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Relationship between Students' Meta-cognitive Awareness and Academic Adaptability at Higher Education Level

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ABSTRACT

This study investigated the relationship between meta-cognitive awareness and academic adaptability among university students. The study was carried out using the positivist paradigm. The research was non-experimental and quantitative in nature. The study was conducted using a correlation research design. The targeted population was the students in 39 public and private universities in Punjab province. The representative sample size was obtained with the help of a multistage random sampling technique which provided 500 students; data were gathered with the help of two adapted survey instruments that used a five-point Likert scale to measure meta-cognitive awareness and academic adaptability. Pearson correlation, linear regression and independent-samples t-tests were performed as statistical analyses, which showed statistically significant positive correlation between the meta-cognitive awareness of students and academic adaptability. In addition, the analysis also established that both the dimensions of meta-cognitive awareness, knowledge of cognition and regulation of cognition, positively and significantly affect academic adaptability of students.

Keywords: meta-cognitive awareness, academic adaptability, university level

INTRODUCTION

Meta-cognitive awareness refers to an individual's understanding of their own cognitive processes and encompasses two principal components: meta-cognitive knowledge and meta-cognitive regulation. Meta-cognitive knowledge includes declarative knowledge (awareness of one's abilities and factors influencing learning), procedural knowledge (understanding how to carry out cognitive tasks), and conditional knowledge (awareness of when and why to apply particular strategies). Meta-cognitive regulation involves the active management of cognitive activities through processes such as planning, monitoring, evaluating, and troubleshooting during learning tasks. This construct plays a pivotal role in shaping learners' perceptions of academic demands, influencing their selection of learning strategies, and guiding the adaptive behaviors they employ in varied and changing learning environments. Empirical evidence consistently demonstrates that meta-cognitive awareness is a significant predictor of learning success, academic resilience, and overall educational performance, with moderate to strong associations reported across higher education contexts (Zheng & Li, 2024; Schraw & Dennison, 1994). Students who possess well-developed meta-cognitive knowledge are generally more skilled at accurately assessing task requirements, anticipating potential challenges, and selecting strategies that are optimally aligned with specific academic situations (Villalobos et al., 2024; Chen et al., 2023). Together, these insights affirm the foundational importance of meta-cognitive awareness in fostering effective, self-regulated, and contextually responsive learning.

Academic adaptability refers to the cognitive, emotional, and behavioral capacity that enables students to adjust effectively to academic demands, navigate uncertainty, and respond to evolving learning contexts. This construct encompasses the ability to employ flexible thinking strategies across diverse situations, regulate emotions in the face of stress, and modify one's behaviors when circumstances or academic expectations shift. Research consistently demonstrates that learners who exhibit high levels of adaptability tend to achieve stronger academic outcomes, display greater motivation, and experience enhanced psychological well-being (Martin et al., 2013; Collie et al., 2020; Datu & Yuen, 2022). Scholarly findings further highlight that cognitive adaptability is closely linked with meta-cognitive knowledge, suggesting that students who understand how their own thinking operates are better equipped to adjust cognitively to academic challenges. Similarly, behavioral and emotional dimensions of adaptability show stronger associations with meta-cognitive regulation, indicating that the ability to plan, monitor, and adjust learning processes plays a critical role in shaping adaptive behavioral responses and emotional stability during academic transitions (He et al., 2022). Together, these insights underscore academic adaptability as a multifaceted construct fundamental to students' success in dynamic educational environments.

The relationship between meta-cognitive awareness and academic adaptability has been extensively supported in contemporary research. Students with well-developed meta-cognitive knowledge demonstrate greater flexibility in

selecting appropriate learning strategies and are more adept at transferring skills to novel or unfamiliar academic contexts (Putri et al., 2021; Mädamürk et al., 2020). In parallel, meta-cognitive regulation contributes to academic adaptability by allowing learners to monitor their understanding, manage cognitive effort, and assess the effectiveness of the strategies they employ (Alshahrani & Woodcock, 2022; Hong et al., 2023). Empirical evidence indicates that while both dimensions of meta-cognitive awareness influence adaptability, meta-cognitive knowledge appears to exert a relatively stronger effect. This is consistently reflected in recent regression analyses and correlation studies, which highlight the prominent role of meta-cognitive knowledge in facilitating students' adaptive capacities in academic settings (Wang & Liu, 2023; Mahasneh et al., 2024). These findings collectively underscore the integral function of meta-cognitive processes in promoting learners' flexibility, strategic competence, and resilience in dynamic educational environments.

