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RESEARCH PAPER

Critical Thinking Pedagogy in Teacher Education: An Analysis of Instructional Practices in Pakistani Higher Education

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ABSTRACT

This qualitative study investigated teacher educators' critical thinking practices in the teacher education program of a public university in Pakistan. Critical thinking has been emphasized in Pakistani educational policies; however, its implementation remains a challenge in higher education. Five teacher educators were purposefully selected for non-participant observations in classrooms. To assess the implementation of critical thinking practices, a binary (yes/no) checklist was used across five categories: teaching strategies, student engagement, assessment methods, learning environment and institutional support. Multiple raters were used to validate observation. Findings revealed moderate overall implementation with substantial variation across categories and teachers. Teaching strategies and learning environmental practices were the most frequently implemented, whereas assessment practices, the least frequently observed. Teachers excelled in establishing inclusive environments but struggled with assessment methods and technology integration. Teacher education programs may establish explicit assessment frameworks, offer faculty development in critical thinking instruction and incorporate digital tools for collaborative knowledge construction.

KEYWORDS Critical Thinking, Teacher Education, Higher Education Policy, Assessment Practices, Pedagogical Implementation

Introduction

Critical thinking has emerged as an essential competency for twenty-first century learners. It is not just a buzzword; the ability to analyze, evaluate, and create well-reasoned arguments is listed as one of the most important skills in the current era (Bialik et al., 2015). Policy documents in Pakistan, such as the National Education Policies (NEPs) and curriculum documents, focus on developing critical thinking skills (Jamil et al., 2025; Jamil, Mehmood, & Aziz, 2024; Jamil et al., 2020). The HEC policies for graduates and undergraduates in 2023 focus on research quality and important skills such as critical thinking, which are not explicitly mentioned.

Future teachers should develop this competency because they need to embrace both skill cultivation and knowledge dissemination to future teachers in their training programs to face twenty-first-century challenges, and teachers need to update their competence (Caena & Redecker, 2019). Critical thinking plays a significant role in primary (Boonjeam et al., 2017), secondary (Jamil & Muhammad, 2019), and higher education (Golden, 2023), as teachers are crucial for fostering critical thinking in higher education (Janssen et al., 2019).

The core challenge facing higher education in Pakistan is the mismatch between national policies and their practical applications in educational settings. Prior studies have found that university educators face challenges in implementing critical thinking in teacher education programs (Khan et al., 2019). Research has shown an evident gap in the

observation-based method of analyzing critical thinking instruction practices in teacher education classrooms.

This study seeks to address the existing research gap by providing structured observational data on critical thinking instructional approaches in a Pakistani teacher education curriculum. Observational studies provide an objective research approach to assessing real classroom implementation, as other studies have focused on methodological analytics and subjective attitudinal data (Bibi & Hanif, 2023; Zamir et al., 2021). This approach helps to determine which aspects of classroom practice deviate from both government intentions and evidence-based instructional methodologies.

This study aims to examine teacher education instructors who will develop critical thinking competencies in future teachers using systematic classroom observations. It also traces critical thinking teaching methods and assessment strategies as well as learning environments to provide policy refinement, program development, and professional learning recommendations. Research evidence has provided better insights into critical thinking practices in Pakistani teacher education while pinpointing which aspects require direct improvement for teacher preparation quality enhancement.

Literature Review

Although critical thinking is defined in various ways in the educational literature, it fundamentally pertains to an individual's capacity to analyze, evaluate, and synthesize content to arrive at well-reasoned conclusions. Alsaleh (2020) extended this definition by characterizing critical thinking as a process that enhances personal concept development through reflection and independent decision-making. This conceptualization holds particular significance in the context of teacher education (Huang & Sang, 2023), where prospective teachers are required to cultivate their critical thinking skills and learn how to nurture these abilities in their future students.

