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Deanship of Scientific Research

The Predictive Ability of the Level of Academic Self-Regulation and Cognitive Agility among University Students

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Abstract

Objectives: This study aimed to explore the predictive power of academic self-regulation and cognitive flexibility among undergraduate students.

Methodology: The study employed two standardized scales one for cognitive flexibility and another for academic self-regulation administered to a sample of 311 students from Amman Arab University in Jordan.

Results: The findings revealed high levels of both cognitive flexibility and academic self-regulation among participants. Significant differences in cognitive flexibility were found based on gender (in favor of females) and academic major (in favor of science majors). Additionally, the variation in cognitive flexibility accounted for 47% of the variance in academic self-regulation.

Recommendations: The study recommended continued efforts to enhance cognitive flexibility and academic self-regulation among university students through campus activities, including seminars, lectures, workshops, and specialized awareness and guidance programs in this domain.

Keywords: Predictive power, academic self-regulation, cognitive flexibility, university students.

القدرة التنبؤيَّة لمستوى التنظيم الذاتي الأكاديمي بالرشاقة المعرفيَّة لدى طلبة الجامعة

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ملخّص

الأهداف: هدفت هذه الدراسة إلى الكشف عن القدرة التنبؤيَّة لمستوى التنظيم الذاتي الأكاديمي والرشاقة المعرفيَّة لدى طلبة مرحلة البكالوريوس.

المنهجيَّة: جرى استخدام مقياسَي المرونة الإدراكيَّة والتنظيم الذاتي الأكاديمي وتطبيقهما على عينة مكوَّنة من (311) طالبًا من جامعة عمان العربيَّة في الأردن.

النتائج: أظهرت النتائج ارتفاع مستوى كل من المرونة الإدراكيَّة والتنظيم الذاتي الأكاديمي، مع وجود فروق في مستوى المرونة الإدراكيَّة تُعزى إلى متغيّرَين: (الجنس لصالح الإناث، والتخصص الأكاديمي لصالح التخصصات العلمية). كما بينت النتائج أن تباين مقياس المرونة الإدراكيَّة يفسر (47%) من التنظيم الذاتي الأكاديمي.

التوصيات: أوصت الدراسة بضرورة الاستمرار في تنمية الرشاقة المعرفيَّة والتنظيم الذاتي الأكاديمي لدى طلبة الجامعات عبر الأنشطة الجامعيَّة، التي تشمل الندوات والمحاضرات وورش العمل وبرامج الإرشاد التوعوي المتخصِّصة في هذا المجال.

الكلمات المفتاحيَّة: القدرة التنبؤيَّة، التنظيم الذاتي الأكاديمي، الرشاقة المعرفيَّة، طلبة الجامعات.

Introduction

The university stage is considered one of the important stages for students that the learner goes through, during which he/she faces many changes that affect aspects of his/her integrated personality and result in some difficulties that hinder his/her performance of the tasks required to achieve his/her goals with high quality, and these require him/her to raise the level of regulation of his/her academic self; to develop his/her abilities and mental skills and develop Cognitive Agility to help him/her control his/her thoughts, and achieve balance in his/her learning practices.

This is emphasized by Elfiel (2020), who shows that Cognitive Agility is one of the most important things that educational systems seek to enhance and develop to enable students to control their thoughts, feelings, and behaviors and the way they process information. It enables them to adapt to emerging changes and succeed in employing them well.

The characteristics of a Learner with Cognitive Agility, as illustrated by Warkentien (2016), include: (Concentration of Attention, Good Social Interaction, Enhanced Communication Skills, and Appropriate Decision-Making). Mariscal (2017) confirms that cognitive Agility has a clear and continuous effect on strengthening learners' memory, improving their interaction with educational activities, and increasing their ability to solve their problems. It also affects their physical and psychological fitness, as it equips those learners with the ability to deal well with others, enhances their sense of self-confidence, and increases their ability to think in a balanced manner and build social relationships. Ross et al., 2018, add that those learners employ patterns of thinking that they perceive to correspond to patterns of behavior appropriate to the situations that they face in different spheres of life.

Yazıcı, Özgenel (2020) divides Cognitive Agility into five forms, namely: (Agility in Human Relationships {People Agility}, such as flexibility in communicating with others in a way that is calm and constructive, sharing and cooperating with them, and providing assistance to them - Agility in Achieving Results {Results Agility}, such as producing excellent results even under the difficult of circumstances - {Mental Agility}, which is characterized by individuals who think about solving problems in new and innovative ways and not being constrained by ambiguous and complex situations - {Change Agility}, which appears in individuals who employ their ideas and skills to bring about appropriate changes - {Self-Awareness Agility}, which is characterized by those who understand themselves, and know their abilities to influence others).

