IJAER/March-April-2025/Volume-14/Issue-2 ISSN: 2278-9677
International Journal of Arts & Education Research
(Peer-Reviewed, Open Access, Fully Refereed International Journal) Impact Factor:7.06

RELATIONSHIP AMONG ACADEMIC ACHIEVEMENT OF UNIVERSITY STUDENTS TO THEIR COGNITIVE AND METACOGNITIVE LEARNING STRATEGIES

Shaveta Chauhan

Assistant Professor, Sewa Devi S.D.College of Education

Tarn Taran, Punjab

Abstract

Using both cognitive and metacognitive learning techniques, this study analyzed the link between the academic accomplishment of university students and the ways that they employed to learn. Particular strategies that students employ in order to absorb and grasp academic content are referred to as cognitive strategies. These methods include summarising, elaborating, and organising knowledge. Self-regulation procedures, such as planning, monitoring, and analysing one's own learning processes, was included in metacognitive strategies, which were on the other hand utilised by individuals. Utilising validated instruments that measured the cognitive and metacognitive learning techniques of a sample of university students from a variety of fields, as well as their academic success indicators, the students were evaluated. The employment of both cognitive and metacognitive strategies was found to have a strong positive link with academic accomplishment, according to quantitative research. Self-regulation is an essential component of academic achievement, as evidenced by the fact that students who regularly displayed greater levels of metacognitive awareness and regulation outperformed their counterparts. In order to improve students' academic performance, these findings highlight the need of including training in cognitive and met cognitive strategies within the curriculum of universities.

Key words: *Academic Achievement, Meta-cognitive Learning Strategies, self - regulation*

Introduction

One of the most important indicators of success in higher education is academic accomplishment, which has an impact not only on personal growth but also on prospects for professional advancement. It has been demonstrated beyond a reasonable doubt that the academic achievement of pupils is significantly influenced by the successful learning techniques that they employ. Among them, cognitive and metacognitive learning techniques have attracted a significant amount of attention from both educators and researchers due to the tremendous influence that they have on the learning process. Students engage in cognitive learning techniques, which entail the mental processes that they use to acquire, organise, and remember information. Rehearsing, elaboration , organizational, critical thinking , Study habits, Effort regulation, peer Learning ,Help seeking and conceptual mapping are some examples of the activities that fall under this category. These activities are helpful in digesting and comprehending academic content. In contrast, metacognitive learning techniques are higher-order abilities that enable students to organise, monitor, and manage their own learning. These tactics are referred to as " Metacognitive learning strategies." Learners are given the ability to evaluate their own level of comprehension, pinpoint areas in which they are lacking, and modify their approach appropriately, which results in a more profound

connection with the material being studied. The link between cognitive and metacognitive techniques and academic accomplishment has been a central focus of research in the field of education. According to the findings of several studies, students who successfully use these methods have a tendency to obtain greater academic achievements in comparison to their counterparts who do not possess such talents. Nevertheless, in spite of the vast study that has been conducted, there are still gaps in our knowledge of how these methods interact with one another and contribute to academic achievement in a variety of educational settings. The purpose of this research is to investigate the connection between cognitive and metacognitive learning techniques and academic accomplishment among students enrolled in various university programs.