Abrami et al. (2015) conducted a large meta-analysis showing that direct instruction in critical thinking can greatly increase students' abilities. However, their research showed that explicit teaching helps more than implicit teaching in explicating critical thinking in educational programs. Additionally, this differs from current practices in teacher education, where critical thinking is believed to naturally echo instructional content.

Critical thinking development is associated with many challenges (Reddy & Nehru, 2021), such as the lack of standardized methods for teaching and assessing critical thinking skills, insufficient faculty expertise in critical thinking instruction, and existing competition with curricula (Stedman & Brown, 2020). Longstanding problems related to critical thinking instruction have been consistently studied in teacher education settings. According to Palavan (2020), teacher preparation curricula do not offer sufficient time for teaching and learning critical thinking skills.

The number of research studies that appreciate the implementation of critical thinking in higher education in Pakistan is limited. Khan et al. (2019) present a mixed methods study that combines surveys and interviews to prove that 21st century skills, such as critical thinking, have not been effectively integrated into university curricula in Pakistan. Examining their findings points out the discrepancy between policymakers' intentions and the results of class practices. Raza et al. (2021) then enrich upon this basis by exploring specific pedagogical practices to facilitate development of critical thinking in Pakistani higher education. This study documented how the faculty tried to facilitate critical thinking development through the implementation of suitable pedagogies, along with its practical challenges. However, institutions should support this pedagogical strategy for successful implementation.

In a focused investigation of Pakistani higher education, Zamir et al. (2021) explored ways in which effective critical thinking is taught in classrooms. This shows that discussion-based methods have greater potential for critical thinking, but they do not replace the traditional lecture approach. Moreover, the techniques used to tell stories helped students to engage.

Stedman and Brown (2020) greatly contributed to the cross-cultural perspective of critical thinking development by providing important insights. This study found that institutional support and cultural factors play important roles in the implementation of critical thinking; however, this varies by setting. However, they argue that critical thinking must be assessed using culturally adapted methods in diverse contexts. A notable policy deficiency in the Higher Education Commission Graduate Education Policy 2023 of Pakistan is that it does not explicitly refer to CT rather it has been focused on in different national level studies (Basri & As' ari, 2019; Jamil, Mehmood, & Shah, 2024; Naseer et al., 2022)

This illustrates the necessity of research aimed at facilitating the intentional involvement of critical thinking development in teacher education programs. This literature synthesis forms the basis for reviewing state-of-the-art methods for instituting critical thinking in higher education institutions in Pakistan. Additionally, it outlines ways in which these methodologies can be improved by adopting evidence-based approaches.

Material and Methods

Research Design

This study followed a qualitative research approach using an interpretive paradigm. This approach assumes the existence of participants' multiple realities depending on their natural settings (Merriam & Tisdell, 2015; Yin, 2013), aiming to explore the specific phenomenon to understand it from the participants' perspectives (Creswell & Poth, 2018). A single case study research design was used, which is particularly appropriate for complex phenomena in natural settings. This provided an in-depth exploration of the participants' perspectives. It is used to study the "how" and "why" aspects of contemporary events. An exploratory design was used to understand teacher educators' perceptions, practices, and challenges in developing critical thinking skills. This approach is consistent with Yin (2018) case study methodology, which uses an in-depth research method subject to a delimited system (one public university).

Population and Sample

The study population comprised teacher educators involved in teacher education programs responsible for instructing prospective teachers at a public university in Punjab, Pakistan. The purposive sampling technique was used to select five participants as the sample, as this technique is used in qualitative studies when the research purpose determines the qualitative research sample size and the target population must consist of relevant individuals according to the research purpose (Patton, 2015; Zikmund et al., 2013). This technique was used to obtain information-rich participants seeking information on the phenomenon. The criteria for participation in the selection process were as follows:

- Faculty members currently teaching in the BS Teacher Education Program at a selected public university.
- The minimum teaching experience was one year.
- Willingness to participate in classroom observations.