Hutton et al., 2020, suggest that metacognitive skills, such as the ability to self-reflect, critical thinking, and self-regulation, contribute to improving Cognitive Agility. Cognitive Agility also reflects the ability of students to use their multiple cognitive abilities integrally and harmoniously in changing academic environments through self-regulation of their thoughts, feelings, and emotions, as was also noted by (Jøsok et al., 2019) that Cognitive Agility consists in the learner's ability to pay attention and think appropriately at the right time, the flexibility in using self-regulation strategies for all this, and showing appropriate reactions while practicing his/her tasks. Zakri (2017) points out that Academic Self-Regulation is a process through which the learner sets goals and monitors his/her learning, organizes it, and controls it, as was also iterated by Hamouda (2020), who sees that self-regulated learning is an active mental process through which the learner can embark on his/her learning process, direct and monitor it, and it is represented in his/her ability to optimize the use of cognitive, metacognitive, and motivational components, use various strategies to improve his/her learning and development, and perform academic tasks as the focus of the educational process. Yahya et al. (2021) confirm that self-regulated students tend to be They are successful in their learning as a result of their planning, set clear goals, organize themselves, and continuously evaluate their progress throughout the learning process.

And Lobos et al. (2024) highlight that self-regulated learning is a process where students plan, monitor, and assess their learning through self-reflection and digital tools. noting that teacher supervision is greater in face-to-face learning. In contrast, in blended learning, students develop stronger self-management skills, become more independent, and take on greater responsibility for their learning.

Jøsok et al., 2019, stress that the level of Self-Regulation has a direct relationship with a positive impact reflected on the level of Cognitive Agility and its improvement, which is evident through the improvement in the level of performance of various tasks. Knox (2019), also indicates that a high level of Self-Regulation helps students control their thoughts and actions, improves their use of high mental skills, and thus makes them more cognitively agile.

Study problem

The concept of cognitive agility reflects an individual's ability to utilize their entire cognitive processes smoothly and harmoniously to achieve their goals in dynamic tasks, enabling them to adapt their performance to cope with the changing environment surrounding these tasks (Knox et al., 2018). However, the scope of cognitive agility has often been narrowed to merely refer to an individual's ability to shift mentally with ease, relying on attentional flexibility and self-regulation strategies. This notion was reinforced by Jøsok et al. (2019), who emphasized that cognitive agility is determined by the extent to which an individual can flexibly adjust their focused attention, regulate cognitive openness, and shift cognitively toward stimuli most relevant to the task at hand through self-regulation of their thoughts, emotions, and responses in time-constrained dynamic tasks.

Despite the crucial role of cognitive agility in enabling individuals, particularly university students, to adapt to academic challenges and enhance their self-regulation skills, there remains a gap in research exploring the relationship between cognitive agility and academic self-regulation, as well as the predictive ability of cognitive agility in shaping students' self-regulation skills. Therefore, this study aims to bridge this research gap by investigating the relationship between cognitive agility and academic self-regulation among undergraduate students and examining the extent to which cognitive agility influences the development of self-regulation skills. The findings of this study may contribute to improving academic performance and better preparing students for their professional futures.

Study questions

This study aims to answer the following questions:

1. What is the Level of Cognitive Agility among University Students?
2. Are There Statistically Significant Differences at the ($\alpha = 0.05$) Level of Significance in the Average Responses of the Study sample about the Level of Cognitive Agility Attributed to The Variables of Gender and Specialization?
3. What is the Level of Academic Self-Regulation among University Students?
4. Are There Statistically Significant Differences at the ($\alpha = 0.05$) Level of Significance in the Average Responses of the Study sample about Academic Self-Regulation Attributed to The Variables of Gender and Specialization?
5. What is The Predictive Ability of the Level of Academic Self-Regulation and Cognitive Agility among University Students?

Significance of the Study

The importance of the study appears from the importance of its variables directly related to the educational process where the results of the current study can help educational and educational institutions focus on the dimensions of Cognitive Agility and Academic Self-Regulation strategies that have a direct impact on the level of academic performance of students that make them more organized and more cognitively agile while performing the tasks required of them.

The practical importance of the study lies in its assistance in designing training programs based on the dimensions of Cognitive Agility that help students adapt their performance to all changes in the context of those tasks and respond to them proportionately and appropriately to their nature. It also helps develop guidance plans to improve self-regulation skills to maximize benefit from what has been learned and acquired. In addition, the current study may provide university academics with measurement tools that help them measure Academic Self-Regulation, given the importance of this variable in a university student's present and future life.

