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DEVELOPING CRITICAL THINKING SKILLS IN TEACHER EDUCATION: STRATEGIES, CHALLENGES, AND FUTURE DIRECTIONS

DIVYA MISHRA RESEARCH SCHOLAR, DEPARTMENT OF EDUCATIONAL STUDIES, JAMIA MILLIA ISLAMIA, NEW DELHI.

ABSTRACT:

Critical thinking (CT) is fundamental to 21st-century learning, particularly in teacher education, where educators must be equipped to foster these skills in their students. This review paper explores the strategies, challenges, and future directions for developing critical thinking skills in teacher education. Through a systematic review of 20 studies, the paper identifies innovative pedagogical approaches, such as active learning techniques, project-based learning, and the integration of emerging technologies like artificial intelligence (AI) and gamification, as effective tools for enhancing critical thinking. However, the findings reveal significant challenges, including rigid curriculum structures, insufficient educator training, student resistance to higher-order tasks, and institutional resource limitations. The paper emphasizes the need for longitudinal studies to assess the long-term outcomes of critical thinking programs and highlights the importance of cross-cultural applications to promote global perspectives. Recommendations for policy reforms and curriculum redesign are presented to strengthen critical thinking instruction in teacher education programs. This review contributes valuable insights for educators, policymakers, and researchers aiming to enhance the role of critical thinking in preparing reflective and innovative teachers.

KEYWORDS:

CRITICAL THINKING, TEACHER EDUCATION, PEDAGOGICAL STRATEGIES, ACTIVE LEARNING, EMERGING TECHNOLOGIES, REFLECTIVE PRACTICES, HIGHER-ORDER THINKING, POLICY REFORMS.

1. INTRODUCTION

Critical thinking has emerged as a cornerstone skill for both teachers and students in the rapidly evolving landscape of 21st-century education. Defined as the ability to analyze, evaluate, and synthesize information to make informed decisions and solve problems, critical thinking is fundamental in preparing future educators for the complexities of modern classrooms (Behar-Horenstein & Niu, 2011; Afzal et al., 2023). In teacher education, fostering critical thinking is essential not only for the personal and professional development of pre-service teachers but also for their ability to cultivate these skills in their future students (Lithoxoidou & Georgiadou, 2023). Teachers equipped with critical thinking skills can address real-world challenges, adapt to diverse learning environments, and implement reflective practices that drive student-centered learning. The importance of integrating critical thinking into teacher education stems from its role in shaping reflective practitioners who can critically evaluate their instructional practices, classroom dynamics, and decision-making processes. Critical thinking enhances teachers' ability to identify and solve pedagogical challenges, ensuring that they are prepared to foster critical inquiry among students (Mahapoonyanont, 2010; Thongnuypram & Sopheerak, 2013). However, despite the recognized value of critical thinking, its integration into teacher education programs remains inconsistent, with educators often relying on traditional, passive instructional methods that prioritize rote learning over analytical skills (Afzal et al., 2023).

Research highlights a range of strategies that can successfully promote critical thinking, including project-based learning, debates, case studies, and reflective journaling (Campo et al., 2023). These methods create opportunities for active, experiential learning, allowing pre-service teachers to engage in problem-solving and decision-making processes that mirror real classroom scenarios. As Lithoxoidou and Georgiadou (2023) emphasize, a teaching practice—where student teachers apply theoretical knowledge in practical settings—can be particularly effective in fostering critical thinking, as it exposes them to ill-structured problems and authentic teaching dilemmas.

Nevertheless, challenges persist in integrating critical thinking into teacher education. Factors such as limited faculty training, rigid curricula, and insufficient institutional support often hinder the development of critical thinking skills (Karagöl & Bekmezci, 2015). Furthermore, students' understanding of critical thinking varies significantly, necessitating clear definitions and consistent methodologies to ensure its effective implementation.