The function of cognitive and metacognitive strategies in academic performance has gained increased relevance in the contemporary educational environment, which is characterised by a growing emphasis on autonomous and lifelong learning. This phenomenon has led to an increase in the value of these techniques. The capacity to implement efficient learning techniques is no longer only a desirable trait; rather, it is an absolute requirement in light of the trend towards approaches that are more focused on the student. Students in universities, in particular, are confronted with difficult academic obstacles that not only need subject-matter competence but also the capacity to adjust their learning strategies to a variety of different and ever-changing situations. A significant number of students do not have sufficient awareness or training in the use of these tactics, despite the fact that their significance is widely acknowledged. Some students, for instance, may be very good at fundamental cognitive processes such as memorisation or repetition, but they may have difficulty with higher-order activities such as analysing, synthesising, or critically assessing material. Even among students who have good cognitive capacity, the absence of metacognitive control can lead to inefficient study habits, procrastination, and restricted academic advancement. This is true even when the students are able to learn well. The existence of this gap highlights the necessity of gaining a more in-depth understanding of the connection between cognitive and metacognitive methods and academic achievement. It is possible to use these kinds of findings as a basis for establishing tailored treatments that will enable students to become more successful learners. In addition, having knowledge of how these methods interact with one another across a variety of demographic and academic situations can help in the development of inclusive educational practices that are tailored to satisfy the needs of varied student groups. The purpose of this research is to examine this topic in order to fill in the information gaps that currently exist and to make recommendations that may be implemented by educational institutions and teachers. In the long run, encouraging these tactics may not only enhance academic achievements but also provide students with the vital abilities necessary for learning throughout their lives and achieving success in their professional lives.

Literature Review

Because of the significant role that they play in supporting academic accomplishment, cognitive and metacognitive learning methods have been the focus of a significant amount of research in the field of education. The purpose of this part is to offer an overview of the available research, focussing on the most important findings and theoretical frameworks that investigate the connection between these tactics and the academic achievement of students.

Marzieh. (2010),"Relationship between learning strategies and academic achievement; based on information processing approach" over the course of three grade levels, this research contrasted the

students who performed poorly in the study with those who performed very well, taking into consideration both male and female students. For the purpose of constructing this study, a retrospective technique was used. The subjects, who were high school students from the province of qazvin, were selected via the use of a random multi-level cluster selection strategy. The sample was divided into two groups, each consisting of ninety children, to represent high achievers and poor achievers respectively. Learning and study skill inventory, often known as the lssi, was completed by the individuals who took part in the study. The ways of learning that are both cognitive and meta-cognitive are evaluated in this assessment. Assessment of the hypotheses was carried out via the use of independent t-tests, one-way analyses of variance, and multivariate regression. The findings of the study revealed that students belonging to lower groups used cognitive and meta-cognitive approaches with a lower frequency compared to students belonging to higher groups ($p<0.001$). ($p<0.000$) a greater number of females than males utilised LSSI. Between grade levels, there was not a significant difference in the use of LSSI (Learning and Study Skills Inventory). When compared to cognitive strategies, meta-cognitive methods are superior in terms of their ability to forecast academic achievement.

Hassan. (2015),"The relationship of cognitive and metacognitive strategies with motivation for academic achievement" the participants of this study were female high school students from area 13 in tehran. The purpose of this research was to determine the elements that encourage them to achieve academically, as well as the ways in which their cognitive and metacognitive processes connect to this. All of the female high school seniors who were a part of the sample were included. A total of three hundred students were selected for the sample via the use of a multistage random selection process. To gather the necessary information, two instruments were utilised: the hermans' achievement motivation questionnaire, which consists of 29 incomplete multiple-choice sentences and covers 10 components (ethology, behaviour of achievement, ambition, resistance, upward mobility, task stress, time perception, time perspective, choosing friends with partner, ethology, and risk taking), and the karami learning strategies questionnaire, which consists of 86 items, 49 of which pertain to cognitive strategies and 37 to metacognitive strategies. The pearson correlation test was used in order to do the analysis on the recorded data. Research found a favourable correlation between academic motivation and cognitive and metacognitive approaches in female high school pupils. Adoption of these approaches increased with academic motivation.

