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Exploring The Role Of Metacognitive Skills In Enhancing Academic Performance

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Abstract: Understanding and being aware of our learning processes is crucial for achieving academic success. It is of utmost importance to develop metacognitive skills that allow us to improve how we learn and think, leading to even better accomplishments in our educational journey. These incredible skills provide us with a deep level of understanding regarding what works best for us individually, enabling us to adapt more effectively to different tasks. By becoming masters of metacognition, we enhance our ability to manage our learning and make intelligent decisions about which strategies to employ while considering our unique goals and preferences. Furthermore, when we possess strong metacognitive skills, we elevate our critical thinking abilities and become incredibly discerning when evaluating the vast array of information that we encounter. With the power of metacognition, we can effectively tackle complex problems, leading to improved problem-solving abilities and fostering resilience and confidence within ourselves. Moreover, the cultivation of metacognitive skills extends its benefits far beyond the realm of academics, as these skills prove to be instrumental in lifelong learning. The ability to think introspectively and tailor our learning approaches to suit our strengths and weaknesses proves incredibly advantageous as we pursue higher education and actively engage in professional endeavors. In conclusion, developing metacognitive skills plays a crucial role in achieving academic success, while also preparing us to gracefully navigate the complexities of the modern world as individuals committed to lifelong learning.

Keywords: *Metacognition, metacognitive skill, academic performance, different learning environments, etc.*

I. INTRODUCTION

Metacognition is the impressive ability to critically assess and carefully strategize cognitive skills. It involves the impressive skill of comprehensively evaluating one's strengths and weaknesses, as well as creating efficient and creative strategies for self-improvement, and it is widely acknowledged as a highly important aspect of what is often called unparalleled non-cognitive or soft skills that undoubtedly contribute to exceptional academic achievement (Maor et al.2023). Committed researchers have continuously demonstrated that conventional assessments of cognitive capabilities, such as the famous IQ, standardized exam scores, and GPA, provide only a restricted comprehension of the disparities in academic performance. They have also proven that thorough assessments in these other diverse areas have a bigger impact (Camacho-Morles et al.2021). More specifically, transcendental non-cognitive abilities such as boundless motivation, unparalleled self-control, unwavering diligence, and relentless perseverance have been unequivocally revealed to play an exceptionally pivotal role in accurately predicting and precisely forecasting academic triumph and accomplishment, even while the undeniable and paramount importance of cognitive skills and intelligence prevails, remaining an influential factor in the pursuit of educational excellence(Apró et al., 2024). These extraordinary qualities, when harnessed and honed, possess the profound ability to propel an individual towards resolute Achieving success and empower individuals to conquer challenges and exceed standards with exceptional skill and elegance. It is through the cultivation and nurturing of these extraordinary non-cognitive attributes that individuals can truly unlock their full potential and embark upon an extraordinary

educational journey filled with unparalleled growth, significant achievements, and profound personal development (Scott, 2021).

The term non-cognitive is a catch-all phrase that is ill-defined by design and that is used to group numerous traits and characteristics that are plucked from the social sciences. Rather than referring definitively to traits that were the product of scientific discovery in educational theory or particular subdomains of study, it encompasses a wide range of aspects. Given the breadth and heterogeneity of the traits in the non-cognitive construct, a series of investigations have occurred to try to go beyond such broad descriptions and delve into the nuances (Denning-Smith, 2020). These various studies arrive at different lists of traits, but the lists tend to focus on the quality named as predictors at the same time. Metacognitive attributes, which involve understanding and regulating one's cognitive processes, have regularly been named in this body of work, for good reason (Frazier et al., 2021). They have their roots in psychology, benefiting from the fruits of decades of work. As a result, measures of metacognitive attributes have been developed and proven to be good predictors of important educational outcomes.