Terms of the Study (Terminology): The terms mentioned in the title of the study were addressed as per the following :

Cognitive Agility: A mental structure that includes the individual's ability to display agility, quick and efficient adaptation, cognitive openness, and concentration of attention to be open to everything new, process information flexibly, and make decisions about the ends and means to achieve the desired goals. (Al-Badawi, 2020).

It is measured by the degree and level obtained by the Study sample members on the Cognitive Agility Scale used in the current study.

Academic Self-Regulation, which is contained in Daradkeh (2018), is defined by Mohammadipour et al. as one of the main processes in education. It increases students' learning, improves their ability to regulate their academic behaviors, and enhances their interaction with the surrounding environment by organizing their academic thoughts and actions to arrive at the set goals.

It is measured by the degree and level obtained by the Study sample members on the Academic Self-Regulation Scale used in the current study**.**

Previous Studies:

Prompan and Piamsai (2024) conducted a study aimed at examining to know the effect of peer feedback and self-regulated learning on students' ability to write essays and organize themselves academically, based on social cognitive theory and formative assessment. The study involved 35 students at a public university in Western Thailand. The participants underwent online training for a period of 12 weeks during the COVID-19 pandemic. Through an assessment of students' writing skills, structured interviews, and the use of a questionnaire to evaluate their self-regulation capabilities, the study demonstrated positive outcomes, including significant improvements in students' essay writing skills, enhanced self-regulation, and greater control over their study strategies.

The Wadi Hbash (2023) study aimed to identify the level and relationship of Cognitive Agility with psychological fluency the study used the correlational approach and developed a questionnaire distributed to (123) young residents in Saudi Arabia. The results showed a high level of Cognitive Agility, The results also highlighted differences in the level of Cognitive Agility due to the gender variable favoring males.

The study of Ajeel (2023) aimed to explore the association between Cognitive Agility, Self-Regulation, and Academic Performance among students of Tikrit University. The study developed a questionnaire applied to (400) students from the University. The researcher concluded in her thesis that the degree and level of students' possession of Cognitive Agility were average, with no differences present in Cognitive Agility attributed to the specialization variable In contrast, these differences appeared in the gender variable and favor of males. As for Self-Regulation, the results showed that students' possession of it was average in degree and level, with statistically significant differences present in this possession belonging to the gender variable and favoring females. In contrast, these differences did not appear in the specialization variable.

The Hussein & Jabbar (2022) study aimed at identifying the Cognitive Agility of Educational Counselors. the study adopted the descriptive approach and developed a questionnaire distributed on three dimensions: (Cognitive Openness, Cognitive Flexibility, and Concentration (Focus) of Attention). They distributed it to (200) counselors from schools of education in Babylon, Iraq. The results showed that male and female counselors had a high level of Cognitive Agility, with no differences in Cognitive Agility be consoled to the gender variable (males, females).

Abdelaziz (2022) conducted a study examining the correlation between Cognitive Agility and Academic Well-being. The study used the correlational approach and developed a questionnaire the study involved sample of (293) students . The results showed a high level of Cognitive Agility and Academic Well-being among students, with a statistically significant correlation between them. The results also showed no differences attributed to the variables of gender and specialization in Cognitive Agility. Moreover, the results concluded that Cognitive Agility contributes to predicting Academic Well-being.

The study of Sarhan and Al-Kubaisi (2022) aimed to Identifying cognitive agility among university students. The sample consisted of (300) students from the University of Anbar, Iraq. The results showed an average level of cognitive Agility, with differences present in the level of this Agility according to the gender variable, in favor of males, and according to the specialization variable and in favor of scientific disciplines.

Al-Ghamdi conducted a study (2020) to ascertain the Predictive Ability of self-regulated learning components in students' level of involvement.The researcher developed a questionnaire distributed to (118) high school students in Ha'il, Saudi Arabia. The results revealed that the level of self-regulated learning was average. In contrast, the level was high in the field of: (recitation and memorization). The results showed that the level of students' involvement in learning was average, with the possibility of predicting the involvement in learning among the target students.

The (Jøsok et al., 2019) study aimed to revealing the relationship between the level of self-regulation and cognitive agility in cyber operations; the study sample consisted of (23) students using and applying the Self-Regulation Questionnaire (SRQ) Scale. The study results showed a high self-regulation and cognitive agility level and a positive correlation between self-regulation and cognitive agility. The results also showed that Self-Regulation explains (43.1%) the level of Cognitive Agility in the study sample and that Self-Regulation supports the study sample students' level of Cognitive Agility.

