An Analysis of the Role of Higher Education in Promoting Critical Thinking and Problem-Solving Skills among Pakistani Students

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Abstract
This study examined the role of higher education in promoting critical thinking and problem-solving skills among Pakistani students through a mixed-methods approach. A cross-sectional survey design was employed, targeting 450 undergraduate and graduate students from five major universities across Punjab, Sindh, and Khyber Pakhtunkhwa provinces. Data collection involved the California Critical Thinking Skills Test (CCTST), a self-developed questionnaire, and semi-structured interviews with faculty and students. Quantitative analysis revealed significant positive correlations between higher education experience and critical thinking abilities ($r = 0.68$, $p < 0.001$), with engineering students demonstrating the highest mean scores ($M = 78.4$, $SD = 8.2$). Qualitative findings highlighted the importance of interactive teaching methods, case-based learning, and research-oriented curricula in developing analytical skills. The study found that while Pakistani higher education institutions show promise in fostering critical thinking, gaps remain in systematic skill development across disciplines. Results indicate that students' problem-solving abilities improved significantly with academic progression, particularly in science and engineering fields. This research contributes to understanding educational practices in Pakistani universities and provides insights for curriculum enhancement to better prepare students for contemporary challenges.

Keywords: Critical thinking, problem-solving skills, Higher education, Pakistani students, educational assessment, mixed-methods research, academic development.

Introduction
The contemporary global landscape demands individuals equipped with sophisticated cognitive abilities, particularly critical thinking and problem-solving skills, to navigate complex challenges across various domains. Higher education institutions worldwide have increasingly recognized their pivotal role in cultivating these essential competencies among students, as they serve as the primary bridge between theoretical knowledge acquisition and practical

application in professional settings. In the context of Pakistan, where educational transformation has become a national priority, understanding how universities contribute to developing critical thinking and problem-solving capabilities among students has emerged as a crucial area of investigation (Ahmed et al., 2023).

The significance of critical thinking in educational contexts cannot be overstated, as it encompasses the ability to analyze information objectively, evaluate evidence systematically, and form reasoned judgments based on logical reasoning rather than mere acceptance of presented information. Research indicates that students who develop strong critical thinking skills demonstrate improved academic performance, enhanced decision-making capabilities, and greater adaptability in professional environments (Rahman & Shah, 2022). Similarly, problem-solving skills enable individuals to identify challenges, generate creative solutions, and implement effective strategies to overcome obstacles, making them indispensable in today's rapidly evolving technological and social landscape.

Pakistani higher education has undergone significant reforms in recent decades, with the Higher Education Commission (HEC) implementing various initiatives to enhance the quality of education and align academic programs with international standards. These efforts have focused on curriculum modernization, faculty development, and the integration of innovative teaching methodologies designed to promote active learning and critical engagement among students (Malik & Khan, 2021). However, despite these improvements, questions remain about the effectiveness of current educational practices in developing the cognitive skills necessary for success in the 21st century.

The traditional pedagogical approaches prevalent in many Pakistani universities have historically emphasized rote memorization and passive learning, which may not adequately prepare students for the analytical and creative thinking required in contemporary professional environments. Recent studies have highlighted the need for educational institutions to adopt more student-centered approaches that encourage inquiry-based learning, collaborative problem-solving, and critical evaluation of information sources (Hussain et al., 2023). This shift requires not only changes in teaching methodologies but also modifications to assessment practices and curriculum design to ensure that critical thinking and problem-solving skills are systematically developed and evaluated.

The diversity of disciplines within Pakistani higher education presents both opportunities and challenges for developing critical thinking and problem-solving skills. While science and engineering programs may naturally incorporate analytical thinking through laboratory work and technical problem-solving, humanities and social sciences require different approaches to foster critical evaluation of texts, arguments, and cultural phenomena (Fatima & Ali, 2022). Understanding how different academic disciplines contribute to skill development is essential for creating comprehensive educational strategies that benefit all students regardless of their field of study.

Faculty members play a crucial role in promoting critical thinking and problem-solving skills, as their teaching approaches, assessment methods, and classroom interactions directly influence student learning outcomes. Research has shown that instructors who employ interactive teaching strategies, encourage

questioning and debate, and provide opportunities for hands-on problem-solving tend to foster greater development of these skills among their students (Nawaz et al., 2021). However, the extent to which Pakistani faculty members are equipped with the necessary training and resources to implement such approaches remains a subject of ongoing investigation.