II. Background and Significance

Metacognition is simply defined as individuals' capacity to reflect upon and control their thinking processes (Kuhn, 2022). It encompasses two key aspects: understanding of cognition and the control of cognition. The monitoring aspect, in particular, is the central element of metacognition, as it involves being aware of what we know and being conscious of our thoughts as we engage in the thinking process. It involves the creation of plans that consist of sequences of strategies to solve problems or achieve specific goals and purposes. Thus, metacognition becomes a pivotal aspect of educational goals and objectives (Padmanabha, 2020) (Murtadho, 2021).

In the current age of information technology and quantitative science, certain features within this domain can only be obtained by honing metacognitive skills (Maryani et al.2021). Consequently, it is of utmost importance to consciously develop metacognition. Given its vital role in various fields, it is not surprising that educational researchers have devoted considerable attention to pedagogical strategies that emphasize the cultivation of metacognitive abilities. (Li & Yuan, 2022). It is crucial to note that products and learning environments designed solely to teach specific knowledge and skills often fall short of developing metacognition. Without explicit enhancements in the learning processes, metacognition may not be adequately fostered. (Dignath et al.2023). Therefore, it is imperative to incorporate explicit metacognitive considerations in educational practices to maximize the development of learners' metacognitive capacities (Dennis & Somerville, 2023).

The importance of metacognition goes beyond just academics and has a significant impact on various aspects of individuals' lives. By utilizing metacognitive skills, individuals can effectively manage their cognitive processes, leading to improved governing and analytical thinking abilities (Akaydin et al.2020). This more profound understanding of their strengths and weaknesses allows for tailored learning and self-improvement strategies. Additionally, metacognition promotes critical thinking as individuals learn to question their assumptions, biases, and preconceived notions, resulting in a more open-minded and adaptable mindset. In the academic realm, metacognitive skills are essential for enhancing success by enabling students to observe and modulate their learning strategies effectively, reflect on their thinking processes, and make adjustments to improve comprehension and retention of information. In professional development, the ability to analyze one's performance, identify areas for improvement, and make adjustments is highly valued. Employers seek individuals with strong metacognitive abilities as they tend to be more self-aware, proactive, and able to continuously grow and adapt in a constantly changing environment. Prioritizing the development of metacognition not only enhances individual employability but also contributes to professional fields through innovative and insightful thinking (Hayat et al., 2020) (Taghani & Razavi, 2022).

In conclusion, metacognition is a multifaceted concept that carries great importance in several aspects of life, particularly in education and professional development. By consciously developing metacognitive skills, individuals can significantly improve their thinking processes, decision-making abilities, and overall adaptability (Arianto & Hanif, 2024). As such, it is essential for educational practices and workplaces to integrate explicit metacognitive considerations to maximize the potential of individuals' metacognitive capacities (Beach et al.2020). With a focus on metacognition, individuals can unlock their full cognitive potential and strive for continuous growth and success.

III. Purpose of the Study

The in-depth analysis will center on how metacognitive skills are essential for boosting academic performance. It will delve into the different facets and aspects of metacognitive skills and uncover potential variations based on age, gender, type of high school, language spoken at home, and whether or not a student is the first in their family to attend college (Santangelo et al.2021). This study aims to offer a better comprehension of the link between metacognitive skills and academic achievement, to help universities improve their retention and graduation rates. This will involve the development of targeted programs to strengthen these skills and promote academic success. The research will delve into the complex nature of metacognitive skills and their correlation to academic success, providing evidence-based insights for policymakers and educators. The ultimate goal is to establish an inclusive learning environment that empowers students and enhances their performance.

IV. Definition of Metacognition

Cognition is the mental processes that we observe in others as they problem-solve or complete tasks, as well as the various activities students engage in when reading and understanding texts. By adding "meta cog" to cognition, we indicate the result of thinking on thinking, with "meta" serving as a prefix. Together, metacognition represents the oversight of one's thinking, including evaluating and adjusting thought processes to improve cognitive tasks. This means being mindful and in charge of one's thought processes (Pradhan & Das, 2021). The significance of metacognition is obvious, as psychologists and educators are keen on exploring whether it can be taught and nurtured. Many researchers hope that education will emphasize a student's consciousness of their thinking and cognitive skills (Lumpkin, 2020). Embracing metacognition means acknowledging the ability to be mindful of one's performance and guide one's efforts while working and learning. This extensive definition leads to numerous other qualities that should be included in any educational framework.