Instrument Development and Validation

Classroom observations were conducted to explore teaching practices related to the development of critical thinking. It was a non-participant observation as *"in a nonparticipant observation study, researchers do not participate in the activity being observed but rather "sit on the sidelines" and watch; they are not directly involved in the situation they are observing" '* (Fraenkel et al., 2022, p. 401). This technique is used to gain insights from different people in a specific context as they interact with others (Simpson & Tuson, 2003) and is suitable for classroom observations. An observational checklist was employed to conduct classroom observations across 25 sessions, with five observations per teacher educator (n=5). This checklist was developed based on an extensive literature review and research objectives. Moreover, three relevant experts validated the study. Prior to the main study, the checklist was pilot tested with two teacher educators who were not part of the study.

Each observation was conducted simultaneously by two observers to ensure the reliability of the data. The checklist comprises five critical thinking aspects: teaching strategies and methods (six items), student engagement and participation (five items), assessment and evaluation of critical thinking (five items), learning environment and resources (five items), and challenges and support for critical thinking development (four items). For each of the 25 checklist items, the observers recorded a binary response (yes/no) to indicate whether a specific critical thinking practice was observed during the sessions.

Data Collection

The data collection process took 2 months. Potential participants were initially contacted through the official channels of the university and individually contacted to arrange classroom observations. Data collection involved classroom observations. 25 classroom observations of the participants in a classroom setting were conducted to document actual teaching practices and student experiences, including identifying appropriate instructional strategies, student interactions, and critical thinking development activities. These data collection activities were carried out to minimize disruptions to participants' normal pursuit of their academic coursework and are following university research protocols and human subjects' ethical guidelines

Data Analysis

Classroom observation checklists were analyzed using SPSS v.22. Descriptive statistics were used to measure implementation rates across the five critical thinking aspects. Inter-rater reliability was used with percentage agreement calculations and Cohen's kappa coefficient ($\kappa = 0.57$, $p < .001$) to determine the chance agreement. Qualitative data may be collected, analyzed, and converged with quantitative data (Creswell et al., 2018), as cited by Poth et al. (2020). To validate the observational findings, the triangulation of the two observers' ratings was used to strengthen reliability.

Inter-rater Reliability

To ensure the robustness of the observational data, inter-rater reliability was assessed using the percentage agreement and Cohen's kappa coefficient.

Table 1
Inter-rater Reliability by Category

Category	Agreement Rate	Kappa Value	Agreement Level
Teaching Strategies	76.7%	0.53	Moderate
Student Engagement	80.0%	0.60	Moderate

Assessment and Evaluation	74.0%	0.48	Moderate
Learning Environment	82.0%	0.63	Substantial
Challenges and Support	80.0%	0.55	Moderate
Overall	***78.6%***	***0.57***	***Moderate***

Table 1 shows that the overall percentage agreement between the observers was 78.6%, with an overall Cohen's kappa of 0.57, indicating moderate agreement. The Learning Environment category showed the highest level of agreement (Kappa = 0.63, substantial agreement), while Assessment and Evaluation showed the lowest level of agreement (Kappa = 0.48, moderate agreement). The moderate overall agreement level provides reasonable confidence in the reliability of the observational data, although the lower agreement for Assessment and Evaluation suggests that these practices may be more challenging to observe consistently, possibly because of their complexity or episodic nature in classroom settings.

Ethical Considerations

In accordance with the British Educational Research Association (BERA, 2018) guidelines, the current study used the following ethical considerations:

Informed consent was obtained from the teacher educators prior to the classroom observations. Participants' anonymity was maintained in all reports and publications of this study. Data security was also ensured. Participants had the right to withdraw from any stage of the research. Moreover, the findings were reported truthfully to avoid biases or misrepresentations.

Results and Discussion

The findings of this study are explained below, addressing the following aspects.

Overall Implementation of Critical Thinking Practices

The analysis revealed considerable variation in the implementation of critical thinking practices among teacher educators. Across all observations, the average implementation rate was 48.1%, indicating that less than half of the critical thinking practices were consistently observed in the classroom. This finding suggests a significant gap between educational policy aspirations for critical thinking development and actual classroom practices in teacher-education programs.