The technological revolution has also transformed the landscape of higher education, creating new opportunities for developing critical thinking and problem-solving skills through digital platforms, online resources, and interactive learning environments. Pakistani universities have increasingly adopted technology-enhanced learning approaches, particularly following the COVID-19 pandemic, which has highlighted both the potential and challenges of digital education in promoting analytical thinking (Siddique & Ahmed, 2023). Understanding how these technological tools can be effectively integrated into traditional educational practices is essential for maximizing their impact on student development.

The socioeconomic context of Pakistani higher education adds another layer of complexity to the development of critical thinking and problem-solving skills. Students from diverse backgrounds bring varying levels of prior educational experience, cultural perspectives, and learning preferences to their university studies, which can influence their ability to engage with analytical thinking tasks and problem-solving activities (Tariq et al., 2022). Educational institutions must therefore develop inclusive approaches that accommodate this diversity while ensuring that all students have opportunities to develop these essential skills.

Assessment and evaluation of critical thinking and problem-solving skills present unique challenges in the Pakistani educational context, as traditional examination systems may not adequately capture the depth and complexity of these cognitive abilities. The development of appropriate assessment tools and methodologies that can accurately measure student progress in these areas is crucial for ensuring that educational interventions are effective and that students are adequately prepared for professional success (Iqbal & Hassan, 2021). This includes both formative assessments that provide ongoing feedback to students and summative evaluations that demonstrate achievement of learning outcomes.

The implications of this research extend beyond individual student success to encompass broader societal benefits, as graduates equipped with strong critical thinking and problem-solving skills are better positioned to contribute to national development, innovation, and economic growth. Pakistani industries and organizations increasingly seek employees who can think analytically, solve complex problems, and adapt to changing circumstances, making the development of these skills a matter of national importance (Ghani & Mahmood, 2023). Understanding how higher education institutions can better prepare students for these demands is therefore essential for both educational policy and economic development.

Research Objectives

1. To assess the current level of critical thinking and problem-solving skills among Pakistani university students across different disciplines and academic levels.
2. To analyze the relationship between educational practices in Pakistani

higher education institutions and the development of critical thinking and problem-solving abilities among students.
3. To identify effective teaching methodologies and institutional factors that contribute to the enhancement of analytical and problem-solving skills in the Pakistani higher education context.

Research Questions
1. What is the current state of critical thinking and problem-solving skills among Pakistani university students, and how do these skills vary across different academic disciplines and levels of study?
2. How do educational practices, teaching methodologies, and institutional factors in Pakistani higher education institutions influence the development of critical thinking and problem-solving skills among students?
3. What are the most effective approaches and strategies for enhancing critical thinking and problem-solving abilities in Pakistani higher education settings?

Significance of the Study
This research holds significant importance for multiple stakeholders within the Pakistani educational ecosystem and beyond. For educational policymakers, the findings provide evidence-based insights into the effectiveness of current higher education practices in developing critical thinking and problem-solving skills, enabling informed decision-making regarding curriculum reforms and institutional improvements. Faculty members and educational administrators can utilize the results to identify successful teaching strategies and institutional practices that enhance student learning outcomes, while also recognizing areas requiring additional support and development. The study contributes to the broader understanding of cognitive skill development in diverse cultural and educational contexts, adding to the international literature on higher education effectiveness. For students, the research highlights the importance of actively engaging with analytical thinking opportunities and seeking educational experiences that promote skill development. The findings also have implications for employers and industry leaders who seek graduates equipped with the analytical and problem-solving capabilities necessary for professional success in contemporary work environments. Furthermore, this research supports Pakistan's national development goals by providing insights into how educational institutions can better prepare graduates to contribute to innovation, economic growth, and societal advancement through enhanced cognitive capabilities.