The term metacognition is a combination of "meta" and "cognition," with "meta" implying existence beyond the original and "cognition" referring to individual thinking. "Cogito" was originally used to describe the existence of individual thinking, highlighting thinking as a characteristic that sets humans apart from animals (Al-Gaseem et al.2020). Metacognition incorporates conscious awareness and understanding of one's cognitive processes, allowing individuals to reflect upon and regulate their thinking. By engaging in metacognition, individuals gain clarity into their cognitive capacity and weaknesses, empowering them to make informed decisions about learning tasks and problem-solving situations (Lumpkin, 2020). Metacognition plays a crucial role in academic success, enabling students to become independent learners and adapt their strategies and resources as needed. Beyond academia, metacognition is a valuable skill that can be applied to various aspects of life, allowing individuals to become more effective problem solvers, decision-makers, and communicators. Cultivating metacognitive skills enables individuals to unlock their full potential as learners and individuals (Pradhan & Das, 2021).

Researchers in cognitive science strongly believe that learners need to understand their strengths, weaknesses, and learning styles. They need to be aware of their learning progress and be able to assess the situation to improve and make the most of their learning strategies (Kwangmuang et al.2021). This is where metacognition comes into play, as it is considered to have a significant impact on a student's academic performance and success. College students with high levels of metacognitive performance tend to do well academically (Santangelo et al.2021). However, it is argued that metacognitive profiling should be a continuous part of the learning process, not just a post-learning assessment. By integrating metacognitive profiling into teaching methods, educators can create a positive learning environment that enhances academic achievement. When college learners possess essential skills such as self-regulating learning behaviors, effective planning strategies, and the ability to use metacognitive techniques to overcome challenging tasks, they are likely to succeed academically (Hong et al.2020) (Tuononen et al.2023). This is possible when learners have strong metacognitive processes, including a deep understanding of tasks, the ability to regulate cognitive processes, and a clear sense of self-awareness. By developing these skills, learners can actively focus on their learning journey, monitor their progress, employ effective strategies, and achieve desired learning outcomes (Darmawan et al.2020) (Pradhan & Das, 2021).

V. Key Components of Metacognitive Skills

Metacognition is the understanding and management of cognitive processes, learning strategies, task comprehension, and self-regulation. Scholars categorize metacognitive skills as declarative, conditional, and procedural knowledge, as well as planning, monitoring, control, and evaluation (Padmanabha, 2020) (Lumpkin, 2020). These skills are essential for academic success as they increase recognition of one's learning processes and strategies. Key components of metacognition include self-monitoring, planning, and assessment of learning strategies (Santangelo et al.2021). It involves apprehension about cognition and the statute of cognition, both crucial for task execution. Defining metacognitive skills is important for continuous learning and academic achievement. Monitoring involves self-reflection and understanding cognitive abilities, while control entails managing cognitive processes and emotions for optimal learning and growth. Metacognition also involves using cognitive strategies, setting goals, and practicing self-regulation. Beliefs and perceptions about intelligence and learning also impact metacognitive functioning. Personal, contextual, and environmental factors, as well as beliefs, influence students' use of goals, cognitive strategies, and self-regulation for academic success. Fostering appropriate beliefs in students is essential for enhancing motivation and achievement (Lumpkin, 2020). Metacognition is generally divided into regulation knowledge and metacognitive experiences. Metacognitive skills are reproducible procedures that guide the process of achieving goals during instruction and testing. They cover much of what happens between cognitive operations. Metacognitive experiences involve the perception and evaluation of cognitive processes. Evaluating metacognitive regulation knowledge suggests that individuals involved in schooling provide precise affirmations of interviews and attrition results. Understanding metacognition involves managing our cognitive functions and reflecting on our thinking. Researchers have categorized methods into metacognitive skills, self-evaluation, and metacognitive knowledge. By studying metacognition, researchers aim to understand how we perceive, control, and optimize our cognitive abilities, providing insights into learning processes and problem-solving skills. Developing metacognitive skills helps individuals enhance their cognitive abilities and reach their full potential (Pradhan & Das, 2021).