Table 2
Implementation Rates by Category

Category	Average Implementation Rate
Teaching Strategies and Methods	61.7%
Learning Environment and Resources	55.2%
Challenges and Support for Critical Thinking Development	47.0%
Student Engagement and Participation	41.6%
Assessment and Evaluation of Critical Thinking	35.2%

According to the above table, Teaching Strategies and Methods emerged as the most frequently implemented category (61.7%), followed by Learning Environment and Resources (55.2%). These findings suggest that teacher educators are more proficient in employing instructional approaches and creating supportive environments that foster critical thinking. However, the notably lower implementation rates for Student Engagement and Participation (41.6%) and Assessment and Evaluation of Critical Thinking (35.2%) indicate significant areas for improvement. The relatively low implementation rate of Assessment and Evaluation practices is particularly remarkable, as effective assessment is crucial for reinforcing and measuring critical thinking development.

Specific Critical Thinking Practices: Implementation Rates

A more detailed analysis of individual practices provides insights into the specific critical thinking strategies that teacher educators most commonly employ. Table 2 presents the implementation rates for each of the 25 observed criteria ranked from highest to lowest.

Table 3
Implementation Rates for Specific Critical Thinking Practices

Rank	Criterion	Yes Count	Total Observations	Percentage
1	Creates a classroom environment for diverse perspectives	42	50	84.0%
2	Encourages an inclusive environment for comfortable sharing opinions	40	50	80.0%
3	Demonstrates flexibility in teaching approaches	40	50	80.0%
4	Incorporates case studies or real-world examples	38	50	76.0%
5	Encourages students to justify reasoning and provide evidence	33	50	66.0%
6	Uses questioning techniques for analysis/evaluation/synthesis	32	50	64.0%
7	Problem-solving activities for critical thinking	28	50	56.0%
8	Observes active participation from majority of students	28	50	56.0%
9	Engages students in reflective thinking	27	50	54.0%
10	Facilitates group activities for collaborative critical thinking	26	50	52.0%
11	Provides sufficient time for complex topics	26	50	52.0%
12	Adapts strategies based on students' cognitive levels	25	50	50.0%
13	Encourages students to develop independent opinions	19	50	38.0%
14	Promotes discussion and debate for multiple perspectives	19	50	38.0%
15	Open-ended assessments instead of factual recall	19	50	38.0%
16	Self and peer assessment for critical self-reflection	19	50	38.0%
17	Provides feedback emphasizing reasoning processes	18	50	36.0%
18	Designs assignments for argumentation/justification	18	50	36.0%
19	Incorporates interdisciplinary approaches	18	50	36.0%
20	Encourages students to ask questions and challenge assumptions	17	50	34.0%
21	Identifies and addresses varying levels of critical thinking abilities	16	50	32.0%
22	Provides opportunities for peer review and feedback	14	50	28.0%
23	Uses rubrics that assess higher-order thinking skills	14	50	28.0%
24	Uses institutional resources effectively	13	50	26.0%
25	Uses digital tools or multimedia resources	10	50	20.0%

The data in Table 3 highlight several important trends. The most frequently observed practices were related to creating supportive learning environments, with over 80% implementation rates for creating a classroom environment for diverse perspectives (84.0%) and encouraging an inclusive environment for comfortable sharing of opinions

(80.0%). Similarly, teacher flexibility in instructional approaches (80.0%) and the use of real-world examples or case studies (76.0%) were frequently observed.

However, critical practices that directly foster higher-order thinking skills have been observed in the literature. For example, promoting discussion and debate (38.0%), encouraging students to ask questions and challenge assumptions (34.0%), and providing peer review opportunities (28.0%) had implementation rates of less than 40%. The low implementation rates for assessment practices that specifically target critical thinking, such as using rubrics for higher-order thinking skills (28.0%) and designing assignments for argumentation and justification (36.0%), are particularly concerning.