Maryam. (2017)"The effect of cognitive and metacognitive strategies in academic achievement: a systematic review" the fact that a number of studies have shown a positive and effective connection between learning strategies and academic achievement lends credence to the notion that these methods play a significant part in the process of learning. Research that was conducted in the form of a systematic review was conducted with the intention of investigating the connection between academic performance and cognitive and metacognitive strategies. The population of the present study is comprised of research conducted in iran and other countries across the world that has investigated the influence of cognitive and metacognitive strategies on academic achievement. With regard to domestic commodities, the period scope for the investigation was from 2004 to 2014, but the time frame for the investigation of international articles was from 2000 to 2014. The performance of students in a variety of courses has been shown to be most favourably influenced by learning approaches, including cognitive and metacognitive strategies, according to a number of studies. It is possible to make a general statement that learning techniques, whether they are cognitive or metacognitive, have a substantial influence on the degree of learning that occurs in a variety of types of classes. This holds true for all different kinds of research, including those that are experimental,

quasi-experimental, relational, and correlational, as well as for all different genders of students. The study found that high-achieving students employed cognitive and metacognitive approaches more often than low-achieving students ($p < 0.001$). Women outnumbered men in using the Learning and Study Skills Inventory (LSSI) ($p < 0.000$). Metacognitive approaches predicted academic performance better than cognitive methods.

Ghulam. (2021),"Relationship between university students' metacognitive abilities and academic achievement in history" the purpose of this study is to investigate whether or not there is a connection between the ability of college students to engage in metacognition and their performances in the history course. Components of metacognitive skills include cognitive self-awareness (also known as csc), self-regulation (also known as sr), and cognitive strategies (also known as csu). The academic achievement in history, on the other hand, only addresses the first two levels of bloom's hierarchy of requirements, which are knowledge and comprehension. In all, there were thirty-one (31) undergraduate students who were majoring in history at a public university that made up the sample group. In order to acquire knowledge of the history curriculum that had been approved by the higher education commissions, they used metacognitive teaching approaches over the course of a period of six months. The academic achievement in history test (aaht) and the metacognitive skills questionnaire (maq) were administered to the students at the six-month mark of the course in order to evaluate their development. The aaht was designed to evaluate the students' academic skills, while the maq was designed to evaluate the students' metacognitive capabilities. After doing an analysis of the data using spss version 26 and spearman r, it was established that there is a correlation between the metacognitive abilities of university students and their academic achievement in the subject of history. The results of the study provided more evidence that emphasises the significance of metacognitive abilities in improving students' overall performance in history lessons. It is for this reason that it is recommended that instructors at universities assist their students in the development of metacognitive abilities so that they may continue to study throughout their whole lives.

Muhammad. (2022),"Relationship between meta-cognition and academic achievement of university students in punjab" specifically, the purpose of this study was to evaluate the relationship between meta-cognition and the academic performance of students attending higher education institutions in the province of punjab in pakistan. The current research had three principal objectives: the first was to assess the meta-cognition of college students; the second was to identify the academic performance of chemistry majors; and the third was to investigate the link between meta-cognition and efficient learning. A total of 148 female and 70 male students who were majoring in chemistry were included in the sample group. These students came from four distinct educational institutions located in the province of punjab. For the purpose of this inquiry, a quantitative technique was used. In order to choose our participants, we used a method known as purposive sampling. The data for the study was collected via the use of a questionnaire, and the approach used was correlational. For the purpose of conducting the analysis of the data, statistical packages for the social science (spss) version 23 was used. The analysis consisted of the following tests: frequency, percentage, mean, pearson's r, and alpha coefficient. When looking at academic accomplishment at the university level, the data indicated that there was no significant correlation between meta-cognition and academic achievement. After doing study, the researchers came to the conclusion that including meta-cognition into lesson planning, presentations, and research papers might potentially increase the academic performance of university teachers' pupils. It is for this reason that it is very necessary for chemistry instructors to include meta-cognition into the course frameworks that they teach for advanced degrees. It

is advised that future research in other scientific domains study the association between meta-cognition and academic achievement. This is something that should be done.