Literature Review
The development of critical thinking and problem-solving skills in higher education has received considerable attention from researchers worldwide, with particular focus on understanding how educational institutions can effectively cultivate these essential cognitive abilities. Critical thinking, defined as the objective analysis and evaluation of information to form reasoned judgments, has been identified as a fundamental competency for success in academic, professional, and personal contexts (Johnson & Smith, 2023). Recent research

has emphasized the multifaceted nature of critical thinking, encompassing skills such as analysis, evaluation, inference, interpretation, and self-regulation, all of which require systematic development through appropriate educational interventions.

The theoretical foundations of critical thinking education have evolved significantly over the past decade, with scholars proposing various models and frameworks for understanding how these skills develop and can be enhanced. The work of contemporary researchers has built upon earlier cognitive theories to develop more nuanced understandings of how students acquire and apply critical thinking abilities in different contexts (Williams et al., 2021). These theoretical advances have important implications for educational practice, as they suggest that critical thinking development requires explicit instruction, practice opportunities, and ongoing reflection rather than simply emerging naturally through exposure to academic content.

Problem-solving skills, while closely related to critical thinking, represent a distinct set of cognitive abilities that enable individuals to identify challenges, generate solutions, and implement effective strategies to overcome obstacles. Research has shown that effective problem-solving involves multiple stages, including problem identification, solution generation, evaluation of alternatives, and implementation of chosen strategies (Brown & Davis, 2022). The development of these skills requires practice with diverse problem types, exposure to different solution strategies, and opportunities for reflection on problem-solving processes.

The role of higher education in developing critical thinking and problem-solving skills has been examined extensively in international contexts, with researchers investigating how different pedagogical approaches, assessment methods, and institutional factors influence student outcomes. Studies have consistently shown that active learning strategies, such as case-based learning, collaborative problem-solving, and inquiry-based instruction, are more effective than traditional lecture-based approaches in promoting critical thinking development (Anderson & Thompson, 2023). These findings have important implications for educational practice, as they suggest that institutions must deliberately design learning experiences that engage students in analytical thinking and problem-solving activities.

The discipline-specific nature of critical thinking and problem-solving skills has emerged as an important area of research, with scholars investigating how these abilities manifest differently across various academic fields. While some researchers argue for the existence of general critical thinking skills that transfer across domains, others contend that these abilities are highly contextualized and must be developed within specific disciplinary frameworks (Martinez & Garcia, 2021). This debate has practical implications for curriculum design and instructional practice, as it influences how institutions approach the development of these skills across different academic programs.

Faculty development and teaching practices have been identified as crucial factors in promoting critical thinking and problem-solving skills among students. Research has shown that instructors who receive training in critical thinking pedagogy and who model analytical thinking in their teaching are more successful in developing these skills among their students (Lee & Park, 2022). However, studies have also highlighted significant challenges in preparing

faculty members to effectively teach critical thinking, including resistance to pedagogical change, lack of institutional support, and insufficient understanding of how to integrate critical thinking instruction into disciplinary content.

The assessment of critical thinking and problem-solving skills presents unique challenges that have been addressed by researchers through the development of various measurement tools and methodologies. Standardized instruments such as the California Critical Thinking Skills Test (CCTST) and the Watson-Glaser Critical Thinking Appraisal have been widely used to measure these abilities, though researchers have also developed discipline-specific and context-sensitive assessment approaches (Taylor & Wilson, 2023). The validity and reliability of these assessment tools, particularly in diverse cultural and educational contexts, remain important areas of ongoing research.

Technology integration in higher education has opened new possibilities for developing critical thinking and problem-solving skills, with researchers investigating how digital tools and online platforms can enhance these cognitive abilities. Studies have shown that properly designed technology-enhanced learning environments can provide students with opportunities for collaborative problem-solving, access to diverse information sources, and interactive learning experiences that promote analytical thinking (Kim & Chang, 2021). However, research has also highlighted the importance of thoughtful integration of technology with pedagogical principles to ensure that technological tools enhance rather than replace critical thinking development.

The cultural and contextual factors that influence critical thinking and problem-solving skill development have received increased attention from researchers, particularly in non-Western educational contexts. Studies have shown that cultural values, educational traditions, and societal expectations can significantly influence how students approach analytical thinking and problem-solving tasks (Rahman & Ahmed, 2022). This research has important implications for educational practice in diverse contexts, as it suggests that effective critical thinking instruction must be culturally responsive and contextually appropriate.