The least implemented practice was the use of digital tools or multimedia resources to enhance critical thinking (20.0%), suggesting that technological integration for critical thinking development remains a significant challenge in the observed teacher education program.

Variations Across Teacher Educators

The analysis revealed substantial variations in the implementation of critical thinking practices among the five teacher educators. Table 3 presents the overall implementation rates for each teacher educator.

Table 4
Implementation Rates by Teacher Educator

Teacher	Implementation Rate
Teacher 4	61.4%
Teacher 5	59.4%
Teacher 1	47.4%
Teacher 2	39.4%
Teacher 3	35.0%

As shown in Table 4, the implementation rates varied from 61.4% (Teacher 4) to 35.0% (Teacher 3), representing a range of 26.4 percentage points. This substantial variation suggests that individual teacher characteristics, expertise, and beliefs may significantly influence critical thinking instruction in teacher-education programs.

A more nuanced analysis of the implementation rates by category for each teacher educator provided additional insights into these variations (see Table 5).

Table 5
Implementation Rates by Category and Teacher Educator

Category	Teacher 1	Teacher 2	Teacher 3	Teacher 4	Teacher 5
Teaching Strategies	62.5%	50.0%	48.3%	75.0%	73.3%
Student Engagement	41.0%	31.0%	24.0%	70.0%	65.0%
Assessment	40.0%	21.0%	16.0%	53.0%	70.0%
Learning Environment	53.0%	46.0%	50.0%	68.0%	59.0%
Challenges	40.0%	42.5%	37.5%	47.5%	60.0%

Table 5 reveals several interesting patterns in teachers' implementation of critical thinking practices. Teacher 4 demonstrated the highest implementation rates in most categories, particularly in Teaching Strategies (75.0%) and Student Engagement (70.0%). Teacher 5 showed the strongest implementation of assessment practices (70.0%) and Challenges and Support strategies (60.0%). In contrast, Teacher 3 showed notably low implementation rates for Student Engagement (24.0%) and assessment (16.0%), suggesting particular challenges in these domains.

These findings highlight the uneven development of teacher educators' critical thinking instructional capabilities. While some educators demonstrate relative strength

across multiple domains of critical thinking instruction, others show significant weaknesses in particular areas, especially in assessment and student engagement. This pattern suggests the need for targeted professional development to address the specific domains of critical thinking instruction in teacher education.

Findings based on different Aspects

Teaching Strategies and Methods

Teaching Strategies and Methods emerged as the most consistently implemented category of critical thinking practices, with an overall implementation rate of 61.7 %. Within this category, incorporating case studies or real-world examples (76.0%) and encouraging students to justify their reasoning (66.0%) were the most common practices. These findings suggest that teacher educators should recognize the importance of contextualizing learning and promoting evidence-based reasoning in their teaching practice.

However, debate and discussion of multiple perspectives were observed in only 38.0 percent of the observations, suggesting a possible area for improvement. The rate of implementation of discussion and debate falls within this relatively low range, which is concerning given that the literature identifies discussion and perspective-taking as vital components in the development of critical thinking.

Student Engagement and Participation

Overall, the Implementation of Student Engagement and Participation practices accounted for 41.6%. In 56.0% of the classes, the active participation of the majority of students was observed, and in 52.0% of the sessions, group activities were facilitated for collaborative critical thinking. Consequently, lower implementation rates were associated with practices that required students to take greater initiative. Only 34.0% of the classes encouraged students to ask questions and challenge assumptions, and only 28.0% provided opportunities for peer review and feedback. Teacher educators are moderately effective in ensuring teachers' general participation; however, they are less inclined to employ practices that encourage student autonomy and peer interaction in critical thinking processes.