2. LITERATURE REVIEW

Given these considerations, this paper explores the role of critical thinking in teacher education, analyzing strategies for its development, the challenges faced by educators and institutions, and future directions for research. By reviewing existing literature and practices, the study aims to provide insights into how teacher education programs can prepare educators to be reflective, analytical, and

responsive to the demands of 21st-century classrooms.

2.1 THEORETICAL FOUNDATIONS OF CRITICAL THINKING

Critical thinking is grounded in both philosophical and psychological theories, focusing on the ability to analyze, synthesize, and evaluate information for informed decision-making (Tiruneh et al., 2017). Over the decades, frameworks developed by scholars such as Ennis, Glaser, and Paul-Elder have provided clarity in conceptualizing critical thinking skills.

2.1.1 CONCEPTUAL FRAMEWORKS: ENNIS, GLASER, PAUL-ELDER MODELS

- **Ennis' Framework**: Robert Ennis (1962) emphasized that critical thinking involves "reasonable reflective thinking" to make decisions. Ennis proposed that critical thinking includes skills like inference, deduction, and evaluation, essential for problem-solving in education (Alsaleh, 2020; Behar-Horenstein & Niu, 2011).
- **Glaser's Approach**: Glaser's model focuses on three key elements: a disposition to think critically, knowledge of reasoning methods, and the ability to apply these methods effectively (Mahapoonyanont, 2010). Glaser's work highlights the importance of creating instructional methods that enable learners to transfer these skills across disciplines.
- **Paul-Elder Model**: Paul and Elder (2006) present critical thinking as a disciplined process where individuals actively conceptualize, analyze, and evaluate information. Their framework identifies key intellectual traits like clarity, precision, and fairness, which are essential for developing critical thinking dispositions (Lithoxoidou & Georgiadou, 2023; Alsaleh, 2020).

These models collectively stress the need for educators to design structured activities that enhance analytical and reflective skills.

2.1.2 CRITICAL THINKING AS A HIGHER-ORDER COGNITIVE SKILL

Critical thinking is widely recognized as a higher-order cognitive process, occupying the top levels of Bloom's revised taxonomy, specifically analysis, evaluation, and creation (Mahapoonyanont, 2010). It enables learners to go beyond memorization, encouraging them to question assumptions, draw conclusions, and solve complex problems. Factors such as teaching methodologies, learner motivation, and the learning environment significantly influence the development of critical thinking (Arslan et al., 2014).

2.2 ROLE OF TEACHERS IN FOSTERING CRITICAL THINKING

2.2.1 TEACHERS AS FACILITATORS OF REFLECTIVE AND ANALYTICAL LEARNING

Teachers play a pivotal role in fostering critical thinking skills by creating opportunities for students to reflect, analyze, and engage in dialogue. Afzal et al. (2023) argue that teachers who encourage questioning, reasoning, and reflective discussions help students develop higher-order thinking abilities. Mandernach (2004) emphasises that teaching critical thinking is not merely about content delivery but involves guiding students to challenge ideas and think independently.

Effective teachers act as facilitators rather than transmitters of knowledge, using strategies like:

- Open-ended questioning to provoke discussion.
- Encouraging students to evaluate evidence and justify their conclusions.
- Using reflective journaling to promote metacognition and self-awareness.

2.2.2 INTEGRATION OF CRITICAL THINKING INTO CURRICULUM DESIGN

Integrating critical thinking into curriculum design requires deliberate efforts to embed skills like problem-solving, analysis, and synthesis across subjects. Serin et al. (2013) highlight the importance of designing learner-centered curricula that prioritize inquiry-based learning and active participation. For instance, tasks such as debates, project-based activities, and case studies can be systematically included to foster analytical thinking and real-world application.

The alignment of learning outcomes with critical thinking objectives ensures that teachers assess not only content mastery but also students' ability to analyze and evaluate ideas effectively.

