

LEVEL OF CRITICAL THINKING AMONG UNIVERSITY STUDENTS

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Abstract: This study examines the level of critical thinking among university students from different fields of study. Critical thinking was analyzed from two perspectives— as a skill and as a disposition. The sample consisted of 92 undergraduate and graduate students from technical and social science fields. Data were collected using the Critical Thinking Questionnaire (CThQ; Kobylarek et al., 2022) and the Critical Thinking Disposition Scale (CTDS; Sosu, 2013). The results indicate a moderate to high level of critical thinking among university students. No statistically significant differences were found between students of technical and social sciences in terms of either critical thinking skills or dispositions. Similarly, no significant gender differences were observed. The findings highlight the importance of systematically fostering critical thinking in higher education, regardless of the field of study.

Keywords: critical thinking, university students, critical thinking disposition, critical thinking skills, higher education

INTRODUCTION

Critical thinking represents one of the most essential competencies in contemporary society. In the context of information overload and the rapid dissemination of unverified information, the ability to analyze, evaluate, and interpret information has become a fundamental component of both academic and professional life. Davies and Stevens (2019) identify critical thinking as one of the ten most important competencies expected by employers, while also emphasizing its role as a key capability required for achieving higher levels of education. Accordingly, the development of critical thinking has become a global priority in educational systems and curricular frameworks. Critical thinking can be understood as a complex set of cognitive processes representing a specific form of higher-order, self-regulated thinking focused on the evaluation of information, argumentation, and reasoned decision-making (Facione, 1990). In the present study, critical thinking is conceptualized as both a disposition and a skill. Dispositions toward critical thinking refer to relatively stable internal tendencies or willingness to engage in critical thinking; thus, they encompass not only the ability to think critically but also the motivation and inclination to apply such abilities in practice (Facione, Facione, & Gittens, 2000). According to Facione (1990), critical thinking comprises a set of cognitive skills necessary for effective information processing. Core skills include interpretation, analysis, evaluation, inference, explanation, and

self-regulation. Interpretation involves clarifying the meaning of information, experiences, and situations. Analysis refers to identifying relationships among statements, arguments, and evidence, while evaluation involves assessing the credibility of sources and the quality of arguments. Inference denotes the ability to draw appropriate conclusions based on available evidence. Explanation encompasses the ability to justify one's conclusions and reasoning processes clearly, and self-regulation refers to the capacity to reflect on and adjust one's own thinking.

Contemporary education increasingly recognizes the need to foster critical thinking among university students, as it is considered one of the key competencies for the 21st century and a major objective of modern higher education. The mission of education is to prepare professionals capable of contributing to the advancement of key domains such as science and technology through their knowledge and skills (Verawati et al., 2010). The importance of critical thinking is further supported by studies examining its application and level across different fields of study. However, findings regarding differences in critical thinking among students from various fields of study remain inconclusive. Therefore, this study focuses on analyzing the level of critical thinking among students from two domains—technical and social sciences.

In the context of technical sciences, critical thinking plays a crucial role, as success in engineering professions requires a complex set of skills, including not only creativity but also the ability to solve practical problems and make sound decisions (Mohaffyza et al., 2017; Mohamad et al., 2018). These skills and dispositions are essential for the effective application of critical thinking in professional challenges, innovation processes, and responsible decision-making in practice. Previous research indicates that students in technical fields achieve high levels of critical thinking across multiple dimensions, including analysis, evaluation, induction, and deduction (Mohamad et al., 2018).

Psychology and educational sciences represent disciplines in which critical thinking is considered fundamental. Lawson, Jordan-Fleming, and Bodle (2015) identify critical thinking as an essential skill for psychology students, as their studies enable them to apply critical thinking in real-life contexts. The American Psychological Association (APA, 2023) emphasizes that psychological science promotes diversity of perspectives and freedom of expression; rather than teaching specific beliefs, students are encouraged to independently apply their knowledge to solve real-world problems and make evidence-based decisions. For future educators, critical thinking enables effective resolution of pedagogical situations, reflection on teaching practice, critical engagement with information, and the preparation of students for active and responsible participation in modern society. In addition, other important competencies, particularly effective communication, are developed through the study of psychology and education.