Vi. Metacognitive Skills and Academic Performance

Influencing their peers positively. Additionally, academic performance can impact students' self-esteem and motivation, shaping their future aspirations and career choices. Therefore, educational institutions must implement effective support systems that foster an environment conducive to learning and personal growth. This includes providing resources, mentorship, and guidance to help students navigate their academic journeys and achieve their goals. By prioritizing academic success, stakeholders can contribute to the overall evolution of students (Abdelrahman, 2020).

As educational scholars consistently prove the advantages of instructing metacognitive abilities, schools worldwide are introducing tactics to boost students' scholastic achievement (Al-Gaseem et al.2020). This research not only expands our knowledge of metacognitive skills but also emphasizes their importance in academic participation and success, paving the way for future achievements in education.

Metacognition is widely recognized as an extremely important cognitive function. Students with high levels of metacognitive abilities can carefully plan, monitor, and assess their learning processes, adjusting their strategies when necessary (Usman et al.2021). As research continues to show the connection between metacognition and positive educational outcomes, educators must prioritize metacognition in the classroom. However, studies have revealed that college students often struggle with metacognitive skills, particularly in the context of the classroom. Therefore, improving metacognitive abilities among undergraduates is essential for enhancing learning efficiency and academic success (Hausman et al.2021)

While most research on metacognitive skills focuses on younger students, there is a lack of understanding of metacognition among college students. This study aims to address this gap by examining the impact of metacognition on the academic performance of undergraduate students taking a challenging mathematics course (Muteti et al.2021). As researchers delve deeper into metacognition, they have recognized its complex nature and its connection to intellectual growth and achievement. The significance of metacognitive abilities lies in their potential to empower learners, allowing them to take control of their learning journeys (Siegfried, 2021).

By identifying the strengths and weaknesses of metacognitive abilities specific to mathematics learning, educators can implement interventions to optimize students' metacognitive development (Wang et al.2022). This can lead to improved learning efficiency, increased self-regulation, and ultimately, academic excellence. The integration of metacognitive strategies into classroom instruction can provide students with the tools to

navigate their coursework effectively, leading to greater engagement, deeper understanding, and higher achievement (Lawson et al.2021).

Overall, this study aims to fill the gap in research by exploring the impact of metacognition on the academic performance of undergraduate students in a demanding mathematics course (Tay et al., 2024). By shedding light on the metacognitive experiences of college students, this study aims to contribute to the broader understanding of metacognition and its implications for educational practices. In the final analysis, the findings from this research can improve instructional approaches and enable students to become self-directed learners (Fleur et al., 2021).

Vii. Development of Metacognitive Skills

To fully understand how students plan, supervise, and evaluate their learning, it is essential to examine the different tiers of metacognitive abilities (Marra et al., 2022). These encompass a wide range of cognitive processes and the intricate inner workings of thinking itself. The development and progression of these metacognitive abilities over time are crucial areas for research and analysis (Schneider et al., 2022). It is worth noting that while there is a belief that metacognitive abilities can be improved, the intentional cultivation and enhancement of these skills within the context of learning and instruction have not received sufficient attention. Often, these recommendations offer general advice that can be applied to specific study skills, such as time management, active listening, and note-taking. However, the detailed nuances that make up the realm of metacognition necessitate a more refined and comprehensive approach. (Roberts, 2021).