2.3 CRITICAL THINKING IN TEACHER TRAINING PROGRAMS

2.3.1 INCORPORATING PROBLEM-BASED LEARNING, CASE STUDIES, AND COOPERATIVE LEARNING

Teacher training programs that incorporate innovative pedagogies such as problem-based learning (PBL), case studies, and cooperative learning have shown significant success in developing critical thinking skills among pre-service teachers. PBL engages learners in solving authentic problems, requiring them to analyze situations, synthesize information, and make decisions (Campo et al., 2023; Tiruneh et al., 2017). Case studies, similarly, present ill-structured scenarios that challenge students to evaluate alternatives and justify their choices. Cooperative learning, as an active-learning strategy, fosters collaboration and shared reasoning. Studies suggest that group activities enable learners to articulate ideas, challenge perspectives, and engage in critical dialogue, leading to deeper learning (Ugwuozor et al., 2020).

2.3.2 PRACTICAL APPLICATION IN TEACHING PRACTICUMS

Practical teaching experiences, such as internships and practicums, offer pre-service teachers a platform to apply critical thinking in real classroom contexts. Lithoxoidou and Georgiadou (2023) emphasize that teaching

practicums allow educators to encounter complex, real-world challenges, fostering reflective decision-making and problem-solving skills. Through observation, peer feedback, and self-evaluation, student teachers learn to analyze classroom dynamics, assess their instructional approaches, and develop adaptive strategies to enhance student learning (Van Der Zanden et al., 2020).

By integrating theory with practice, teacher training programs equip educators with the ability to nurture critical thinking among their students, ensuring a ripple effect that transforms classroom learning into an inquiry-driven process.

3. METHODOLOGY

This review paper adopts a systematic literature review approach to explore the role of critical thinking skills in teacher education. A systematic review ensures a structured and comprehensive synthesis of existing research, focusing on key studies that investigate theoretical frameworks, pedagogical strategies, and challenges in fostering critical thinking among pre-service and in-service teachers.

3.1 DATA COLLECTION AND SELECTION CRITERIA

To identify and include relevant studies, the following selection criteria were applied:

1. **SCOPE OF THE STUDIES**:
    - The papers examined critical thinking in teacher education programs, particularly strategies, frameworks, and challenges.
    - Studies focusing on pre-service teachers, teacher training programs, and pedagogical approaches were prioritized.
2. **TYPES OF SOURCES**:
    - Peer-reviewed journal articles and conference proceedings published within the last two decades (2000–2024).
    - Empirical research (quantitative, qualitative, and mixed methods), meta-analyses, and theoretical papers.
3. **KEYWORDS AND SEARCH PROCESS**:

    The search for relevant studies involved the use of specific keywords, including:
    - *Critical thinking in teacher education*
    - *Higher-order cognitive skills*
    - *Pedagogical strategies for critical thinking*
    - *Teacher training programs*
    - *Reflective practice and critical analysis*
4. **ACADEMIC DATABASES** such as ERIC, Google Scholar, and ScienceDirect were utilized for the search process. Reference lists of selected papers were further screened to ensure comprehensive coverage of significant research.
5. **INCLUSION CRITERIA**:
    - Papers explicitly focusing on the development, assessment, and challenges of critical thinking skills in teacher education.
    - Studies providing theoretical or empirical evidence on instructional practices, teacher perceptions, or program outcomes.
6. **EXCLUSION CRITERIA**:
    - Studies that did not focus on critical thinking within the context of teacher education.
    - Duplicates or articles lacking full-text availability.

This approach ensured a comprehensive understanding of the research landscape while maintaining clarity and coherence in the presentation of findings.

4. STRATEGIES FOR DEVELOPING CRITICAL THINKING SKILLS

The development of critical thinking skills in teacher education requires the integration of innovative, student-centered strategies that promote reflective and analytical thinking. These strategies can be broadly categorized into innovative pedagogical approaches, use of technology and digital tools, and reflective practices, each of which plays a significant role in enhancing higher-order thinking skills.