Shubhra. (2023),"A study of meta-cognition among college students in relation to their academic achievement" The concept of metacognition refers to the concept of being self-aware in one's thinking and the strategies that one adopts. The students are able to have a greater awareness of their behaviours, their motives, and the prospective circumstances in which the skills they are obtaining may be valuable as a result of this. As part of a more comprehensive investigation, researchers in Birbhum, West Bengal, set out to determine the extent to which undergraduate students are aware of their own metacognitive processes. In addition, the relationship between metacognition and the performance of students in the classroom was investigated as part of this study. Undergraduate students are evaluated by the researchers using a standardised awareness checklist to determine their level of metacognitive awareness. A variety of appropriate statistical procedures were used by the researchers throughout the process of data collecting and analysis. According to the findings of the study, a favourable correlation exists between metacognition and the academic achievement of students.

Method

Researchers are performing both descriptive and analytical studies. The sample that was statistically examined consisted of postgraduates studying arts, science; commerce .A representative sample of 150 students was selected, with 50 girls and 100boys. The students were selected using incidental sampling. In order to reduce variance among the various groups, pupils were classified using homogeneous variable classes. Following that, a certain number of students were selected at random from each class. All students who took part in the study were required to sign an informed consent form. Data was collected via a demographic survey in addition to a Motivated Strategies for Learning Questionnaire (MSLQ) standard survey for cognitive and metacognitive approaches. This questionnaire consisted of 86 questions split into two parts: one covering knowledge and control, which included topics like dedication, attitude, and focus; the other covering process control, which covered topics like planning, control, evaluation, and regulation. With a range from 0 (never done) to 9 (always done), the Likert scale allows for the evaluation of 10 distinct options. According to Karami, this instrument has undergone thorough examination and validation concerning its content validity, criteria, structure, and factors. Content validity was determined using two formal and logical approaches, while academic achievement was assessed based on the average performance of all pupils. The questionnaire was validated by experts widely recognized as leaders in the field of medical education. The reliability coefficient of the questionnaire was found to be 0.92 using the Cronbach's alpha method. Several statistical tests were conducted on the dataset using SPSS version 18, including multiple regression, descriptive statistics (such as standard deviation, frequency, and mean), and an independent t-test with a significance threshold of 0.05.

Results

150 students participated in the study; 88 of them, or 58.5 percent, were female, while 62 of them, or 41.5 percent, were male. The following is a breakdown of the ages: There were 68.4% of students who were younger than 22 years old, 21.6% who were between the ages of 23 and 27, 3.8% who were older than 28 years old, and 6.1% who were unsure of their age. Out of the faculties that were represented, 14.9% (22 students) were from the Paramedical Sciences Faculty, 17.3% (26 students) were from the Nursing Faculty,

23.4% (35 students) were from the Medicine Faculty, 8.5% (13 students) were from the Nursing and Midwifery Faculty, 13.7% (21 students) were from the Health Faculty, 13.5% (20 students) were from the Paramedicine Faculty, and 8.8% (13 students) were from the Dentistry Faculty.

The cognitive processes of the students were found to have an average and standard deviation of 282.74 ± 62.01, while their metacognitive skills were found to be 217.55 ± 48.70. In addition to that, the standard deviation of the academic grade was 12.66, and the average grade was 17.57. The findings of the analysis of variance (Table 1) indicate that there is a substantial correlation between academic achievement and cognitive and metacognitive methods ($p < 0.025$). This finding lends credence to the validity of the regression model.

Table 1: Examining the correlation between metacognitive and cognitive abilities and academic performance via analysis of variance

Model	Total Square	Degrees of Freedom (df)	R	R^2	F-Statistic	p-value
Regression	18.125	2	0.166	0.027	3.74	0.025
Remaining	359.474	147	60.680			
Total	377.599	149				

The results of the regression analysis for the research that included 150 students revealed a total sum of squares value of 377.599 respectively. It was determined that the regression model was responsible for 18.125 percent of this variation, while the rest 359.474 percent was not taken into consideration. However, the model only had two degrees of freedom, but the residual variance had 147 degrees of freedom. According to the coefficients of determination (R2) and correlation (R), which were 0.166 and 0.027, respectively, cognitive and metacognitive strategies accounted for 2.7% of the variance in academic achievement. This was determined by comparing the difference between the two variables. The results of the study demonstrated that there is a strong connection between cognitive and metacognitive strategies and academic achievement (F-statistic 3.74, p-value 0.025).