Viii. Metacognition in Different Learning Environments

Different teaching methods, such as in-person, group learning, and online education, are present in various educational settings. Research has explored the role of students' metacognitive skills in learning within these environments. In traditional classrooms, students develop metacognitive skills to acquire specialized knowledge (Li & Yuan, 2022). Studies suggest that both the social acknowledgment of metacognitive processes and their deliberate incorporation into teaching can improve student success in applying metacognitive thinking outside of academics. In online education settings, students take on greater responsibility for their learning through accessing and managing information. However, the impact of metacognition on learning in fully online and blended formats and the teacher's role is not fully understood (Eggers et al.2021).

Extensive research has delved into the connection between self-regulation, the use of metacognitive skills, and the effectiveness of educational choice by students in computing disciplines (Graesser et al., 2022). The computer programming environment has emerged as a prime example of an individual, online, and academically intense interactive learning experience. This environment not only encourages metacognitive reflection but also promotes the use of metacognitive strategies. Additionally, in technology-mediated instruction in statistics, a noteworthy authoring tool has been utilized (Ratnayake et al.2024). This tool has proven highly effective as an instructional strategy and is specifically designed to support the development of metacognitive skills in technology-mediated higher education courses. By implementing this tool, significant progress has been made in fostering students' metacognitive abilities and enhancing their overall learning experience.

IX. Conclusion

In summary, metacognitive abilities are necessary for student's academic success as they allow individuals to profoundly reflect on their path of education, make necessary adjustments, and improve their academic performance significantly (Santangelo et al.2021). These skills help students understand, analyze, and evaluate their cognitive abilities and strategies, leading to a greater awareness of their strengths and weaknesses. By actively utilizing and integrating metacognitive skills into their learning process, students can consistently and effectively monitor their learning progress, identify areas for improvement, and make necessary changes to enhance their academic performance (Pradhan & Das, 2021). Furthermore, the development and strengthening of metacognitive skills have consistently been shown to significantly improve problem-solving abilities, critical thinking skills, and self-awareness, which are paramount for achieving and sustaining academic success. As a result, it is imperative for educational institutions and educators to actively promote and nurture these essential skills, as they play an indispensable role in fostering continuous growth, self-efficacy, and overall improvement throughout students' academic journeys.

References

[1] Abdelrahman, R. M. (2020). Metacognitive awareness and academic motivation and their impact on academic achievement of Ajman University students. *Heliyon*, *6*(9).

[2] Al-Gaseem, M., Bakkar, B., & Al-zoubı, S. (2020). Metacognitive thinking skills among talented science education students. *Journal for the Education of Gifted Young Scientists*, *8*(2), 897-904.

[3] Akaydin, B. B., Yorulmaz, A., & Cokcaliskan, H. (2020). Investigation of Primary School Students' Metacognitive Awareness and Decision-Making Skill. *International Journal of Progressive Education*, *16*(4), 158-171.

[4] Apró, A., Fejes, N., Bandi, S. A., & Járai, R. (2024). Investigating the effect of grit trait on performance and success in Hungarian athlete's sample. *Frontiers in Psychology*, *15*, 1283115.

[5] Arianto, F., & Hanif, M. (2024). Evaluating Metacognitive Strategies and Self-Regulated Learning to Predict Primary School Students' Self-Efficacy and Problem-Solving Skills in Science Learning. *Journal of Pedagogical Research*, *8*(3), 301-319.

[6] Beach, P. T., Anderson, R. C., Jacovidis, J. N., & Chadwick, K. L. (2020). Making the abstract explicit: the role of metacognition in teaching and learning. *Inflexion, Policity Paper: Metacognition in Education*, 8-27.

[7] Camacho-Morles, J., Slemp, G. R., Pekrun, R., Loderer, K., Hou, H., & Oades, L. G. (2021). Activity achievement emotions and academic performance: A meta-analysis. *Educational Psychology Review*, *33*(3), 1051-1095.