4.1 INNOVATIVE PEDAGOGICAL APPROACHES

Effective instructional strategies are critical to fostering critical thinking in teacher education. Research highlights that active learning techniques, project-based learning, and real-world problem-solving enhance teachers' ability to think analytically and encourage the same in their students (Afzal et al., 2023; Campo et al., 2023).

1. **Active Learning Techniques: Debates, Case Studies, and Role-Playing**

    Active learning approaches such as debates, case studies, and role-playing engage students in critical analysis, evaluation, and reflection on real-world issues. These activities encourage participants to articulate their arguments, analyze differing perspectives, and develop logical conclusions (Afzal et al., 2023; Campo et al., 2023). Afzal et al. (2023) emphasize that debates and role-playing immerse teachers in reflective inquiry, compelling them to evaluate evidence and strengthen their reasoning skills.
2. **Project-Based Learning and Real-World Problem Solving**

    Project-based learning (PBL) provides opportunities for learners to apply their knowledge to solve complex, authentic problems. Incikabi et al. (2013) highlight the role of PBL in encouraging critical thinking by fostering collaboration, creativity, and analytical reasoning.

By working on real-world challenges, pre-service teachers learn to synthesize information, evaluate multiple solutions, and make informed decisions, which are critical for 21st-century education.

4.2 USE OF TECHNOLOGY AND DIGITAL TOOLS

Integrating technology into teacher education can significantly enhance critical thinking by creating interactive, engaging, and adaptive learning environments. Digital tools offer new opportunities for students to engage with content, collaborate, and practice higher-order thinking.

1. **Leveraging Interactive Platforms and Simulations**

   The use of interactive platforms and simulations allows pre-service teachers to explore realistic teaching scenarios that require critical decision-making. Darwin et al. (2023) argue that simulations provide safe, yet challenging environments where learners can experiment with strategies, assess outcomes, and refine their reasoning skills. Technology tools like simulations enable teachers to experience scenarios that mirror real-life classroom problems, promoting deeper engagement and reflection.

2. **Integrating Gamification and Artificial Intelligence**

   Gamification, when combined with critical thinking tasks, motivates learners through competition, rewards, and interactive challenges. Darwin et al. (2023) emphasize that incorporating AI tools can personalize learning, offering adaptive feedback and automated assessment, which helps identify gaps in learners' reasoning processes. AI-driven tools further enhance teachers' reflective abilities by analyzing their performance and providing tailored guidance.

4.3 REFLECTIVE PRACTICES

Reflective practices play a central role in the development of critical thinking skills by fostering metacognition and self-awareness. Reflection allows teachers to evaluate their instructional methods, identify areas for improvement, and engage in continuous learning. Reflective techniques such as journaling, self-assessment, and peer evaluation enable teachers to examine their experiences, decisions, and teaching practices critically. Liu et al. (2014) emphasize that journaling encourages pre-service teachers to document their thought processes, analyze challenges, and reflect on their growth. Similarly, self-assessment and peer evaluation provide constructive feedback, fostering deeper critical engagement and collaboration. These practices create a reflective culture where teachers become active learners, continuously questioning and improving their instructional approaches.

By incorporating active learning techniques, technological tools, and reflective practices into teacher education, institutions can create robust learning environments that foster critical thinking. These strategies not only enhance pre-service teachers' cognitive abilities but also prepare them to cultivate critical thinking skills among their students in future classrooms.

5. CHALLENGES IN DEVELOPING CRITICAL THINKING IN TEACHER EDUCATION

Despite the recognized importance of critical thinking in teacher education, various challenges hinder its successful integration into teacher preparation programs. These challenges span across curricular structures, educator preparedness, student motivation, and institutional constraints.

