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Cognitive and metacognitive strategies, and academic buoyancy: Effects and analysis

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***Abstract*---**The present study was devised and implemented to examine the comparison of the effectiveness of teaching cognitive learning strategies and metacognitive learning strategies on the Academic Buoyancy of students in Tehran in the academic year 2020-2021. The present study was a quasi-experiment with a pre-test/post-test design using therein control and intervention groups and follow-up examinations. Research subjects were selected using random sampling. As such, one of the universities was first randomly selected, from which three classrooms were randomly selected. From the selected classrooms, 30 students were randomly selected based on the pre-determined inclusion and exclusion criteria and hence assigned to Groups of Intervention 1, Intervention 2, and Control. First, the pre-test measurements were performed for all three groups, then one intervention group received instructions on cognitive learning strategies, and the other intervention group was taught metacognitive learning strategies. After the completion of interventions, post-test measurements were taken from all three groups. The inventory used in the research was the academic buoyancy scale of Martin and Marsh (2008). Split-plot ANOVA design was used to analyze the data. The findings from comparing the mean scores of pre-tests and post-tests of the three groups indicated that the academic buoyancy of students increased after the intervention, and the improvement were shown to be consistent in the one-month follow-up examinations.

***Keywords*---**academic buoyancy, cognitive learning strategies, metacognitive learning strategies.

Introduction

Among the highly sought-after notions within the modern education sphere is self-regulated learning (Schunk and Zimmerman, 1989). In the last decade, the main purpose of higher education has gradually shifted from familiarizing students with a particular field to nurturing feedback and independent learning (Duchy, 2001; cited by Clerk, Galland, & Fernay, 2013). Self-regulation has valuable outcomes in the process of learning, teaching, and even for the success of life. Adaptability and successfulness in school performance require that students develop and reinforce their cognition, emotions, or behaviors by developing self-regulation or similar processes so that they can achieve their goals (Schunk and Zimmerman, 1989). Schunk (2005) defines self-regulation as the ability of students to gain control of physical functions, to manage emotions, and to maintain attention and concentration, arguing that self-regulation development is the basis of early childhood development, the effects of which can be tracked in all aspects of behavior.

Academic buoyancy is a structure that falls into the realm of positivist psychology from an evaluative point of view. Instead of focusing on the risk of trauma, buoyancy research is rather devoted to the ability of students to deal with conflicts, everyday academic challenges such as low grades, and the pressures of exams and quizzes (Martin and Marsh, 2008). Unsuccessful return of students to good grades and appropriate performance in the educational environment was the main grounds for examining academic buoyancy as the main research variable. Academic buoyancy is a factor that can be controlled by the teacher in educational settings and can enhance the quality of education offered to the students, hence the significance. Martin (2009) defines academic buoyancy as a term used to describe students' ability to return successfully after academic difficulties and failures, which is improved by aspects such as self-efficacy, commitment, and control. Findings from various studies (e.g., Alexi and Paraskieva, 2013; Abolghasemi et al., 2014) show that teaching self-regulation learning strategies increase the self-efficacy and motivation of students. Moreover, Mostafa Sarbaz et al. (2014) reported that students with higher academic setbacks have lower self-regulated strategies. Gholami Lavasani et al. (2011) further evidenced that teaching a self-regulated learning strategy has a significant effect on the academic motivation of students. The results of several studies also show that lower levels of self-regulation learning strategies are associated with higher levels of academic setbacks (Zahed et al., 2012).

Given that the theory of self-regulation learning strategies can offer a solid theoretical basis for examining the efforts of students to succeed in learning environments (Bianca, 2013) and since self-regulation processes are often deemed good predictors of the success of students in their academic performance (Zimmerman, 2015) and also considering the role that students have in such processes, gaining insight to self-regulation learning strategies and cognitive styles of students is of paramount importance in alleviating any potential obstacle

to effective education (Soleimannejad and Hosseini Nasab, 2012). Therefore, university professors should employ cognitive and metacognitive learning strategies to provide effective education for students on the one hand, and on the other hand, shift the negative attitude towards their own abilities and also gain faith in alleviating academic challenges to prevent its irreversible effec3ts on various physical, cognitive, social aspects of learners and to create the optimal context for reinforcing students with positivist approaches. This would, in turn, have valuable implications for students ready to enter the labor pool.