The aim of this study is to analyze the level of critical thinking among university students and to compare it by field of study and gender. Research findings examining differences in critical thinking across academic domains are inconsistent. Some studies report higher levels of critical

thinking among students in technically oriented fields, while others highlight stronger critical thinking dispositions among students in social sciences. Similarly, findings on gender differences remain inconclusive and do not provide consistent evidence.

METHODS

Sample

The sample included 92 university students aged 19–26 years, of whom 45 were enrolled in technical sciences and 47 in social sciences; 49 were females and 43 males. The social sciences group included students of psychology and educational sciences, while the technical sciences group consisted predominantly of students of Applied Informatics, Production Technology, Biotechnology, and Civil Engineering and Architecture.

Measures

Critical thinking skills were assessed using the Critical Thinking Questionnaire (CThQ; Kobylarek, Błaszczewski, Ślósarz, & Madejová, 2022), which comprises 25 items across six dimensions of cognitive processes: analyzing, evaluating, creating, remembering, understanding, and applying. The dispositional aspect of critical thinking was measured using the Critical Thinking Disposition Scale (CTDS; Sosu, 2013). Within this instrument, critical thinking disposition is operationalized through two dimensions: critical openness, reflecting the willingness to consider alternative perspectives and new information, and reflective skepticism, representing the tendency to critically evaluate claims and evidence before forming conclusions.

The study employed a quantitative, comparative design. Data were collected online using the Google Forms platform. Statistical analyses were conducted using IBM SPSS Statistics 20. Group comparisons were performed using the Mann–Whitney U test. Effect sizes (r_m) were interpreted as small ($< .30$), medium ($.30-.50$), or large ($> .50$).

RESULTS

In the first phase of the analysis, we compared the level of critical thinking among students across different fields of study, considering both critical thinking skills and dispositions.

Table 1 Differences in Critical Thinking Skills by Field of Study

	Social Sciences Students (n = 47)	Technical Sciences Students (n = 45)	U	p	r_m
CThQ	Md ₁	Md ₂	1050.00	0.953	-0.01
	97	95			
Analyzing	16	16	998.50	0.643	-0.05
Evaluating	16	16	952.00	0.406	-0.09

Creating	24	24	1039.00	0.884	-0.02
Remembering	11	10	933.00	0.325	-0.10
Understanding	15	14	941.00	0.360	-0.10
Applying	15	16	1014.50	0.360	-0.04

Note. CThQ = critical thinking skills; n = number of participants; Md = median; U = Mann-Whitney U statistic; p = statistical significance; r_m = effect size.

No statistically significant differences were found in critical thinking skills or their individual dimensions between students of social sciences and technical sciences. The effect size coefficients ranged from r_m = -.01 to -.10, indicating a small effect (Table 1).

In the next phase, we conducted a comparative analysis of critical thinking disposition and its dimensions between the examined groups (Table 2).

Table 2 Differences in Critical Thinking Disposition by Field of Study

	Social Sciences Students (n = 47)	Technical Sciences Students (n = 45)	<i>U</i>	<i>p</i>	<i>r_m</i>
CTDS	Md ₁	Md ₂	1035.50	0.863	-0.02
	46	45			
CO	29	28	1048.50	0.944	-0.01
RS	17	16	1022.00	0.780	-0.03

Note. CTDS = critical thinking disposition; CO = critical openness; RS = reflective skepticism; n = number of participants; Md = median; U = Mann-Whitney U statistic; p = statistical significance; r_m = effect size.

The examined dimensions of critical thinking disposition—critical openness and reflective skepticism—showed no statistically significant differences between students of social sciences and technical sciences. The effect size coefficients ranged from r_m = -.01 to -.03, indicating a small effect.