The relationship between critical thinking skills and academic achievement has been extensively studied, with researchers consistently finding positive correlations between these abilities and student performance across various measures. Students who demonstrate strong critical thinking skills tend to perform better on examinations, produce higher quality written work, and show greater engagement with academic content (Jackson & Miller, 2023). These findings support the importance of developing critical thinking abilities as part of comprehensive educational programs designed to enhance student success.

The long-term outcomes of critical thinking and problem-solving skill development have been investigated through longitudinal studies that track graduates into their professional careers. Research has shown that individuals who develop strong analytical and problem-solving abilities during their university studies are more likely to experience career success, demonstrate leadership capabilities, and contribute to innovation in their respective fields (Chen & Rodriguez, 2021). These findings provide strong justification for institutional investments in critical thinking development as part of preparing students for lifelong success.

The challenges and barriers to developing critical thinking and problem-solving

skills in higher education have been identified through research as including institutional resistance to pedagogical change, faculty preparation inadequacies, assessment difficulties, and student expectations shaped by previous educational experiences. Studies have shown that overcoming these barriers requires comprehensive institutional approaches that address multiple levels of the educational system, from individual faculty development to institutional policy changes (Thompson & Davis, 2022). Understanding these challenges is essential for developing effective strategies to enhance critical thinking and problem-solving skill development in higher education contexts.

Research Methodology

This study employed a mixed-methods approach to examine the role of higher education in promoting critical thinking and problem-solving skills among Pakistani students. The research utilized a cross-sectional survey design that targeted undergraduate and graduate students from five major universities across Punjab, Sindh, and Khyber Pakhtunkhwa provinces. A stratified random sampling technique was used to select 450 participants from various disciplines including humanities, social sciences, natural sciences, and engineering. Data collection involved administering the California Critical Thinking Skills Test (CCTST) and a self-developed questionnaire measuring problem-solving abilities and educational experiences. Additionally, semi-structured interviews were conducted with 30 faculty members and 25 students to gain deeper insights into teaching methodologies and learning experiences. The quantitative data was analyzed using SPSS version 25, employing descriptive statistics, correlation analysis, and multiple regression to identify relationships between variables. Qualitative data from interviews was transcribed and analyzed using thematic analysis to identify recurring patterns and themes. The study maintained ethical standards by obtaining institutional approval and informed consent from all participants. Reliability and validity of instruments were established through pilot testing and expert validation, ensuring the credibility of findings regarding critical thinking development in Pakistani higher education contexts.

Results and Data Analysis
Quantitative Analysis

The quantitative analysis revealed significant insights into the critical thinking and problem-solving abilities of Pakistani university students. The demographic distribution of participants showed a relatively balanced representation across gender (52% female, 48% male), academic levels (60% undergraduate, 40% graduate), and disciplines (25% humanities, 28% social sciences, 24% natural sciences, 23% engineering). The age range of participants was 18-28 years, with a mean age of 21.6 years (SD = 2.4).

Table 1: Demographic Characteristics of Participants (N = 450)

Variable	Category	Frequency	Percentage
Gender	Male	216	48.0
	Female	234	52.0
Academic Level	Undergraduate	270	60.0

	Graduate	180	40.0
Discipline	Humanities	113	25.1
	Social Sciences	126	28.0
	Natural Sciences	108	24.0
	Engineering	103	22.9
University Region	Punjab	180	40.0
	Sindh	162	36.0
	Khyber Pakhtunkhwa	108	24.0

Table 1 presents the demographic characteristics of the study participants, showing a well-distributed sample across gender, academic levels, and disciplines. The representation across provinces reflects the educational landscape of Pakistan, with Punjab and Sindh having the largest number of participants, corresponding to their higher concentrations of universities and student populations.

Table 2: Descriptive Statistics for Critical Thinking Skills Test (CCTST) Scores

Discipline	N	Mean	SD	Minimum	Maximum
Humanities	113	64.2	9.8	45	82
Social Sciences	126	67.5	8.6	48	85
Natural Sciences	108	72.1	7.4	56	89
Engineering	103	78.4	8.2	61	94
Overall	450	70.3	9.7	45	94

The descriptive statistics for CCTST scores revealed significant variations across disciplines, with engineering students demonstrating the highest mean scores (M = 78.4, SD = 8.2), followed by natural sciences (M = 72.1, SD = 7.4), social sciences (M = 67.5, SD = 8.6), and humanities (M = 64.2, SD = 9.8). The overall mean score was 70.3 (SD = 9.7), indicating moderate to high levels of critical thinking abilities among Pakistani university students.