The Milad et al. (2018) study aimed to reveal the relationship between Academic Self-Regulation and both gender and academic specialization variables among students of the Scientific and humanitarian colleges. The study adopted the Descriptive Method, and the Scale applied it to (168) students from both faculties. The results showed that specialization and gender variables significantly impacted Academic Self-Regulation, with differences in the level of this regulation in favor of the faculty of education and in favor of females in the gender variable.

The Daradkeh study (2018) aimed to determining the level of academic self-regulation and its relationship to some variables among students at Northern Border University in Saudi Arabia. The sample consisted of (337) students from the University. The results showed that the level of Academic Self-Regulation was average, with differences in the gender variable in favor of males. In contrast, these differences did not appear in the variable of the type of college.

In the study of Momani and Khazali (2016) which aimed to determine the level of self-regulation and the predictive ability of self-regulation in the academic achievement of university students. the study adopted the descriptive approach, and the researchers used the (2010) Mriyan Scale for Self-Regulation after making adjustments to it and verifying its validity and reliability indices. Sample included of (213) students from the University of Jadara in Jordan. The results showed that students had an medium level of self-regulation, with There are differences in the level of self-regulation due to gender and in favor of females.

Methodology: The study used the descriptive correlational approach

Study Population: population consists of all undergraduate students at Amman Arab University in the first semester of the academic year (2023/2024), and the total number (3462) students.

Study participants

The study sample consisted of (311) male and female students selected according to the Convenience Sampling (Opportunity Sampling). There are (123) male and (188) female students according to gender, (136) students according to academic specialization in the scientific faculties, and (175) students in the humanitarian faculties.

Study instruments

1. Cognitive Agility Scale: The researchers used the Cognitive Agility Scale that Yazıcı, Özgenel (2020) developed. It consists of (30) items divided into five domains.

2. Academic Self-Regulation Scale: The researchers used the Academic Self-Regulation Scale developed by (Akhtar & Mahmood, 2013). The Scale consisted of (30) items divided into five domains

Content Validity

The validity of the content of the study scales was presented to a group of experts and A standard (80%) of the arbitrators' agreement was adopted to amend the items of the scales.

Construct validity

To verify the construct validity of the scales, they were applied to a survey/pilot sample from the study population and from outside its sample, the correlation coefficients between each item and the domain to which it belongs were also calculated on the one hand, and the total score for each Scale on the other hand, The Pearson values were (0.49-0.88) between the items and dimensions of the cognitive agility scale and (0.63-0.91) between the items and the total score of the cognitive agility scale. The Pearson values were (0.57-0.86) between the items and dimensions of the Academic Self-Regulation Scale and (0.48-0.90) between the items and the total score of the Academic Self-Regulation Scale.

Study Limitations

The study was applied to bachelor's degree students at Amman Arab University in the academic year (2023-2024). The study's results remain the psychometric characteristics of the tool used and the possibility of generalizing the results to similar communities**.**

Reliability

The reliability coefficients of the domains of the Cronbach's Alpha Cognitive Agility Scale came in the following order respectively: (Agility of Human Relationships, {0.85}, Agility of Results {0.80}, Mental Agility {0.86}, Agility of Expression {0.79}, Agility of Self-Awareness {0.87}), while the total score of the Scale was (0.90).

The reliability coefficients of the domains of the Cronbach's Alpha Academic Self-Regulation Scale came in the following order respectively: (Self-Planning {0.89}, Self-Monitoring {0.78}, Self-Learning {0.84}, Self-Assessment/Evaluation {0.81}, Self-Reaction {0.76}), while the total score of the Scale was (0.88).

Results and Discussion

Results of the first question: What is The Level of Cognitive Agility among University Students?

To answer this question, the arithmetic means and standard deviations were extracted and Table (1) below shows this**.**

Table (1) arithmetic means and standard deviations

Rank	No.	Domain	M	SD	Level
1	1	Agility of Human Relationships	4.25	.484	High
2	3	Mental Agility	4.15	.487	High
3	5	Agility of Self-Awareness	4.14	.536	High
4	2	Agility of Results	4.07	.542	High
5	4	Agility of Expression	3.99	.719	High
Total			4.12	.434	High