Research has extensively evidenced that cognitive and metacognitive self-regulation learning strategies have beneficial effects on the education and social life of students. Nevertheless, no research thus far has sought to compare the effectiveness of cognitive and metacognitive learning strategies on the academic buoyancy of students. Therefore, ignoring the effect of teaching these skills on the variables under study can be a gap in the research literature, and hence the present study sought to answer the question of whether teaching cognitive and metacognitive self-regulation learning strategies can have a significant effect on academic buoyancy or not. Furthermore, the study sought to compare the features and efficacy of cognitive and metacognitive learning strategies on research variables. The findings of this study have two short-term and long-term implications. The short-term implication requires the authorities to realize the effect of teaching cognitive and metacognitive self-regulation learning strategies on academic buoyancy and take the necessary measures to improve. The long-term implications enable the development of vibrant and energetic students who are then able to face the overwhelming breadth of the challenges of the modern era.

Theoretical foundations of research

Recently, the concept of self-regulation has garnered a great deal of academic attention in the realms of psychology and education. To this end, several programs have been developed in recent years to teach educate students on self-regulation. One of the highly successful programs of self-regulation education is cognitive-behavioral change, defined as changing explicit behavior by manipulating one's implicit thought processes (Agen and Kavchak, 2001, cited by Seif, 2016). With the advent of psychology, the concept of willpower became an important part of psychological theories and provided the basis for the development of the notion of self-regulation.

In self-regulation training programs based on cognitive-behavioral change, the learner is taught the four skills of goal-setting, self-monitoring, self-assessment, and self-reward. Moreover, self-regulation learning strategies are among the most effective strategies employed in educational processes (Mahdian Amrayi, 2012). These strategies are perceived to reduce anxiety and increase self-efficacy, the latter of which has been evidenced to be correlated with goal achievement and academic achievement. The positive effects of self-regulation strategies have been proven in all fields of academic endeavors (Cobb, 2003, quoted in Shirazi, 2010).
Education professionals have offered various classifications of self-regulated learning strategies; But in general, self-regulation learning strategies are mostly classified into the following four categories:

- Cognitive strategies
- Metacognitive strategies
- Resource management strategies
- Motivational strategies

Cognitive strategies are measured by which new information is constantly extracted and hence employed to link and combine with previously learned information, altering the long-term memory in the aftermath (Seif, 2008). In other words, cognitive strategies refer to the solutions through which the learner can learn, memorize, recall and comprehend (Kajbaf et al., 2008, cited by Shirazi, 2010). In contrast, metacognitive strategies are measures employed to monitor, control, and guide cognitive strategies. Comparing these two strategies with each other, Fiaveil (1979, cited by Seif, 2012) states that skilled learners employ cognitive strategies to achieve cognitive development, while they use metacognitive strategies to monitor that progress and have control thereon. Metacognitive knowledge helps a person to monitor their progress as they learn and know things, to evaluate the results of their efforts, and to measure their proficiency on what they have learned. Pintrich (2002) identifies two general aspects of metacognition, namely knowledge about cognition and self-regulation of cognition.

Academic buoyancy is a term coined by Dr. Martin to refer to the capacity of a student to return to academic achievement after suffering from setbacks; itself reinforced with factors such as self-efficacy, commitment, and control. Somewhere else, Martin and Marsh (2009) have employed the term Academic buoyancy to refer to the student's ability to successfully overcome problems and challenges that are specific to the normal course of daily academic life (such as poor performance, setting deadlines, and competition, doing assignments and homework). Also, the life cycle of academic buoyancy is multidimensional in nature and consists of 4 levels.

- Level of cognitive adaptation consisting of low-level motivational structures (self-efficacy, evaluation, and proficiency goals).
- Level of behavioral adaptation that includes self-regulation, consistency in doing homework, and management of assignments.
- Level of cognitive incompatibility that includes lower levels of emotional and motivational constructs of anxiety, failure avoidance, and uncertain control.
- Level of behavioral maladaptation that includes lower structures associated with failure in self-regulation, self-disability, and lack of academic motivation.

Martin and Marsh (2008) first introduced buoyancy as a necessary but not sufficient condition for academic resilience of students experiencing life-threatening problems and hence altered it to be exclusive to the students' ability to cope with less challenging environments. As such, they considered academic buoyancy as a result of dealing with psychological risk and vice versa. In addition to introducing the five predictors of academic buoyancy, i.e., the 5Cs, Martin and Marsh (2008) concluded that academic buoyancy predicts school enjoyment, class attendance, and general self-esteem. In general, the corresponding literature

indicated that family communication patterns play an important role in adjustment, adaptation and resilience, and attainment of students. Moreover, family communication patterns, especially effective communication between parents and students, have been shown to increase the self-efficacy of students and reflect their effective attitude towards academic tasks and challenges (Lent, 1997).