Recent research study highlighted those students possessing advanced meta-cognitive skills were better able to navigate and adapt to digital learning environments (Rogiers et al., 2023). Consequently, understanding the interplay between meta-cognitive awareness and academic adaptability has emerged as a critical area of inquiry, particularly for designing effective instructional strategies and support mechanisms within higher education institutions. This study posits that fostering both meta-cognitive knowledge and meta-cognitive regulation especially the development of conditional knowledge can substantially enhance students' adaptive capacities. By strengthening these meta-cognitive competencies, learners are better equipped to manage academic demands, respond flexibly to evolving learning conditions, and optimize their performance across diverse educational tasks.

Research Objectives

Following were research objectives of the study to:

1. Investigate relationship between meta-cognitive awareness and academic adaptability.
2. Find out the effect of students' meta-cognitive awareness on academic adaptability at the university level.
3. Determine differences in students' meta-cognitive awareness and academic adaptability with regard to gender.

Research Questions

Following were research questions of the study:

1. What is relationship between students' meta-cognitive awareness and academic adaptability at university level?
2. What is the effect of students' meta-cognitive awareness on academic adaptability at the university level?
3. Is there a difference in students' meta-cognitive awareness and academic adaptability with regard to gender?

LITERATURE REVIEW

Meta-cognitive awareness is widely recognized as a fundamental component

of effective learning, as it enables students to understand and regulate their own cognitive processes. Empirical evidence suggests that enhanced meta-cognitive skills contribute significantly to academic development by facilitating accurate task interpretation, strategic planning, and efficient problem-solving (Veenman & van Cleef, 2019). The theoretical framework proposed by Schraw and Dennison provides a robust foundation by conceptualizing meta-cognitive awareness as comprising both knowledge of cognition and regulation of cognition, which interact synergistically to support and strengthen the learning process. More recent studies emphasize that meta-cognitive competence not only enhances students' ability to make informed judgments regarding their own learning but also mitigates cognitive overload and fosters long-term learning autonomy (Panadero, 2017). By developing an understanding of when and how to apply specific strategies, students acquire essential self-monitoring and self-evaluation skills, which in turn empower them to optimize academic performance across diverse disciplines.

Academic adaptability has emerged as a pivotal construct for understanding how university students successfully navigate complex, uncertain, and rapidly changing learning environments. Credé and Niehorster (2012) define adaptability as a multidimensional process of adjustment that underpins students' ability to survive and thrive within higher education institutions. Students who exhibit high adaptability demonstrate flexibility by modifying their learning behaviors, emotional responses, and study practices to meet evolving academic demands. As highlighted by Jiang et al. (2022), adaptability extends beyond mere behavioral adjustments, encompassing the management of cognitive load, regulation of attention, and resilient responses to academic stressors. Contemporary research, particularly in contexts marked by educational disruptions, indicates that adaptability plays a critical role in promoting students' persistence, emotional stability, and engagement with learning, positioning it as an essential attribute for success in modern higher education settings (Hong et al., 2023).

The dynamic interplay between meta-cognitive awareness and academic adaptability has garnered substantial attention in recent educational research. Mamaday et al. (2020) reported that students with well-developed meta-cognitive skills exhibited higher levels of academic adaptability, as they were able to accurately identify learning demands and tailor their strategies accordingly. This association is further supported by Liu et al. (2022), who contend that meta-cognition fosters both resilience and flexibility in academic performance by enabling learners to exercise effective cognitive control when tackling challenging tasks. Conditional knowledge, in particular, emerges as a critical predictor of adaptability, equipping students with the capacity to select the most appropriate strategies for diverse learning contexts (Putri et al., 2021). Moreover, evidence suggests that academic adaptability is strengthened when students not only plan their learning actions but also engage in reflective evaluation and adjust their approach based on ongoing self-assessment—a process that lies at the core of meta-cognitive functioning (He et al., 2022). Collectively, these findings underscore the essential

role of meta-cognitive processes in enabling students to navigate complex academic environments with flexibility, strategic insight, and resilience.