Table (1) shows that the total level of Cognitive Agility among University Students was high, with an *M* (4.12) and *SD* (.434), and this result can be attributed to the fact that students have achieved what educational systems seek to achieve of developing and enhancing students' Cognitive Agility, as indicated by the Elfiel (2020); due to the need of students - especially at the undergraduate level- to control their thoughts, process the knowledge and information that they acquire and receive, exhibit their appropriate expressions and behaviors during their quest for success, and put into practice what they have learned in their working and professional lives. This result was consistent with the results of the studies of (Wadi Hbash {2023}, Hussein & Jabbar {2022}, Abdelaziz {2022}, and Jøsok et al. {2019}), which all indicated the presence of a high level of Cognitive Agility among the target groups in each of them, while it differed with the results of the two studies of (Ajeel {2023}, Sarhan and Al-Kubaisi {2022}), which both showed the existence of an average level of Cognitive Agility of the target groups in each of them.

Table (1) also illustrated that the Arithmetic Averages of all Domains of Cognitive Agility came with high levels, as these Averages ranged between (3.99 and 4.25). The Domain of Agility of Human Relationships came in the first rank with the highest *M* (4.25) and with *SD* (.484). This result can be because students in university life form human relations among themselves that are far more sophisticated than those that they formed during their school stage, and this is necessitated by the educational process itself, during which processes of cooperation and assistance take place among colleagues, and may develop and evolve into long-lasting friendly relationships.

Results of the Second question: Are There Statistically Significant Differences at the (α = 0.05) Level of Significance in the Average Responses of the Study sample about the Level of Cognitive Agility Attributed to The Variables of Gender and Specialization?

To answer this question, the arithmetic means and standard deviations of the Level of Cognitive Agility were extracted according to the variables of the student's Gender and Specialization and Table (2) below illustrates this.

Table (2) arithmetic means and standard deviations according to the variables

Variable	Levels Domains		Agility of Human Relationships	Agility of Results	Mental Agility	Agility of Expression	Agility of Self-Awareness	Total Score
Gender	M	M	4.18	4.02	4.06	3.87	4.01	4.02
		SD	0.59	0.66	0.60	0.82	0.64	0.52
	F	M	4.30	3.62	4.21	4.08	4.23	4.18
		SD	0.39	0.66	0.38	0.63	0.42	0.34
Specialization	Scientific	M	4.35	4.21	4.25	4.16	4.26	4.24
		SD	0.34	0.38	0.38	0.56	0.41	0.29
	Humanities	M	4.17	3.96	4.08	3.87	4.06	4.02
		SD	0.55	0.61	0.54	0.79	0.60	0.49

Table (2) shows apparent differences in the arithmetic means and standard deviations and (MANOVA) test is used to determine the significance of these differences Table (3) below illustrates this

Table (3) Results MANOVA Test

Source of Variance Domains		SS	DF	MS	F	Sig
Gender (0.06) Hotelling (4.014)F Sig (0.200)	Agility of Human Relationships	1.447	1	1.447	6.645	0.010
	Agility of Results	0.823	1	0.823	3.046	0.002
	Mental Agility	1.929	1	1.929	8.817	0.003
	Agility of Expression	4.313	1	4.313	8.943	0.003
	Agility of Self-Awareness	4.649	1	4.649	17.782	0.000
	Total Score	2.430	1	2.430	14.805	0.000
Specialization (0.114) Hotelling F (6.913) Sig (0.000)	Agility of Human Relationships	4.055	1	4.055	18.623	0.000
	Agility of Results	6.579	1	6.579	24.356	0.000
	Mental Agility	3.727	1	3.727	17.038	0.000
	Agility of Expression	8.786	1	8.786	18.215	0.000
	Agility of Self-Awareness	4.765	1	4.765	18.224	0.000
	Total Score	5.409	1	5.409	32.958	0.000
Error	Agility of Human Relationships	66.840	307	0.218		
	Agility of Results	82.932	307	0.270		
	Mental Agility	67.158	307	0.219		
	Agility of Expression	148.074	307	0.482		
	Agility of Self-Awareness	80.269	307	0.261		
	Total Score	50.382	307	0.164		
Corrected Total	Agility of Human Relationships	72.707	310			
	Agility of Results	91.015	310			
	Mental Agility	73.442	310			
	Agility of Expression	160.438	310			
	Agility of Self-Awareness	89.020	310			
	Total Score	58.271	310			

Table (3) shows statistically significant differences at the level of (α= 0.05) attributed to the Gender variable in favor of females. This result may be due to the change in the perception of societies about the equal right of females to education as males, in addition to the nature of females in exhibiting persistence, challenge, perseverance, desire for knowledge, understanding, and self-affirmation, and the performance of the academic tasks required of them with high accuracy and perspicacity to achieve academic success and excellence. Moreover, by tracking the results of the Tawjihi (High School Diploma) Exams in Jordan, we find that females get the top ten ranks or slightly less in the (Literary Stream). A percentage of about (70%) of the top ten in the (Scientific Stream) and such excellence can also be observed in the results of university exams and most university study courses.