Table 3: Problem-Solving Skills Assessment Results by Academic Level

Academic Level	N	Mean Score	SD	95% CI Lower	95% CI Upper
Undergraduate	270	68.7	10.2	67.5	69.9
Graduate	180	76.8	8.9	75.5	78.1

Total	450	71.9		10.4	70.9		72.9

Table 3 demonstrates that graduate students significantly outperformed undergraduate students in problem-solving skills assessment, with mean scores of 76.8 (SD = 8.9) compared to 68.7 (SD = 10.2) respectively. This difference was statistically significant (t = -8.42, p < 0.001), indicating that academic progression is associated with improved problem-solving abilities.

Table 4: Correlation Matrix for Key Variables

Variable	1	2	3	4	5
1. Critical Thinking Score	1.00				
2. Problem-Solving Score	0.68**	1.00			
3. Academic Level	0.45**	0.52**	1.00		
4. GPA	0.42**	0.39**	0.31**	1.00	
5. Years of University Study	0.38**	0.44**	0.78**	0.28**	1.00

Note: *p < 0.05, **p < 0.01

The correlation analysis revealed strong positive relationships between critical thinking and problem-solving scores (r = 0.68, p < 0.001), suggesting that these skills are closely interconnected. Academic level showed moderate positive correlations with both critical thinking (r = 0.45, p < 0.001) and problem-solving scores (r = 0.52, p < 0.001), indicating that higher levels of education are associated with enhanced cognitive abilities.

Table 5: Multiple Regression Analysis Predicting Critical Thinking Scores

Predictor	B	SE B	β	t	p
Constant	42.18	3.24		13.02	< 0.001
Academic Level	8.65	1.12	0.35	7.72	< 0.001
Discipline (Engineering)	12.34	1.98	0.28	6.23	< 0.001
GPA	4.21	0.89	0.19	4.73	< 0.001
Interactive Teaching Methods	3.78	0.94	0.16	4.02	< 0.001

Note: $R^2 = 0.52$, $F(4, 445) = 120.8$, p < 0.001

The multiple regression analysis indicated that academic level, discipline, GPA, and exposure to interactive teaching methods significantly predicted critical thinking scores, explaining 52% of the variance. Engineering discipline emerged as a particularly strong predictor, with students in this field scoring significantly higher than those in other disciplines.

Table 6: Teaching Method Preferences and Their Impact on Skill Development

Teaching Method	Frequency Used	Mean CT Score	Mean PS Score	Effect Size (Cohen's d)
Traditional Lecture	68%	66.2	67.4	0.32
Case-Based Learning	42%	74.8	76.1	0.68
Group Discussions	55%	72.3	73.7	0.54
Problem-Based Learning	38%	77.2	78.9	0.74
Research Projects	31%	78.6	79.2	0.76

Table 6 reveals that students exposed to active learning methods such as problem-based learning and research projects demonstrated significantly higher critical thinking and problem-solving scores compared to those primarily experiencing traditional lecture-based instruction. The effect sizes were substantial, indicating meaningful practical differences in skill development.

Qualitative Analysis

The qualitative analysis of interview data revealed several important themes regarding the development of critical thinking and problem-solving skills in Pakistani higher education. Through thematic analysis of transcripts from 30 faculty members and 25 students, five major themes emerged that provide deeper insights into the educational experiences and practices that influence skill development.

Theme 1: Pedagogical Approaches and Teaching Methods

Faculty members consistently emphasized the importance of moving beyond traditional lecture-based teaching to more interactive and engaging approaches. A senior professor from the engineering faculty noted, "When we shifted from simply delivering information to creating scenarios where students must analyze and solve real-world problems, we saw a dramatic improvement in their analytical thinking abilities." Students echoed this sentiment, with one graduate student explaining, "The courses where professors encouraged us to question assumptions and debate different perspectives helped me develop confidence in my own analytical abilities."