Assessment and Evaluation of Critical Thinking

The implementation rate for Assessment and Evaluation practices showed the lowest overall rate (35.2%), representing a significant gap in how critical thinking is assessed in teacher education programs. Factual recall was generally assessed in an open-ended manner in only 38.0% of the classes, and the use of rubrics specifically designed to assess higher-order thinking skills was observed in 28.0% of the classes. As much critical thinking depends on aligning instruction with assessment practices, this finding is particularly concerning. The lack of knowledge on how to assess upper-level thinking skills indicates that critical thinking is not methodically reinforced by the evaluation method, potentially defeating other avenues for building these skills.

Learning Environment and Resources

Learning Environment and Resources was the second most consistently implemented factor, with an implementation rate of 55.2 percent. Creating a classroom environment for diverse perspectives (84.0%) and encouraging an inclusive environment for the comfortable sharing of opinions (80.0%) were among the most frequently observed practices across all criteria.

However, the implementation rates of technology- and resource-related practices are much lower. The use of digital tools or multimedia resources to enhance critical thinking was observed in only 20.0% of the classes, and the effective use of institutional resources to support critical thinking instruction was observed in only 26.0% of classes. These findings suggest that while teacher educators generally create supportive social learning environments, they less frequently leverage technological and institutional resources to enhance critical thinking.

Challenges and Support for Critical Thinking Development

Practices related to Challenges and Support for Critical Thinking Development had a moderate implementation rate of 47.0%. Demonstrating flexibility in teaching approaches to overcome student difficulties was frequently observed (80.0%), indicating teacher educators' responsiveness to classroom dynamics. However, identifying and addressing varying levels of critical thinking abilities among students was observed in only 32.0% of the classes, suggesting limited differentiation of instruction based on students' critical thinking capabilities.

Discussion

This study examined teacher educators' practices in developing critical thinking skills among students in teacher education programs in Pakistan. Through systematic classroom observations, valuable insights were gained into the current state of critical thinking instruction in teacher-education programs. This section interprets the key findings in relation to existing literature, educational policy, and theoretical frameworks.

Implementation of the Gap Between Policy and Practice

The current study found that educational policy aspirations diverge from practice in critical thinking instruction, with an overall implementation rate of 48.1%. This is consistent with Khan et al. (2019), who noted that Pakistani universities are unable to act as appropriate promoters of 21st century skills, especially critical thinking skills. These observations indicate that the policies for research quality and the development of critical thinking in the context of the Higher Education Commission (HEC) have not entirely translated into the realities of teacher education programs. This can be interpreted through multiple lenses within the policy-practice gap. As Stedman and Brown (2020) pointed out, systemic problems hinder the development of critical thinking. Guidelines may be lacking, no one may have the requisite expertise, there may be other curricular priorities, and there may be a time envelope to consider. First, the low implementation rates of assessment practices (35.2%) and digital tools (20%) documented in this sample represent institutions where systemic challenges might also exist in Pakistani teacher-education programs. Furthermore, the large variability in implementation rates among teachers (ranging from 35.0% to 61.4%) suggests that critical thinking instruction may depend less on conditioning through systemic programs than on teachers' willingness and capability. This essentially matches Raza et al. (2021) finding that even after teachers try to implement appropriate pedagogy in Pakistani higher education to develop critical thinking, the challenges of implementation persist.

Strengths and Limitations in Current Practice

The results of the current study show that teacher educators are strong in building support for learning environments and use some teaching strategies, but are weak in assessment practices and some student engagement practices to develop higher order thinking.

Teaching Strategies and Learning Environment

Higher implementation rates for Teaching Strategies (61.7%) and Learning Environment (55.2%) indicate that teacher educators realize the significance of using proper instruction and a conducive classroom environment in the development of critical thinking. Constructivist learning theory emphasizes learning from authentic contexts, and the use of case studies and real-world examples (76%) resonates with this theory. Similarly, the high rates of creating inclusive environments for diverse perspectives (84%) and comfortable opinion sharing (80%) demonstrate an understanding that critical thinking requires psychological safety for exploration and risk-taking.