This result differs from the results of many previous studies that have been obtained, such as the results of the (Abdelaziz {2022} and Hussein & Jabbar {2022}) studies that have shown that there are no statistically significant differences attributed to the Gender variable, whereas the results of the studies of (Wadi Hbash {2023}, Ajeel {2023}, Sarhan and Al-Kubaisi {2022}) all highlighted the existence of differences, but they were in favor of males.

Table (3) also illustrates statistically significant differences at the level of (α= 0.05) attributed to the Academic Specialization variable in favor of scientific disciplines. Researchers may attribute this result to the nature of the study subjects of scientific disciplines, which are characterized by accuracy, difficulty, and mental effort exertion in dealing with them, which requires high self-efficacy and Cognitive Agility and the use of various strategies to reach solutions to the situations facing students. In addition, students studying scientific disciplines may have a greater interest in scientific cognitive topics, as they may develop a passion and particular interest in scientific discoveries and solving complex problems. This interest and high motivation can lead to investing more significant efforts in developing Cognitive Agility and achieving better results.

The above result was consistent with the result of the study of Sarhan and Al-Kubaisi (2022), which indicated that there were statistically significant differences in the level of Cognitive Agility attributed to the variable of Academic Specialization, and in favor of scientific disciplines while it differed with the results of both studies of (Ajeel {2023} and Abdelaziz {2022}), which did not show the presence of these differences.

Results of the Third question: What is The Level of Academic Self-Regulation among University Students?

To answer this question, the arithmetic means and standard deviations were extracted and Table (4) below shows this.

Table (4) arithmetic means and standard deviations

Rank	No.	Dimension	M	SD	Level
1	1	Self-Planning	4.48	.571	High
2	2	Self-Monitoring	4.45	.622	High
3	5	Self-Reaction	4.07	.844	High
4	3	Self-Learning	4.06	.749	High
5	4	Self- Evaluation	3.45	1.179	High
Total			4.23	.515	High

Table (4) that is related to the results of the Third Question showed that the Level of Total Academic Self-Regulation among University Students was high, with an *M* (4.23) and *SD* (.515). This result may be because university study, achievement, and gaining experience require the student to organize him/herself according to an organized plan, and this corresponds to Zakri (2017) study's definition of Academic Self-Regulation, which is a process through which the learner sets goals and monitors, organizes, and controls his/her learning; and this gives him/her the skill to deal with what he/she may face from educational, psychological, or social problems during his/her studies.

This result is consistent with the study of Jøsok et al. (2019), which found that the level of self-regulation among the members of the study sample was high. However, it differs from the result of the Daradkeh study (2018), which indicated that the level of Academic Self-Regulation among the members of his study sample was average.

It is noted in Table (4) that the Self-Planning Dimension ranked first with *M* (4.48) and *SD* (.571), and with a high level of self-regulation, and this is a natural result that corresponds to the overall result since planning is the building block in all forms of regulation; and through it, any action can be judged in advance whether it will succeed or fail, all in keeping with the famous saying that says, quote: ***"[h]e who fails to plan is planning to fail"***, unquote.

*Results of the Fourth question***:** Are There Statistically Significant Differences at the (α= 0.05) Level of Significance in the Average Responses of the Study sample about Academic Self-Regulation Attributed to The Variables of Gender and Specialization?

To answer this question, the arithmetic means and standard deviations of the level of Academic Self-Regulation were extracted according to the variables of the student's Gender and Specialization and Table. (5) below illustrates this.

Table (5) arithmetic means and standard deviations according to the variables

Variable	Category/Level Domains		Self-Planning	Self-Monitoring	Self-Reaction	Self-Learning	Self-Evaluation	Total Score
Gender	M	M	4.36	4.32	4.01	4.03	3.45	4.15
		SD	0.66	0.71	0.92	0.78	0.73	0.58
	F	M	4.55	4.54	4.10	4.09	3.57	4.29
		SD	0.48	0.53	0.79	0.72	0.79	0.46
Specialization	Scientific	M	4.58	4.51	4.18	4.17	3.64	4.33
		SD	0.53	0.61	0.86	0.77	0.98	0.50
	Humanities	M	4.40	4.41	3.98	3.98	3.30	4.15
		SD	0.58	0.62	0.82	0.71	0.88	0.51

Table (5) shows apparent differences in the arithmetic means and standard deviations and (MANOVA) test is used to determine the significance of these differences as shown in Table (6) below.