Another body of evidence highlights meta-cognitive regulation as a critical determinant of students' adaptive capacities. Zhou and Yu (2021) found that regulatory skills, such as monitoring and evaluating one's own learning, enhance students' preparedness to confront novelty and uncertainty within academic environments. However, meta-cognitive regulation alone is insufficient to ensure effective adaptability; its impact is most pronounced when supported by well-developed meta-cognitive knowledge. As Hong et al. (2023) emphasize, the cultivation of adaptability is a gradual process that requires the integration of reflective assessment, strategic adjustment, and self-monitored awareness. Together, these meta-cognitive processes enable students to respond effectively to academic challenges, navigate setbacks, and maintain sustained engagement in learning. Collectively, these findings underscore that meta-cognition—through the synergistic interaction of knowledge and regulation—forms the foundation for academic adaptability, equipping learners to manage complexity, optimize their performance, and persist in the face of evolving educational demands.

The ability to reflect upon, plan, monitor, and regulate one's own cognitive processes commonly referred to as meta-cognitive awareness has increasingly been recognized as a fundamental contributor to both academic adaptability and overall student success. Empirical research in higher education consistently demonstrates that the two primary dimensions of meta-cognitive awareness, namely knowledge of cognition and regulation of cognition, are closely associated with the use of deep learning strategies, structured study habits, and improved academic outcomes (Flavell, 1979; Zimmerman, 2002). Contemporary studies from 2024 to 2025 further reinforce this relationship. For instance, large-scale investigations have indicated that meta-cognitive awareness serves as a robust predictor of academic adaptability at the university level (Akpur, 2024; Döş & Eraslan, 2024). Additionally, research in blended and self-regulated learning contexts highlights that meta-cognitive self-regulatory processes such as planning, monitoring, and strategic adjustment mediate the effects of educational interventions and self-efficacy, thereby facilitating students' adaptation to varied academic demands (Uğur, 2024). Taken together, both classical theoretical frameworks and recent empirical evidence converge to underscore the pivotal role of meta-cognitive awareness in enabling learners to exercise control over their learning processes and to adapt effectively to complex, dynamic, or shifting academic challenges.

METHODOLOGY

The study adopted a descriptive correlational research design to examine the relationship between university students' meta-cognitive awareness and their academic adaptability. The target population comprised all 39 public and private universities located in Punjab province. However, the accessible population was limited to public sector universities in Lahore. A multistage sampling technique was

employed to select a representative sample for the study. In the first stage, two public sector universities the University of Education and the University of the Punjab were selected. In the second stage, one department from the social sciences and one department from the natural sciences were randomly chosen from each of the selected universities. In the third stage, all students enrolled in the selected departments were considered for inclusion. Finally, a census sampling approach was applied, resulting in a total sample of 500 students drawn from the University of Education and the University of the Punjab. Data were collected using a structured questionnaire consisting of two sections. The first section was based on the Students' Meta-cognitive Awareness Inventory developed by Schraw and Dennison (1994), while the second section measured academic adaptability, drawing on the frameworks proposed by Martin et al. (2013) and Credé and Niehorster (2012). To ensure the accuracy and reliability of the responses, the researchers personally administered the questionnaires and supervised the data collection process. The researchers personally visited the selected universities and formally contacted the heads of the concerned departments to seek official permission for conducting the study. After obtaining the necessary approvals, the purpose, scope, and objectives of the research were clearly explained to the students. Participants were informed that their involvement was entirely voluntary and that their responses would be used solely for research purposes. Subsequently, the questionnaires were administered during regular classroom sessions under the supervision of the researchers. Detailed instructions were provided to the respondents to facilitate accurate and complete responses to the printed questionnaires. This controlled administration process was adopted to enhance the clarity of responses, minimize misunderstandings, and ensure the overall quality and reliability of the collected data. For data analysis, inferential statistical techniques were employed, including Pearson's product-moment correlation, linear regression analysis, and independent samples t-tests, to examine the nature and strength of the relationships among the study variables.