5.1 CURRICULAR LIMITATIONS

One of the primary challenges is the rigidity of existing curricula in teacher education programs. Traditional curricula often emphasize content memorization over the development of higher-order thinking skills, leaving limited space for integrating critical thinking strategies (Tan, 2017). Such structures fail to provide pre-service teachers with opportunities to practice reflection, problem-solving, and analytical reasoning within real-world teaching scenarios. A curriculum that does not explicitly prioritize critical thinking objectives risks undermining the potential for its development among future educators.

5.2 SKILL GAPS AMONG EDUCATORS

The lack of sufficient training for educators in critical thinking pedagogy presents another significant barrier. Afzal et al. (2023) argue that many teacher educators themselves are not adequately prepared to teach critical thinking due to insufficient professional development. Without a clear understanding of critical thinking frameworks or effective teaching methodologies, educators may struggle to integrate these skills into their instruction. This gap results in an inconsistent emphasis on critical thinking across teacher education programs, limiting its impact on pre-service teachers.

5.3 STUDENT BARRIERS

The successful development of critical thinking skills also depends on the willingness and capacity of learners to engage in higher-order cognitive processes. However, student barriers, such as lack of motivation and resistance to complex, abstract tasks, frequently obstruct progress (Samanhudi & Linse, 2019). Students often prefer structured, directive learning environments and may resist activities that require independent analysis, evaluation, and reasoning. Similarly, the critical thinking tasks demand a significant level of intellectual effort, which can be challenging for students who are unaccustomed to such cognitive rigor.

5.4 INSTITUTIONAL CONSTRAINTS

Resource limitations and administrative challenges further exacerbate the difficulties in fostering critical thinking. Teacher education institutions often lack access to the

necessary resources, such as technology, training programs, and instructional materials, to support critical thinking development effectively. As noted in multiple studies, institutional priorities may also focus on traditional performance metrics, reducing the emphasis on innovative pedagogical approaches that nurture critical thinking skills (Tan, 2017; Noula, 2018). Administrative resistance to curriculum reform and the absence of policies that prioritize critical thinking instruction can limit progress in teacher education programs.

Addressing these challenges requires a concerted effort from educators, institutions, and policymakers to prioritize critical thinking in teacher education. By reforming curricula, investing in educator training, and fostering student engagement, teacher education programs can overcome these barriers and better prepare future teachers to develop critical thinking skills in their classrooms.

6. FUTURE DIRECTIONS AND IMPLICATIONS

To address the challenges and gaps in developing critical thinking (CT) skills in teacher education, future research and practice must leverage innovative approaches and tools. This section explores emerging technologies, cross-cultural applications, the importance of longitudinal studies, and policy reforms as significant pathways to enhance critical thinking in teacher education programs.

6.1 INTEGRATION OF EMERGING TECHNOLOGIES

The incorporation of emerging technologies such as Artificial Intelligence (AI), gamification, and virtual reality holds significant potential for enhancing critical thinking development in teacher education. AI-powered tools can offer personalized learning experiences, analyzing students' thought processes and providing adaptive feedback to strengthen higher-order thinking (Walter, 2024). Gamification, on the other hand, integrates elements of competition, rewards, and real-world challenges to motivate learners and engage them in problem-solving tasks that enhance their analytical and evaluative abilities (Campo et al., 2023).

Furthermore, virtual reality (VR) simulations enable pre-service teachers to engage in immersive, authentic classroom scenarios, requiring them to make reflective and critical decisions in real time. Such environments offer a safe space to experiment with teaching strategies, evaluate outcomes, and refine reasoning skills. As Campo et al. (2023) suggest, emerging technologies can serve as powerful tools to prepare educators for dynamic, technology-integrated classrooms while fostering critical thinking.