[8] Darmawan, E., Zubaidah, S., Ristanto, R. H., Zamzami, M. R. A., & Wahono, B. (2020). Simas Eric Learning Model (SELM): Enhance Student Metacognitive Skill Based on the Academic Level. *International Journal of Instruction*, *13*(4), 623-642.

[9] Denning-Smith, J. B. (2020). *Design Thinking as a Common Language between Higher Education and Employers* (Doctoral dissertation, Western Kentucky University).

[10] Dennis, J. L., & Somerville, M. P. (2023). Supporting thinking about thinking: examining the metacognition theory-practice gap in higher education. *Higher Education*, *86*(1), 99-117.

[11] Dignath, C., van Ewijk, R., Perels, F., & Fabriz, S. (2023). Let learners monitor the learning content and their learning behavior! A meta-analysis on the effectiveness of tools to foster monitoring. *Educational Psychology Review*, *35*(2), 62.

[12] Eggers, J. H., Oostdam, R., & Voogt, J. (2021). Self-regulation strategies in blended learning environments in higher education: A systematic review. *Australasian Journal of Educational Technology*, *37*(6), 175-192.

[13] Frazier, L. D., Schwartz, B. L., & Metcalfe, J. (2021). The MAPS model of self-regulation: Integrating metacognition, agency, and possible selves. *Metacognition and learning*, *16*, 297-318.

[14] Fleur, D. S., Bredeweg, B., & van den Bos, W. (2021). Metacognition: ideas and insights from neuro- and educational sciences. *npj Science of Learning*, *6*(1), 13.

[15] Graesser, A. C., Sabatini, J. P., & Li, H. (2022). Educational psychology is evolving to accommodate technology, multiple disciplines, and twenty-first-century skills. *Annual review of psychology*, *73*(1), 547-574.

[16] Haataja, E., Dindar, M., Malmberg, J., & Järvelä, S. (2022). Individuals in a group: Metacognitive and regulatory predictors of learning achievement in collaborative learning. *Learning and Individual Differences*, *96*, 102146.

[17] Hausman, H., Myers, S. J., & Rhodes, M. G. (2021). Improving metacognition in the classroom. *Zeitschrift für Psychologie*.

[18] Hayat, A. A., Shateri, K., Amini, M., & Shokrpour, N. (2020). Relationships between academic self-efficacy, learning-related emotions, and metacognitive learning strategies with academic performance in medical students: a structural equation model. *BMC medical education*, *20*, 1-11.

[19] Hong, W., Bernacki, M. L., & Perera, H. N. (2020). A latent profile analysis of undergraduates' achievement motivations and metacognitive behaviors, and their relations to achievement in science. *Journal of educational psychology*, *112*(7), 1409.

[20] Kuhn, D. (2022). Metacognition matters in many ways. *Educational Psychologist*, *57*(2), 73-86.

[21] Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. *Heliyon*, *7*(6).

[22] Lawson, C. A., McGuire, S., Hodges, R., Gray, R., McGuire, S. Y., Killingbeck, M., & Segovia, J. (2021). Recipe for Success: Teaching Students Metacognitive and Self-Regulatory Learning Strategies. *Learning Assistance Review*, *26*(2), 149-178.