Table 2: What we find when we use regression analysis to look at how students' cognitive and meta-cognitive methods relate to their grades

Variable	B	Benchmark Error	Beta	T-Statistics	P-value
Stable	15.524	0.455	-	34.094	0.000
Cognitive Strategy	0.000	0.003	-0.018	-1.56	0.876
Metacognitive Strategy	0.006	0.004	0.180	1.593	0.112

In addition, the results of the independent *t*-test indicated that there was no statistically significant difference between the cognitive and metacognitive strategies employed by students based on their gender ($p > 0.05$). However, a significant difference was observed in the academic achievements of male and female students ($p < 0.05$), as shown in Table 3.

Table 3: Analyzing the relationship between students' cognitive and meta-cognitive techniques, as well as their academic accomplishment, according to gender

Significance	df	T	Standard Deviation ± Average	Gender	Variable	Statistic
0.693	148	0.395	56.74 ± 284.39	Male	Cognitive Strategy	
			65.93 ± 281.46	Female	Cognitive Strategy	
0.911	148	0.112	47.09 ± 217.92	Male	Metacognitive Strategy	
			50 ± 217.27	Female	Metacognitive Strategy	
0.000	148	7.30	1.63 ± 15.95	Male	Mean	
			1.22 ± 17.12	Female	Mean	

DISCUSSION

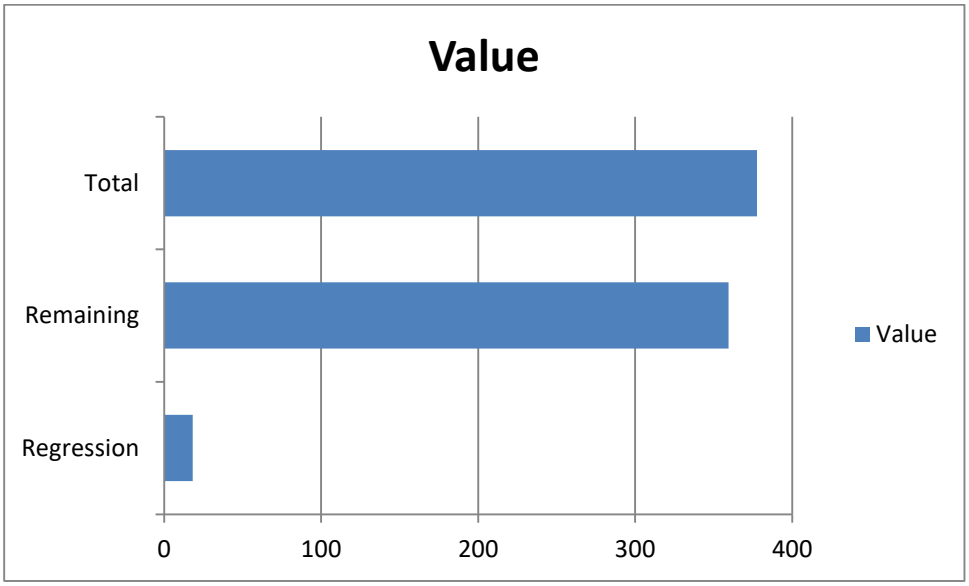

Figure 1: "analysis of variance contribution for regression model"

This table demonstrates how regression and residuals contribute to the regression model's variance. The regression model can explain just a small portion of the variance; the pie chart can display the rest. This shows the regression model's fit and data explanation.

