the complex demands of contemporary classrooms, it is crucial that teacher preparation programs cultivate 21st century talents. This study demonstrates how the critical competencies needed in today's educational environment can be effectively developed through a combination of experiential learning, reflective practice, digital literacy integration, collaborative teaching models, problem-based learning, adaptive expertise, and the 4Cs framework. These tactics help develop digital fluency, adaptability, and lifelong learning habits in addition to fundamental abilities like critical thinking, creativity, communication, and teamwork.

Teacher preparation programs can produce educators who are not only educated in their subject areas but also adept in facilitating dynamic, student-centered learning experiences by eschewing standard instructional approaches. This all-encompassing strategy guarantees that educators are prepared to mentor their pupils in acquiring the creativity, problem-solving, and adaptability abilities necessary for surviving in a planet that is becoming more complicated and linked by the day. Incorporating these competences into teacher preparation ultimately turns



educators into change agents who can motivate and equip the next generation to prosper in a world that is changing quickly.

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