Subsequently, we examined gender differences in the level of critical thinking skills and their components.

Table 3 Gender Differences in Critical Thinking Skills

	Females (n = 49)	Males (n = 43)	<i>U</i>	<i>p</i>	<i>r_m</i>
CThQ	Md ₁	Md ₂	926.00	0.318	-0.10
	97	98			
Analyzing	16	16	967.50	0.498	-0.07

Evaluating	15	16	948.50	0.408	-0.09
Creating	24	24	1016.00	0.768	-0.03
Remembering	11	11	993.00	0.632	-0.05
Understanding	14	15	857.00	0.122	-0.16
Applying	16	16	1013.50	0.752	-0.03

Note. CThQ = critical thinking skills; n = number of participants; Md = median; U = Mann-Whitney U statistic; p = statistical significance; r_m = effect size.

No statistically significant differences were found between males and females in the level of critical thinking skills or in any of their individual cognitive components. The effect size coefficient indicated a small effect ($r_m = -.10$) between the two groups (Table 3).

Table 4 Gender Differences in Critical Thinking Disposition

	Females (n = 49)	Males (n = 43)	U	p	r_m
CTDS	Md ₁	Md ₂	1027.50	0.838	-0.02
	45	45			
CO	29	29	1006.00	0.709	-0.04
RS	17	17	1026.00	0.828	-0.02

Note. CTDS = critical thinking disposition; CO = critical openness; RS = reflective skepticism; n = number of participants; Md = median; U = Mann-Whitney U statistic; p = statistical significance; r_m = effect size.

No significant gender differences were observed in critical thinking disposition. The effect size coefficient ($r_m = -.02$) indicated a small effect between the groups. Similarly, no statistically significant gender differences were observed in critical openness ($r_m = -.04$, small effect) or reflective skepticism ($r_m = -.02$, small effect).

The comparison of students from technical and social sciences did not reveal statistically significant differences in the overall level of critical thinking skills or in critical thinking disposition. Likewise, no significant differences were found between males and females.

Overall, the results indicate a moderate to high level of critical thinking among university students, as measured by two self-report questionnaire methods. In the domain of critical thinking skills, students demonstrated moderate to high levels across all assessed components. Similarly, in the domain of critical thinking disposition, respondents achieved moderate to high levels, with comparable results observed in both dimensions—critical openness and reflective skepticism.

When assessing the level of critical thinking disposition based on the total score as well as scores obtained in the individual subscales, we follow the interpretive framework proposed by Sosu (2013). The scores of the 11 items can be summed up to obtain an overall dispositional score for

everyone, ranging from 11 to 55. Scores between 11 and 34 indicate low disposition, scores of 35–44 indicate moderate disposition, and scores of 45–55 indicate high disposition. The total score for the critical openness scale ranges from 7 to 35, with values interpreted as follows: 7–21 (low), 22–28 (moderate), and 29–35 (high). Reflective skepticism has a score range of 4 to 20, with values of 4–12 indicating low, 13–16 moderate, and 17–20 high levels of the construct.

DISCUSSION

This study aimed to examine differences in the level of critical thinking among university students across technical and social science fields and by gender.

The comparison of critical thinking skills and their dimensions (analyzing, evaluating, creating, remembering, understanding, and applying), as well as critical thinking disposition, revealed no statistically significant differences. The effect size coefficients indicated a small effect of differences between students in both groups. Research examining differences in critical thinking across academic disciplines yields inconclusive results. Mahdyeh and Arefi (2014) report that students in technical fields (e.g., architecture and engineering disciplines) demonstrate higher levels of critical thinking than those in the humanities (e.g., history, psychology, law, languages, and literature). Similarly, Aliakbari and Sadeghdaghghi (2011) found that students in technical disciplines generally demonstrate stronger critical thinking skills compared to those in other fields of study. In contrast, Rodzalan and Saat (2015) found that social science students demonstrate higher levels of critical thinking and problem-solving abilities than their peers in natural and technical sciences.