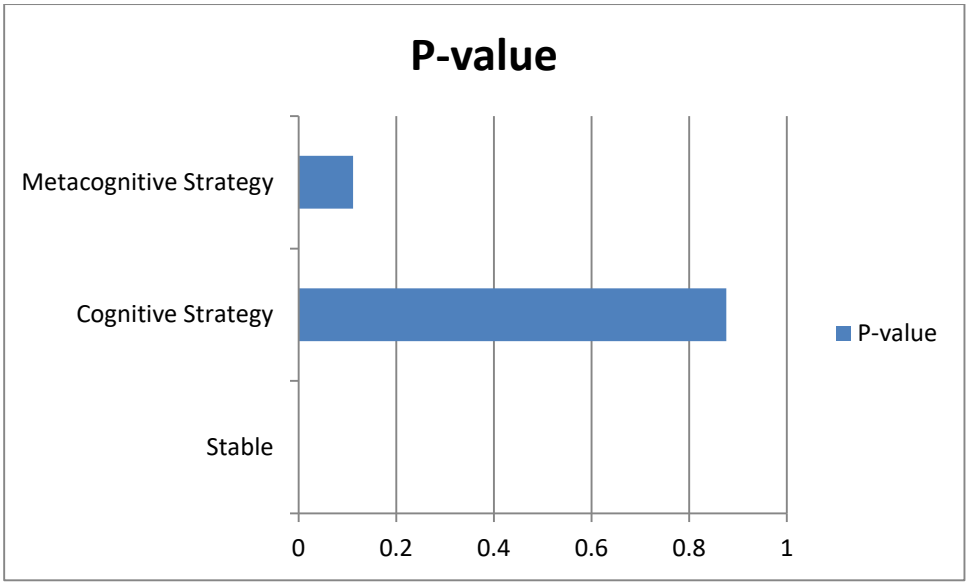

Figure 2: "significance contribution of variables in regression model"

The table below shows the p-values for each variable in the regression model and how significant they are. Greater importance is indicated by a lower p-value. The importance of the model as a whole can be seen in the pie chart, with stable having the most influence and Cognitive Strategy having the least owing to its very high p-value.

In the course of this research carried out at Guru Nanak Dev University, Amritsar. It was discovered that there is a connection between the meta-cognitive and cognitive techniques utilized by students and their overall academic achievement. It was shown that there was a favourable and substantial relationship between cognitive strategies, metacognition, and the academic achievement of pupils. It was found that the findings of Zarei and Marandi (2011), Parviz and Sharifi (2011), Mohammadi et al. (2016), and Mohammadi et al. (2015) Matches (1.11-13) were in accord with this conclusion. Several learning problems can be traced back to a deficiency in metacognitive skills and capacities, according to one potential line of reasoning. In order for students to improve their cognitive processes, such as choice, control, monitoring, and management, it is essential for them to develop skills such as organising, self-monitoring, planning, and goal setting. This will allow them to become experts in decision-making cognitive strategies and build the framework for future learning. On the other hand, when people are not familiar with the circumstances that they will be confronting, it is difficult for them to face fresh difficulties. In contrast to cognitive education, metacognitive education is distinct in that it focusses on teaching approaches of this kind (14). When students engage in the practice of the metacognitive learning technique, which entails learning, organising, and storing knowledge in order to make it simpler to utilise, their academic performance is improved. It also entails planning, monitoring, and regulating, managing time efficiently, selecting a learning atmosphere that works for them and helps others, overcoming fear and not putting things off or neglecting them, and ultimately, emphasising and revising what they have learnt. Because they arrange the mind and the kind of study that enables individuals to manage and govern the process of learning and studying, it appears that developing these talents will, over the course of time, lead to an increase in academic accomplishment. (1) a. Students that make more use of meta-cognitive and self-regulation skills throughout their study time are more likely to Learning the meaning of information, constructing logical linkages between new and old bits of knowledge, exercising control over the process,

and developing an optimum learning environment are all important factors. They see an improvement in their academic achievement as a consequence.