DATA ANALYSIS AND INTERPRETATION

Table 1

Correlation between Metacognitive awareness and Academic Adaptability

Variables	*N*	*r*-value	*Sig.*
Metacognitive awareness and Academic Adaptability	500	.756**	.000

** $p < .001$ (2-tailed)

The results of the Pearson product–moment correlation analysis revealed a strong, positive, and statistically significant relationship between students' metacognitive awareness and academic adaptability. As presented in the table, the correlation coefficient ($r = .756$, $N = 500$) indicates a high magnitude of association between the two variables. The significance value ($p = .000$, $p < .01$) confirms that this relationship is statistically significant and unlikely to have occurred by chance. This finding suggests that students with higher levels of metacognitive awareness

such as the ability to plan, monitor, and regulate their learning processes tend to demonstrate greater academic adaptability, including more effective adjustment to academic demands, learning challenges, and changing educational contexts. The strength of the correlation implies that metacognitive awareness plays a substantial role in supporting students' capacity to adapt academically. Overall, the result provides empirical support for the assumption that enhancing students' metacognitive skills may positively contribute to their academic adaptability in university settings.

Table 2

Effect of Metacognitive awareness on Academic Adaptability

Variables	*B*	*t*-value	*Sig.*	Model *R* Square
Metacognitive awareness and Academic Adaptability	.756	25.21	.000	.571

A linear regression analysis was conducted to assess the influence of metacognitive awareness on students' academic adaptability. As indicated in Table 2, the coefficient of determination (R^2 = .571) reveals that metacognitive awareness accounts for approximately 57.1% of the variance in academic adaptability. This substantial proportion of explained variance underscores the explanatory power of metacognitive awareness in understanding students' adaptive academic behaviors. Furthermore, the standardized regression coefficient (β = .756, p < .001) reflects a strong and statistically significant positive effect of metacognitive awareness on academic adaptability. This result indicates that higher levels of metacognitive awareness are associated with correspondingly higher levels of academic adaptability among university students. Collectively, these findings provide compelling empirical evidence that metacognitive awareness is a critical factor influencing students' capacity to adjust effectively to academic demands and evolving learning environments in higher education.

Table 3

Gender Wise Comparison in Meta-cognitive Awareness and Academic Adaptability

Variables	Gender	*N*	*M*	*SD*	*t*	*df*	*P*
Meta-cognitive Awareness	Male	250	82.30	9.80	4.91	498	.000
	Female	250	78.20	10.40			
Academic Adaptability	Male	250	79.50	10.20	4.45	498	.000
	Female	250	75.30	11.00			

Table 3 presents the results of an independent-samples t-test conducted to examine gender-based differences in metacognitive awareness and academic adaptability among university students. The analysis revealed that male students demonstrated significantly higher levels of metacognitive awareness (M = 82.30, SD = 9.80) compared to female students (M = 78.20, SD = 10.40). The observed mean difference was statistically significant (t = 4.91, p < .001), indicating a meaningful

gender-related variation in metacognitive awareness. Similarly, the findings showed that male students scored higher on academic adaptability (M = 79.50, SD = 10.20) than their female counterparts (M = 75.30, SD = 11.00). This difference was also found to be statistically significant (t = 4.45, p < .001), suggesting that gender plays a role in students' adaptive academic functioning. Overall, these results indicate that gender contributes significantly to differences in both metacognitive awareness and academic adaptability. Although the magnitude of the differences is moderate, the consistency of the findings suggests that male students exhibit a comparatively higher level of metacognitive functioning and academic adaptability than female students within the context of the present study.

DISCUSSION

The present study examined both the associational and predictive role of metacognitive awareness in relation to academic adaptability among university students. The findings revealed a strong, positive, and statistically significant relationship between the two constructs, indicating that students who possess higher levels of metacognitive awareness are more likely to demonstrate greater adaptability in academic contexts. This result suggests that students who are more conscious of their cognitive processes are better equipped to adjust to academic demands, cope with learning challenges, and respond effectively to changing educational conditions.