The interviews revealed that faculty members who employed case-based learning reported seeing stronger development of critical thinking skills among their students. A social sciences professor shared, "Using real-world cases from Pakistani contexts makes the learning more relevant and forces students to apply analytical frameworks to situations they can relate to." However, several faculty members mentioned challenges in implementing these approaches, including large class sizes, time constraints, and institutional pressure to cover extensive curricula.

Theme 2: Assessment Practices and Skill Evaluation

The analysis revealed significant concerns about traditional assessment methods

and their ability to measure critical thinking and problem-solving skills effectively. A humanities professor observed, "Our examination system still relies heavily on memorization and reproduction of information, which doesn't capture students' ability to think critically or solve complex problems." Students similarly expressed frustration with assessment approaches, with one undergraduate stating, "We're taught to think analytically in class, but then tested on our ability to recall facts and theories."

Faculty members who had experimented with alternative assessment methods reported more positive outcomes in skill development. A natural sciences professor explained, "When I started using project-based assessments that required students to design experiments and analyze results, I saw much better development of their problem-solving abilities." However, institutional constraints and standardization requirements often limited faculty flexibility in assessment design.

Theme 3: Disciplinary Differences and Skill Development
The interviews revealed important differences in how critical thinking and problem-solving skills were developed across different academic disciplines. Engineering and natural sciences faculty reported that their disciplines naturally incorporated analytical thinking through laboratory work and technical problem-solving. An engineering professor noted, "Our students are constantly required to analyze problems, design solutions, and test their effectiveness, which builds these skills systematically."

In contrast, humanities and social sciences faculty faced different challenges in developing these skills. A literature professor explained, "We focus on critical analysis of texts and cultural phenomena, but students sometimes struggle to see how these skills apply to broader problem-solving contexts." However, several humanities faculty members had developed innovative approaches, such as using debate formats and requiring students to analyze contemporary social issues through theoretical frameworks.

Theme 4: Student Engagement and Motivation
The analysis revealed that student engagement and motivation played crucial roles in skill development. Faculty members noted that students who actively participated in discussions, asked probing questions, and sought additional challenges showed greater improvement in critical thinking abilities. A psychology professor observed, "Students who come to office hours with questions that go beyond the basic material are the ones who develop the strongest analytical skills."

Students themselves recognized the importance of active engagement, with one stating, "I realized that just attending lectures wasn't enough. I had to actively participate in discussions and challenge myself to think about problems from different angles." However, several students mentioned cultural and educational background factors that initially made them hesitant to question authority or express dissenting opinions.

Theme 5: Institutional Support and Resource Availability
The interviews highlighted the importance of institutional support in facilitating the development of critical thinking and problem-solving skills. Faculty members

who had access to professional development opportunities, smaller class sizes, and technological resources reported greater success in implementing effective teaching strategies. A department head explained, "When we provided faculty with training on active learning techniques and reduced class sizes, we saw significant improvements in student outcomes."

However, resource constraints emerged as a significant barrier. Several faculty members mentioned inadequate library resources, limited access to technology, and insufficient support for innovative teaching methods. A junior faculty member noted, "I want to use more interactive approaches, but with classes of 80 students and limited resources, it's difficult to implement these methods effectively."

Theme 6: Cultural and Social Factors
The analysis revealed that cultural and social factors significantly influenced the development of critical thinking and problem-solving skills. Several faculty members noted that students from more traditional educational backgrounds initially struggled with approaches that required independent thinking and questioning of established ideas. A senior professor observed, "Many students come from educational environments where questioning authority is discouraged, so we must carefully build their confidence in analytical thinking."

Students also recognized these cultural influences, with one noting, "Learning to think critically required me to overcome my hesitation to disagree with teachers or challenge established ideas." However, faculty members reported that when these cultural barriers were addressed sensitively, students showed remarkable growth in their analytical abilities.

Discussion
The findings of this study provide valuable insights into the role of higher education in promoting critical thinking and problem-solving skills among Pakistani students, revealing both strengths and areas for improvement in current educational practices. The quantitative results demonstrate that Pakistani university students possess moderate to high levels of critical thinking abilities, with significant variations across disciplines and academic levels. The strong positive correlation between critical thinking and problem-solving scores ($r = 0.68$, $p < 0.001$) supports theoretical frameworks that suggest these cognitive abilities are interconnected and mutually reinforcing (Ahmed & Rahman, 2023). This finding aligns with international research indicating that students who develop strong analytical thinking skills tend to excel in complex problem-solving tasks across various domains.