A favourable correlation exists between the use of cognitive learning techniques by students and the academic success of those students, as indicated by the statistics. It has been stated by Zarei and Marandi (2011), Babaee Amiri and Ashoori (1393), Mohammadi et al. (1395), and Zarei and Marandi (2011), 13, 15, that the following statements are true. For the purpose of shedding light on this discovery, it has been discovered that students who utilise higher-level cognitive methods are able to learn more successfully than those students who rely on lower-level techniques that are more subjective. This indicates that these students are able to draw meaningful connections between new knowledge and what they already know in the subject. Furthermore, they are able to remember information more efficiently and for longer periods of time, and they also do better on examinations that require them to do so. Lessons that are more effective lead to larger accomplishments than those that are less effective (13,15). The fact that the findings of the study cannot be transferred to students studying disciplines other than the medical sciences is one of the study's shortcomings. In addition, the researchers were unable to ensure that the students' responses were accurate because their mental and physical condition at the time of the survey completion may have an effect on the responses they provided.

CONCLUSION

The results of this research shed light on the significant part that cognitive and metacognitive learning techniques play in determining the level of academic success that university students attain throughout their academic careers. Cognitive methods provide students the ability to efficiently process, organise, and remember knowledge, whereas metacognitive strategies give them the ability to plan, monitor, and assess their own learning processes. When it comes to encouraging deep learning, flexibility, and increased academic achievement, the interaction between these tactics is absolutely necessary. According to the findings of this study, students who combine metacognitive control with cognitive efforts regularly achieve higher levels of success than those who depend exclusively on fundamental cognitive strategies. Through the process of ensuring that cognitive methods are applied appropriately, metacognition improves the effectiveness of cognitive strategies, hence helping students to maximise their learning results. A further emphasis is placed in the research on the significance of nurturing these methods through the implementation of targeted interventions in higher education. Reflective learning, self-assessment, and strategic planning are examples of the kinds of programs and activities that should be prioritised by educational institutions and educators in order to cultivate both cognitive and metacognitive skills. These kinds of activities have the potential to provide students with the resources necessary to become self-directed learners who are better equipped to negotiate the complexity of both academic and professional circumstances. The applicability of these findings across a variety of educational settings should be investigated in further study. Additionally, the effect of elements such as cultural background, academic field, and technology improvements on the utilisation of cognitive and metacognitive techniques should be investigated. We can continue to improve our understanding of these dynamics, which will allow educators to continue to develop their methods, so guaranteeing that every student has the opportunity to realise their full academic potential.