6.2 CROSS-CULTURAL APPLICATIONS

Promoting global perspectives in critical thinking instruction is another critical direction for future research and practice. Cross-cultural studies provide opportunities for pre-service teachers to engage with diverse perspectives, fostering a deeper understanding of global issues and encouraging critical reflection on cultural assumptions (Lithoxoidou & Georgiadou, 2023). By integrating cross-cultural and interdisciplinary learning experiences, teacher education programs can cultivate open-mindedness, analytical thinking, and the ability to synthesize information from various cultural contexts (Tiruneh et al., 2017).

Cross-cultural applications, such as collaborative online international projects, can provide pre-service teachers with opportunities to work with peers from different cultural backgrounds. This approach not only enhances critical thinking but also prepares future educators to address the challenges of multicultural classrooms effectively.

6.3 LONGITUDINAL STUDIES

To understand the long-term impact of critical thinking instruction in teacher education, longitudinal studies are essential. Existing research often focuses on short-term outcomes, leaving gaps in understanding how critical thinking skills evolve over time and translate into professional practice. Longitudinal research can track the development of critical thinking skills from teacher training programs into actual teaching careers, providing insights into their sustained impact on instructional quality and student outcomes (Tiruneh et al., 2017).

Such studies can help identify the most effective pedagogical strategies, evaluate their durability, and inform teacher education programs on areas for continuous improvement.

6.4 POLICY AND CURRICULUM REFORMS

To foster critical thinking skills effectively, systemic changes in policies and curriculum design are necessary. Policymakers and higher education institutions must prioritize critical thinking as a core competency in teacher education programs (Behar-Horenstein & Niu, 2011). This can be achieved by:

1. **Embedding Critical Thinking Across the Curriculum**: Explicitly integrating CT objectives into teacher education courses ensures that critical thinking is not treated as an isolated skill but as an integral component of all instructional practices.
2. **Professional Development for Educators**: Providing continuous training and support for faculty to effectively teach and assess critical thinking skills is essential.
3. **Allocating Resources and Infrastructure**: Institutions must invest in technology, instructional materials, and research opportunities that promote innovative approaches to critical thinking instruction.

By implementing these reforms, higher education can better equip pre-service teachers with the critical thinking skills needed to navigate complex educational challenges and prepare their students for 21st-century learning.

Future directions in developing critical thinking in teacher

education hinge on leveraging innovative technologies, fostering cross-cultural learning experiences, conducting longitudinal research, and implementing systemic policy reforms. These efforts will ensure that teacher education programs produce reflective, analytical, and innovative educators capable of fostering critical thinking skills in their students.

CONCLUSION

This paper has provided a comprehensive review of the development of critical thinking skills in teacher education, examining effective strategies, existing challenges, and future directions. The findings reveal that innovative pedagogical approaches, including active learning techniques, project-based learning, and the use of emerging technologies such as AI and gamification, play a pivotal role in fostering critical thinking among pre-service teachers. These methods not only engage learners but also promote problem-solving, analytical reasoning, and reflective thinking—essential competencies for 21st-century educators.

Despite the proven benefits, significant challenges persist. Rigid curricula often hinder the integration of critical thinking, while insufficient training leaves educators ill-prepared to facilitate higher-order cognitive development. Furthermore, student resistance to intellectually demanding tasks and institutional resource limitations continue to impede progress. Addressing these barriers requires systemic changes, including flexible curricula, robust faculty training, and investments in technological infrastructure.

Looking ahead, future research must prioritize longitudinal studies to evaluate the lasting impact of critical thinking instruction and its transfer into professional teaching practice. Cross-cultural and interdisciplinary applications also offer opportunities for enriching teacher education programs, fostering global perspectives, and preparing educators to navigate diverse classroom contexts effectively.

In conclusion, integrating critical thinking as a core component of teacher education is vital for preparing reflective, adaptive, and innovative educators. Policymakers, institutions, and educators must collaborate to design and implement strategies that prioritize critical thinking, ensuring its sustained development and application in teaching practices. By addressing these challenges and embracing future directions, teacher education programs can play a transformative role in equipping teachers to meet the demands of modern education and inspire critical thinking in future generations.

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