Table (6) Results (MANOVA) Test

Source of Variance	Domains	SS	DF	MS	F	Sig
Gender Hotelling (0.04) F (2.937) Sig (0.013)	Self-Planning	3.380	1	3.380	11.006	0.001
	Self-Monitoring	4.058	1	4.058	10.944	0.001
	Self-Reaction	1.082	1	1.082	1.540	0.016
	Self-Learning	0.662	1	0.662	1.193	0.026
	Self-Assessment/Evaluation	0.099	1	0.099	0.072	0.014
	Total Score	1.983	1	1.983	7.881	0.005
Specialization Hotelling (0.063) F (3.77) Sig (0.003)	Self-Planning	3.942	1	3.942	12.835	0.000
	Self-Monitoring	1.657	1	1.657	4.469	0.035
	Self-Reaction	4.336	1	4.336	6.174	0.013
	Self-Learning	2.611	1	2.611	4.704	0.031
	Self- Evaluation	10.546	1	10.546	7.721	0.006
	Total Score	3.505	1	3.505	13.929	0.000
Error	Self-Planning	94.293	307	0.307		
	Self-Monitoring	113.832	307	0.371		
	Self-Reaction	215.629	307	0.702		

Source of Variance	Domains	SS	DF	MS	F	Sig
	Self-Learning	170.420	307	0.555		
	Self- Evaluation	419.324	307	1.366		
	Total Score	77.257	307	0.252		
Corrected Total	Self-Planning	101.064	310			
	Self-Monitoring	119.754	310			
	Self-Reaction	221.071	310			
	Self-Learning	173.732	310			
	Self- Evaluation	430.910	310			
	Total Score	82.314	310			

Table (6) shows that there are statistically significant differences among the Arithmetic Averages of the responses of the study sample members at the level of Academic Self-Regulation according to different Gender and Specialization variables in all domains and on the total score by returning to Table (6), we find that the difference is in favor of females and favor of scientific discipline.

Results of the Fifth question: What is The Predictive Ability of the Level of Academic Self-Regulation and Cognitive Agility among University Students?

To answer this question, Pearson correlation coefficients were extracted and Table. (7) below illustrates this.

Table (7) Pearson Correlation Coefficient

		Cognitive Agility Scale
Self-Planning	Correlation Coefficient (r)	.631(**)
	Statistical Significance	.000
	Number	311
Self-Monitoring	Correlation Coefficient (r)	.553(**)
	Statistical Significance	.000
	Number	311
Self-Learning	Correlation Coefficient (r)	.472(**)
	Statistical Significance	.000
	Number	311
Self-Assessment/Evaluation	Correlation Coefficient (r)	.090
	Statistical Significance	.112
	Number	311
Self-Reaction	Correlation Coefficient	270(**)0.
	Statistical Significance	0.000
	Number	311
Academic Self-Regulation	Correlation Coefficient (r)	614 (**)0.
	Statistical Significance	.000
	Number	311

Table. (7) Shows a statistically significant positive relationship between the level of Cognitive Agility and each (Self-Planning et al.). To test the suitability of the data, the (Durbin-Watson) Coefficient was extracted, which amounted to (1.89), which is close to (2), indicating the independence of errors.

To reveal the Predictive Ability of Academic Self-Regulation with Cognitive Agility among University Students, multiple linear regression analysis Table (8) below illustrates this.

Table (8) Results Multiple Linear Regression

Predictive Variables	Multiple Correlation Coefficient (R)	Cumulative Proportion of Variance Explained (R^2)	How Much the Variable Adds to the Total Explained (R^2) Variance	Regression Coefficient (B) nt	Value (F)	Value (t)	Regression Constant	Statistical Significance
Self-Planning	.631	.399	0.397	.479	204.768	14.310	1.970	.000
Self-Monitoring	.669	.447	0.444	.192	124.701	5.219	1.671	.000
Self-Learning	.686	.4700	0.465	.159	90.882	3.646	1.587	.000

The Dependent Variable: The Cognitive Agility Scale

It is clear from Table. (8) that the variables involved in predicting the Cognitive Agility Scale are (Self-Planning et al.), which together explained (47.8%) of the variance's explanation of the Cognitive Agility Scale, and the Self-Learning Variable was the most able to predict the Cognitive Agility Scale; as it explained (47%) of the variance, and it was followed by the Self-Monitoring Variable, which explained (44.7%) of the variance, and the Self-Planning Variable, which explained (39.9%) of the variance. The Percentage of Variance added to these Variables was statistically significant at the significance level of (α= 0.05). The Variables of (Self-Assessment/Evaluation and Self-Reaction) did not enter into the prediction of the Cognitive Agility Scale, given that the Explained Variance added by them is not statistically significant at the level of significance of (α= 0.05).