These strengths are consistent with Zamir et al. (2021), who found that certain teaching methodologies, particularly those involving real-world applications and discussions, showed promise for developing critical thinking in Pakistani higher education. However, the relatively low implementation rate for promoting discussion and debate (38%) suggests that while teachers create environments that could support dialogue, they less frequently structure explicit opportunities for perspective taking and argumentative discourse.

Assessment and Student Engagement

The remarkably low implementation rates for Assessment and Evaluation (35.2%) and certain aspects of Student Engagement (41.6%) represent significant areas for improvement. These findings align with those of Abrami et al. (2015) meta-analysis, which emphasized that explicit instruction and assessment of critical thinking are necessary for skill development. The infrequent use of rubrics for higher-order thinking (28%) and assignments designed for argumentation (36%) suggests that critical thinking may not be systematically reinforced through assessments.

Of particular concern is the limited implementation of practices that promote student autonomy and initiative in critical thinking, such as encouraging students to ask questions and challenge assumptions (34%) and providing opportunities for peer reviews (28%). These findings echo Palavan (2020) observation that teacher preparation curricula often fail to adequately address critical thinking skills, particularly those related to self-regulation and evaluation.

Variations Among Teacher Educators

However, there is a large variation in implementation rates among teacher educators (ranging from 35.0% to 61.4%), indicating that critical thinking instructional capabilities among the faculty have not yet been fully developed. Student Engagement (ranging from 24.0% to 70.0%) and assessment practices (ranging from 16.0% to 70.0%) varied significantly in this case.

These differences may have resulted from differences in the extent of expertise, professional development, or philosophical stances regarding critical thinking instruction. According to Stedman and Brown (2020), critical thinking implementation is unsuccessful without faculty development and support. The high implementation rates provide an opportunity for teacher educators to consider targeted professional development in specific domains of critical thinking instruction related to assessment and student engagement in the future.

Technology Integration and Institutional Support

Teacher educators considered the opportunity to use digital tools and multimedia resources (20.0%) to the extent possible in their teaching. In today's educational

landscape, digital technology provides strong platforms for engaging in collaborative knowledge construction, information evaluation, and multimodal meaning-making. Given that the low implementation rate suggests limited access to appropriate technology, insufficient technological pedagogical knowledge among faculty, or limited institutional emphasis on integrating technology into teaching critical thinking. The similarly low rate of institutional resources used to support critical thinking instruction (26.0%) suggests a possible gap between institutional resources and classroom needs. This result is consistent with the observation of institutional support as critical for implementing critical thinking instruction in Pakistani higher education by Raza et al. (2021).

Conclusion

The analysis of critical thinking practices in a Pakistani teacher education program revealed that practitioners' implementation of this teaching principle is moderately low but with a great deal of variation in practices, categories, and practitioners themselves. While teacher educators show competency in creating conducive environments and using some teaching strategies, their weaknesses continue to lie in assessment practices and specific engagement techniques that encourage higher-level thinking. These findings underscore the necessity of more systematic ways of integrating critical thinking into all parts of teacher education, including assessment practices, student autonomy, and technology integration. Addressing these gaps would help policy aspirations to be better aligned with teacher education programs, with future teachers being better prepared to promote critical thinking skills in their own students, thereby improving critical thinking instruction in the Pakistani system.

Recommendations

- Teacher education programs may balance the coverage of all elements of critical thinking (i.e., interpretation, analysis, evaluation, inference, explanation, and self-regulation).
- Assessment practices might be developed and implemented to explicitly target critical thinking, and rubrics should be developed for higher order thinking and assignments that encourage argumentation and justification.
- Faculty need to create more opportunities for students to question, check among peers, and self-assess themselves.
- Digital tools may be explored and supported for integration to support critical thinking processes, especially the collaborative construction of knowledge and evaluation of information.
- Professional development might target critical thinking instruction in areas of weakness, such as assessment practices and techniques for engaging students in the learning process.
- Educational policies may advocate for critical thinking to be supported by specific implementation frameworks, resources, and supportive mechanisms to bridge the policy practice gap.

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