The disciplinary differences observed in this study, with engineering students demonstrating the highest critical thinking scores, reflect the nature of engineering education, which inherently incorporates analytical thinking through design challenges, technical problem-solving, and systematic evaluation of solutions. These findings are consistent with recent research by Malik et al. (2022), who found that disciplines with strong emphasis on practical application and hands-on learning tend to produce students with better developed critical thinking skills. However, the lower scores in humanities and social sciences suggest that these disciplines may need to adopt more explicit approaches to developing analytical thinking, despite their rich potential for fostering critical

evaluation of ideas, arguments, and cultural phenomena.

The qualitative findings highlight the crucial role of pedagogical approaches in skill development, with faculty and students consistently emphasizing the effectiveness of interactive teaching methods over traditional lecture-based instruction. This aligns with contemporary educational research demonstrating that active learning strategies, such as case-based learning and problem-based instruction, are more effective in promoting critical thinking development (Johnson & Smith, 2024). The challenges identified by faculty members, including large class sizes and institutional constraints, reflect broader issues in Pakistani higher education that require systemic solutions rather than individual faculty initiatives alone.

Conclusion

This comprehensive study has provided significant insights into the development of critical thinking and problem-solving skills among Pakistani university students, revealing both the potential and challenges within the current higher education system. The research demonstrates that Pakistani students possess considerable capacity for analytical thinking, with mean critical thinking scores indicating moderate to high levels of ability across different disciplines and academic levels. The strong positive correlation between critical thinking and problem-solving abilities confirms the interconnected nature of these cognitive skills and supports educational approaches that develop them in tandem.

The disciplinary variations observed in this study highlight the need for tailored approaches to skill development that recognize the unique characteristics and requirements of different academic fields. While engineering and natural sciences students demonstrated higher critical thinking scores, likely due to the inherent analytical nature of their disciplines, the lower performance in humanities and social sciences suggests untapped potential that could be realized through more explicit focus on developing these skills. This finding does not diminish the value of humanities and social sciences education but rather indicates opportunities for enhancement through pedagogical innovation and curriculum reform.

The qualitative findings underscore the transformative potential of interactive teaching methods, with both faculty and students recognizing the superiority of active learning approaches over traditional lecture-based instruction. The challenges identified by participants, including institutional constraints, resource limitations, and cultural factors, provide a roadmap for addressing barriers to effective skill development. These insights are particularly valuable for educational policymakers and institutional leaders seeking to enhance the quality of higher education in Pakistan.

The implications of this research extend beyond individual student development to encompass broader societal benefits, as graduates equipped with strong critical thinking and problem-solving skills are better positioned to contribute to national development, innovation, and economic growth. The findings support the importance of continued investment in educational reform and faculty development to ensure that Pakistani higher education institutions can effectively prepare students for the challenges of the 21st century.

Recommendations

Based on the findings of this study, several key recommendations emerge for enhancing the development of critical thinking and problem-solving skills in Pakistani higher education. Universities should prioritize faculty development programs that train instructors in active learning methodologies, including case-based learning, problem-based instruction, and interactive discussion techniques. Institutional policies should be modified to support smaller class sizes and provide resources necessary for implementing innovative teaching approaches. Curriculum reforms should explicitly incorporate critical thinking and problem-solving skill development as learning outcomes across all disciplines, with particular attention to enhancing these competencies in humanities and social sciences programs. Assessment practices should be modernized to include evaluation methods that measure analytical thinking and problem-solving abilities rather than relying primarily on memorization-based examinations. Universities should invest in technology infrastructure and digital resources that support interactive learning environments and provide students with access to diverse information sources for analytical thinking development. Professional development opportunities should be expanded to help faculty members understand and address cultural factors that may inhibit student engagement with critical thinking activities. Finally, institutional support systems should be strengthened to provide ongoing assistance to faculty members implementing innovative teaching methods, including mentoring programs, resource allocation, and recognition for excellence in promoting student analytical thinking development.

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