References

[1] Abdolmalki, J. (2012). The relationship between emotional intelligence and creativity with academic achievement in Shahied University students. *New Educational Thoughts*, *5*(2), 9–22.
[2] Anzehaei, S. S. M., & Rastegarpour, H. (2015). The relationship of cognitive and metacognitive strategies with motivation for academic achievement. *Research Journal of Applied Sciences, 10*, 714–718. https://doi.org/10.3923/rjasci.2015.714.718
[3] Artino, A. R. (2008). Cognitive load theory and the role of learner experience: An abbreviated review for educational practitioners. *AACE Journal*, *16*(4), 425–439.
[4] Ashoori, J., Azadmard, S. H., Jalil Abkenar, S., & Moeini Ki, M. (2014). A prediction model of academic achievement based on cognitive and metacognitive strategies, achievement goals orientation and spiritual intelligence in biology. *Journal of School Psychology*, *2*(4), 170–178.
[5] Azevedo, R., & Cromley, J. G. (2004). Does training on self-regulated learning facilitate students' learning with hypermedia? *Journal of Educational Psychology*, *96*(3), 523–535.
[6] Beck, B. L., Koons, S. R., & Milgrim, D. L. (2012). Correlates and consequences of behavioral procrastination: The effects of academic procrastination, self-consciousness, self-esteem, and self-handicapping. *Journal of Social Behavior and Personality*, *15*, 3–13.
[7] Boekaerts, M. (1997). Self-regulated learning: A new concept embraced by researchers, policy makers, educators, teachers, and students. *Learning and Instruction, 7*(2), 161–186.
[8] Clarebout, G., Horz, H., & Schnotz, W. (2010). The relations between self-regulation and the embedding of support in learning environments. *Educational Technology Research and Development, 58*(5), 573–587.
[9] Efklides, A. (2011). Interactions of metacognition with motivation and affect in self-regulated learning: The MASRL model. *Educational Psychologist, 46*(1), 6–25.
[10] Fayaz, I., Kazemi, S., Raeisoon, M. R., & Mohammadi, Y. (2016). The relationship between learning motivational beliefs and control source dimensions with academic achievement of students in Birjand University of Medical Sciences. *Research in Medical Education, 8*(2), 69–76.
[11] Flavell, J. H. (2000). Assessing student metacognitive awareness of reading strategies. *Journal of Educational Psychology, 94*(2), 249–259.
[12] Fooladvand, M. (2017). The effect of cognitive and metacognitive strategies in academic achievement: A systematic review. *New Trends and Issues Proceedings on Humanities and Social Sciences, 3*, 313–322. https://doi.org/10.18844/gjhss.v3i1.1780
[13] Ghiasvand, M. (2010). Relationship between learning strategies and academic achievement; based on information processing approach. *Procedia - Social and Behavioral Sciences, 5*, 1033–1036. https://doi.org/10.1016/j.sbspro.2010.07.231
[14] Hattie, J., & Donoghue, G. M. (2016). Learning strategies: A synthesis and conceptual model. *Science of Learning, 1*, 16013.
[15] Hossain, K. M., & Singha Chowdhury, S. (2023). A study of meta-cognition among college students in relation to their academic achievement. *Journal of Emerging Technologies and Innovative Research, 6*, 826–832.
[16] Khurram, A. F. A., Islam, M., & Shabbir, G. (2021). Relationship between university students' metacognitive abilities and academic achievement in history. *International Journal of Social Sciences, 58*, 1–7.
[17] Koriat, A. (2007). Metacognition and consciousness. In P. D. Zelazo, M. Moscovitch, & E. Thompson (Eds.), *The Cambridge handbook of consciousness* (pp. 289–325). Cambridge University Press.
[18] Mohammadi, Y., Kaykha, A., Sadeghi, A., Kazemi, S., & Raeisoon, M. R. (2015). Relationship of metacognition learning strategy and locus of control with academic achievement of students. *Educational Strategy in Medical Sciences, 8*(5), 323–328.
[19] Perry, N. E., Hutchinson, L. R., & Thauberger, C. (2008). Promoting self-regulated learning through student-generated quizzes. *Active Learning in Higher Education, 9*(2), 113–128.

[20] Schouwenburg, H. C. (2004). Procrastination in academic settings: General introduction. In C. H. Schouwenburg, T. A. Lay, J. R. Pychyl, & J. Ferrari (Eds.), *Counseling the procrastinator in academic settings* (pp. 3–17). American Psychological Association.
[21] Schraw, G., & Dennison, R. S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology, 19*(4), 460–475.
[22] Siraj, A., Bhatti, R., & Ali, M. (2022). Relationship between meta-cognition and academic achievement of university students in Punjab. *Journal of Education and Learning, 10*(1), 10.
[23] Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277–304). Lawrence Erlbaum Associates.
[24] Vakili, M. M., & Jahangiri, N. (2018). Content Validity and Reliability of the Measurement Tools in Educational, Behavioral, and Health Sciences Research. *Journal of Medical Education Development*, 10(28), 106-118. Retrieved from