These findings are consistent with the existing body of literature that identifies metacognition as a critical determinant of learning effectiveness, cognitive flexibility, and academic performance across educational levels. Prior research has consistently emphasized that metacognitive awareness encompassing both metacognitive knowledge and metacognitive regulation plays a pivotal role in shaping learning outcomes, academic resilience, and students' capacity to navigate complex learning environments (Schraw & Dennison, 1994; Zheng & Li, 2024). The strong association observed in the present study aligns with the work of Mädamurk et al. (2020), who reported that students with well-developed metacognitive skills are more capable of interpreting academic tasks accurately, selecting appropriate learning strategies, and modifying their learning behaviors in response to evolving academic requirements. Similarly, studies by Putri et al. (2021) and Chen et al. (2023) have demonstrated that conditional knowledge understanding when and why to apply specific strategies enhance students' confidence and effectiveness when confronting novel and complex academic situations. These findings support the results of the current study by reinforcing the view that metacognitive knowledge directly contributes to flexible thinking and successful academic adaptation.

Another noteworthy outcome of the present research is the significant role of metacognitive regulation in predicting academic adaptability. Regulatory processes such as planning, monitoring, evaluation, and strategic adjustment enable students to manage their learning more efficiently and to respond constructively to academic challenges. Empirical evidence from Alshahrani and Woodcock (2022) and Hong et

al. (2023) supports this perspective, demonstrating that students with stronger regulatory skills are better at self-assessment, error correction, and sustained effort in the face of difficulty. Consistent with these findings, the present study indicates that learners who actively regulate their cognitive processes are more likely to adapt successfully to academic transitions, uncertainty, and increasing academic pressures. The regression analysis further confirmed the predictive power of metacognitive awareness, revealing that it accounts for a substantial proportion of the variance in academic adaptability. This result is congruent with findings reported by Wang and Liu (2023) and Mahasneh et al. (2024), who identified metacognition as a key predictor of students' ability to manage academic challenges and maintain effective performance within dynamic educational environments. The strength of this predictive relationship highlights the central role of metacognitive processes in fostering academic resilience and in enabling students to regulate their thoughts, emotions, and behaviors under conditions of academic stress.

These findings hold particular relevance for contemporary higher education, where rapid and continuous change such as the expansion of online and blended learning modalities has become increasingly prevalent. Research conducted during the COVID-19 period indicates that students with stronger metacognitive abilities were better able to adapt to digital learning environments, manage cognitive load, and sustain engagement and persistence (Rogiers et al., 2023). The results of the present study corroborate this evidence, suggesting that students' capacity to cope with academic uncertainty and evolving learning formats can be significantly enhanced through the development of metacognitive awareness. In conclusion, the findings clearly demonstrate that metacognitive awareness, encompassing both its knowledge and regulatory dimensions, exerts a significant and positive influence on students' academic adaptability. This relationship underscores the importance of incorporating instructional strategies and educational interventions that explicitly foster metacognitive skills. Promoting these competencies may yield long-term benefits, including improved academic performance, heightened resilience, and an enhanced ability to respond effectively to academic challenges in increasingly complex and dynamic learning environments.

CONCLUSION

The present study concludes that academic adaptability among university students is generally high and is strongly predicted by metacognitive awareness. The observed strong positive correlation and high predictive value indicate that students with elevated levels of metacognitive awareness are better able to modify their behaviors, regulate their emotions, and effectively cope with challenges encountered in academic settings. Both dimensions of metacognition metacognitive knowledge and metacognitive regulation were found to play critical roles in facilitating students' adaptive functioning. Metacognitive knowledge enables students to understand task requirements, select and apply appropriate learning strategies, and transfer acquired skills effectively to novel academic contexts. In parallel,

metacognitive regulation allows students to monitor their performance, evaluate progress, and make necessary adjustments to their learning strategies. Collectively, these metacognitive processes enhance students' flexibility, persistence, and overall academic effectiveness, thereby equipping them to navigate complex and dynamic learning environments successfully. The findings highlight the importance of systematically promoting metacognitive development within higher education institutions. Enhancing students' metacognitive awareness not only strengthens academic adaptability but also contributes to increased motivation, emotional stability, and long-term academic success. To cultivate these essential skills, universities should consider incorporating explicit instruction on metacognitive strategies, structured reflection exercises, and opportunities for strategic learning into the curriculum. By fostering metacognitive awareness, educational institutions can better prepare students to manage academic challenges, optimize learning outcomes, and achieve sustained success across diverse educational contexts.

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