From the perspective of critical thinking disposition, Morais et al. (2023) identified specific differences across three academic domains: biomedicine, social sciences, and STEM (science, technology, engineering, and mathematics). Overall, the highest scores were achieved by students of biomedicine. Compared with STEM students, social science students demonstrated higher levels of analyticity (i.e., the tendency to examine problems systematically, seek evidence, and anticipate potential consequences) and self-confidence (i.e., trust in one's ability to reason, analyze information, and reach appropriate conclusions). Lower levels of critical thinking disposition were observed in systematicity (i.e., the tendency to approach problem-solving in an organized, methodical, and consistent manner), particularly among social science students.

In evaluating the overall level of critical thinking, a moderate to high level was observed among university students. Similarly, across both the dimensions of critical thinking skills and the components of critical thinking disposition, students achieved moderate to high scores. These findings are consistent with the results of several previous studies. For example, relatively high levels of critical thinking disposition among university students have been reported by Karakuş (2024) and Valentim et al. (2026). According to Dong, Li, and Chang (2023), the development and higher levels of critical thinking among university students may be supported by increasing awareness of the importance of critical thinking. The authors also highlight the significant role of social factors and the educational environment in fostering the development and application of critical thinking in academic contexts. Interaction with digital content through social media may

further contribute to the development of students' abilities to analyze and evaluate various issues, formulate arguments, and support their opinions with evidence. These processes simultaneously promote the development of cognitive abilities, particularly critical thinking (Galindo-Domínguez, Bezanilla, & Campo, 2024). In contrast, some studies report insufficient levels of critical thinking, for example among students in the field of social pedagogy (Kosturková, 2014). This discrepancy may be explained by the time gap between studies, as well as differences in measurement instruments used. Landa-Blanco and Cortés-Ramosa (2021) found no differences in the dimensions of critical thinking between undergraduate and graduate students; however, the level of reflective skepticism was higher than that of critical openness across all students. Their findings also suggest a relationship between higher levels of critical thinking and better academic performance, highlighting the need for further research on the associations between critical thinking and variables such as academic achievement, year of study, age, study engagement, and participation in more demanding educational activities.

The comparison of students of technical and social sciences did not reveal significant gender differences in the overall level of critical thinking skills and their components, nor in critical thinking disposition and its dimensions. Research on gender differences in critical thinking generally indicates higher scores among women in critical thinking disposition, particularly in dimensions such as openness, cognitive maturity, and truth-seeking, which are also associated with greater curiosity (Morais et al., 2023; Walsh & Hardy, 1999). In contrast, Aliakbari and Sadeghdaghi (2011) and Ma (2021) report higher overall critical thinking scores among men. In these studies, men achieved better results, particularly in areas related to focusing on task requirements, providing constructive criticism, and other aspects of analytical reasoning. Women, on the other hand, demonstrated higher levels of ability in interpreting implicit meanings, formulating clear and persuasive arguments, and identifying the logical structure of arguments. These differences across specific components of critical thinking suggest distinct strengths of men and women in various aspects of critical thinking. Such findings highlight the importance of educational approaches that support the effective development of this key competence in all individuals.

When interpreting the results of the present study, several limitations should be considered, including the use of self-report questionnaires, the relatively small sample size, and the online mode of data collection.

CONCLUSIONS

Critical thinking represents one of the key competencies in contemporary higher education. The results of this study indicate a moderate to high level of critical thinking among students in both technical and social science disciplines, both in terms of overall critical thinking skills and their individual components. Similarly, moderate to high levels of critical thinking disposition, particularly in critical openness and reflective skepticism, were observed, with no differences across fields of study or by gender. The findings suggest that students demonstrate well-developed critical thinking abilities, including the capacity to analyze and evaluate information,

approach knowledge openly, reflect on their own beliefs, and critically question claims. These results highlight the need for systematic and targeted development of critical thinking across all areas of higher education, which may contribute to better preparedness of students for academic, professional, and societal challenges.

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