It is also clear from Table (8) that the increase of the Self-Planning Variable by a Standard/Normative Unit (Standard Deviation) increases the Scale of Cognitive Agility by an amount of (.479) of the standard/normative unit and that the increase of the Self-Monitoring Variable by a standard/normative unit (Standard Deviation) increases the Scale of Cognitive Agility by (.192) of the standard/normative unit, and that the increase of the Self-Learning Variable by a standard/normative unit (Standard Deviation) decreases the Scale of Cognitive Agility by (.159) of the standard/normative unit.

Researchers may attribute this result to the fact that Cognitive Agility expresses the individual's ability to adapt his/her response whenever the situation requires it and that the emergence of Cognitive Agility is due to the individual's awareness of the options and alternatives available in the situation that he/she finds themselves in, and to his/her desire to be agile, and to his/her ability to organize him/herself more agilely and more gracefully, and this is consistent with what Ajeel and Saleh (2024) study pointed out to when it stated that Cognitive Agility is a mental structure for the learner that enables him/her to open up mentally flexibly and quickly, allowing him/her to apply all the knowledge, skills, and abilities required in dynamic contexts in response to environmental changes surrounding him/her according to the three Dimensions of Agility: (Cognitive Openness, Cognitive Flexibility, Concentration/Focus of Attention).

This is also in agreement with what the Hutton et al. (2020) study alluded to when it indicated that metacognitive skills such as the ability to self-reflection, critical thinking, and self-regulation contribute to improving the level of Cognitive Agility.

The result of this study is consistent with the result of the study of Jøsok et al., 2019, which mentioned that there is a statistically significant positive relationship between the Level of Cognitive Agility and Self-Regulation. This means that Self-Regulation explains (43.1%) the Level of Cognitive Agility in the study sample and also contributes to improving the level of Cognitive Agility in the study sample.

Ethics statement:

This study was conducted on undergraduate students at Amman Arab University in Jordan, to which most of the researchers belong. The questionnaire was sent to students from the university's colleges according to the approved

procedures. In order to adhere to the rules and ethics of scientific research, participants were not asked to provide personal information such as email, phone number, name, or address. Additionally, there were no costs for the participants, and they did not receive any compensation for their participation in answering the questionnaire items.

CONCLUSION

The transition from the school learning stage to the university stage is a tremendous qualitative process, as it brings intellectual and psychological changes in the learner's life. It adds opportunities for personal growth and academic learning when the student enters the University brimming with hopes, perceptions, and ambitions that he/she aspires to achieve so that his/her future working life will be more prosperous. Therefore, he/she needs to plan his/her university life and organize his/her academic education. One of the main objectives of the current study is to pinpoint the Predictive Ability of the Level of Academic Self-Regulation with Cognitive Agility among Undergraduate Students at Amman Arab University in Jordan. Cognitive Agility and Academic Self-Regulation Scales were used to collect data from students.

The results showed the following:

- A high level of Cognitive Agility and Academic Self-Regulation among students
- The existence of statistically significant differences in the level of Cognitive Agility is attributed to two Variables: (Gender, which is in favor of females, and Academic Specialization, which is in favor of scientific disciplines).
- The Academic Self-Regulation explained (47%) of the Explained Variance of the Cognitive Agility Scale.

Despite the high level of Cognitive Agility and Academic Self-Regulation, universities are still required to intensify efforts to increase this level through awareness-raising activities and programs to ensure students' participation in the planning, implementation, and evaluation processes.

Study Recommendations

In light of the results of the current study, the researchers recommend the following:

Seminars, lectures, workshops, and awareness guidance programs specialized in the subject represent the necessity of continuity in the development of the level of cognitive Agility among university students through university activities.

-Developing Students' Academic Self-Regulation Skills, given their importance in explaining most of the variance in the Level of Cognitive Agility, by enhancing these skills through workshops and training programs to train students to organize their time and resources more effectively.

-Promoting awareness of the importance of Academic Self-Regulation and its impact on Cognitive Agility through workshops or seminars for University Students to teach them strategies and tools of self-regulation, including (Goal Setting, Time Management, and Resources Organization)**.**

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