[23] Li, M., & Yuan, R. (2022). Enhancing students' metacognitive development in higher education: A classroom-based inquiry. *International Journal of Educational Research*, *112*, 101947.
[24] Lumpkin, A. (2020). Metacognition and its contribution to student learning introduction. *College Student Journal*, *54*(1), 1-7.
[25] Maor, R., Paz-Baruch, N., Grinshpan, N., Milman, A., Mevarech, Z., Levi, R., ... & Zion, M. (2023). Relationships between metacognition, creativity, and critical thinking in self-reported teaching performances in project-based learning settings. *Thinking Skills and Creativity*, *50*, 101425.
[26] Marra, R. M., Hacker, D. J., & Plumb, C. (2022). Metacognition and the development of self-directed learning in a problem-based engineering curriculum. *Journal of Engineering Education*, *111*(1), 137-161.
[27] Maryani, I., Alhakim, M. A., & Gestiardi, R. (2021). The student's metacognitive skills of prospective primary school teachers. *International Journal of Educational Management and Innovation*, *2*(2), 199.
[28] Murtadho, F. (2021). Metacognitive and critical thinking practices in developing EFL students' argumentative writing skills. *Indonesian Journal of Applied Linguistics*, *10*(3), 656-666.
[29] Muteti, C. Z., Zarraga, C., Jacob, B. I., Mwarumba, T. M., Nkhata, D. B., Mwavita, M., ... & Mutambuki, J. M. (2021). I realized what I was doing was not working: the influence of explicit teaching of metacognition on students' study strategies in a general chemistry I course. *Chemistry Education Research and Practice*, *22*(1), 122-135.
[30] Padmanabha, C. H. (2020). Metacognition: conceptual framework. *Journal on Educational Psychology*, *14*(1), 1-11.
[31] Pradhan, S. & Das, P. (2021). Influence of metacognition on academic achievement and learning style of undergraduate students in Tezpur University. *European Journal of Educational Research*.
[32] Ratnayake, A., Bansal, A., Wong, N., Saseetharan, T., Prompiengchai, S., Jenne, A., ... & Ashok, A. (2024). All "wrapped" up in reflection: supporting metacognitive awareness to promote students' self-regulated learning. *Journal of Microbiology and Biology Education*, *25*(1), e00103-23.
[33] Roberts, J. S. (2021). Integrating metacognitive regulation into the online classroom using student-developed learning plans. *Journal of Microbiology & Biology Education*, *22*(1), 10-1128.
[34] Santangelo, J., Cadieux, M., & Zapata, S. (2021). Developing student metacognitive skills using active learning with embedded metacognition instruction. *Journal of STEM Education: Innovations and Research*, *22*(2).
[35] Schneider, W., Tibken, C., & Richter, T. (2022). The development of metacognitive knowledge from childhood to young adulthood: Major trends and educational implications. In *Advances in child development and behavior* (Vol. 63, pp. 273-307). JAI.
[36] Scott, A. (2021). *Student Work Ethic: Is There a Difference? A Comparative Analysis of the Non-cognitive Attitudes of College Students* (Doctoral dissertation, Florida Gulf Coast University).
[37] Siegfried, J. L. (2021). *Student Perspectives of Pedagogy and the Development of Autonomy, Metacognition, and Critical Thinking: A Narrative Inquiry Study of Student Experiences to Inform and Define Meaningful Practice* (Doctoral dissertation, Northeastern University).
[38] Taghani, A., & Razavi, M. R. (2022). The effect of metacognitive skills training of study strategies on academic self-efficacy and academic engagement and performance of female students in Taybad. *Current Psychology*, *41*(12), 8784-8792.
[39] Taouki, I., Lallier, M., & Soto, D. (2022). The role of metacognition in monitoring performance and regulating learning in early readers. *Metacognition and Learning*, *17*(3), 921-948.
[40] Tay, L. Y., Chan, M., Chong, S. K., Tan, J. Y., & Aiyoob, T. B. (2024). Learning of mathematics: A metacognitive experiences perspective. *International Journal of Science and Mathematics Education*, *22*(3), 561-583.
[41] Tuononen, T., Hyytinen, H., Räisänen, M., Hailikari, T., & Parpala, A. (2023). Metacognitive awareness in relation to university students' learning profiles. *Metacognition and Learning*, *18*(1), 37-54.
[42] Usman, A., Susilo, H., Suwono, H., & Corebima, A. D. (2021). The Contributions of Metacognitive Skills towards the Retention of Different Academic Ability Students for the Implementation of Several Learning Models. *International Journal of Education and Practice*, *9*(3), 550-567.
[43] Wettergren, S. S. (2023). *Timing Implications of Non-Cognitive Skills Training as a Determining Factor for College Success* (Doctoral dissertation, University of St. Francis).