Research Method

The present study was a quasi-experiment with pre-test and post-test design and control and follow-up groups. The study population included students studying in the universities of Tehran in 2021. Research subjects were selected using random sampling. As such, one of the universities was first randomly selected, from which three classrooms were randomly selected. From the selected classrooms, 30 students were randomly selected based on the pre-determined inclusion and exclusion criteria and hence assigned to Groups of Intervention 1, Intervention 2, and Control. The first group was taught cognitive learning strategies, and the second group was educated on metacognitive learning strategies for eight virtual sessions using Skype. However, the control group received no intervention, and post-test measurements were recorded from all three groups. The follow-up analysis was performed one month after the completion of the post-test phase. Finally, the data were analyzed using SPSS and mixed ANOVA.

The Academic Buoyancy Scale was used to collect the data in this study. It was developed by Martin and Marsh (2008), has four items on a self-report basis, and is scored on the seven-point Likert scale, that is, from “Strongly Agree” to “Strongly Disagree.” The reliability obtained by Cronbach's alpha coefficient was reported to be 0.8, while its validity was confirmed using CFA, with items 1-4 respectively measured at 0.66, 0.67, 0.73, and 0.75. The reliability of the Persian edition was calculated to 0.87 for the whole scale using Cronbach's alpha coefficient, and its validity through criterion validity using correlation with Pintrich educational questionnaire was 0.568. moreover, Cronbach's alpha for the learning factor was reported to be 0.82, 0.73 for the performance factor, and 0.75 for the failure avoidance factor.

Content of the training sessions for cognitive learning strategies
Session 1

In the first session, the students were initially appreciated for their participation in the training course on cognitive learning strategies, after which they were informed regarding the purpose of the research and its contributive significance, the important role of research samples in research, and the importance of accuracy and correctness of their opinions. In the following, the effect of teaching cognitive learning strategies on academic buoyancy, goal orientation, and academic motivation, and the potential implications of this research and its variables for students were discussed. Also, the time of weekly meetings, their frequency, and other details were outlined. Then, students are then asked to briefly introduce and are briefly acquainted with the concept of learning, types of memory and its structure, the causes of forgetfulness, as well as the concept of self-regulated learning and its importance. It should be noted that before the start

of the session, students were incentivized to attract their attention; The subject of education and its relationship with the realities of lives of students and the effect of education on their academic success was also explained.

Session 2

In this session, cognitive strategies were defined, and various types of cognitive strategies, including repetition and rehearsal, expansion, and organization, were discussed.
Goals

- Students should be able to define repetition and rehearsal and offer examples therefor.
- Get acquainted with different strategies of repetition and mental review, including asking oneself questions, underlining important topics, and practicing through repeating and retelling content.
- Students should be able to identify appropriate repetition and mental review strategies while reading and use them to read their textbooks.

Session 3

At the beginning of the session, a review of the contents of the previous session.
Goals

- Getting information on the advantages of repetition and mental review.
- Be able to evaluate the repetition and mental review strategies using a track sheet form and record his / her opinion.

Session 4
Goals:

- Students should be able to define the development strategy and offer examples thereof.
- Get acquainted with various development strategies, including giving examples, making connections between new and old content, thinking about content, and building a mental image.
- Be able to identify appropriate development strategies while reading and employ them to navigate through their textbooks.
- Be able to evaluate the development strategies using a track sheet form and record his / her opinion.

Session 5

In this session, the students were informed on how to apply the offered instructive content to solve problems and to describe and analyze the relationships established from the previous sessions. Finally, various assignments were handed out to the students for the next session.

Session 6

Likewise, in this session, the students were informed on how to apply the offered instructive content to solve problems and to describe and analyze the relationships established from the previous sessions. Then, various assignments were handed out to the students for the next session.

Session 7

In this session, the analogy was taught in the manner of previous sessions. Then, assignments were handed out to the students for the next session

Session 8

In this session, first, the assignments from the previous sessions were reviewed, and the contents taught in the previous sessions were reviewed.

Content of the training sessions for metacognitive learning strategies

Session 1

In the first session, the students were first cherished for their participation in the training course on metacognitive learning strategies, after which they were informed regarding the purpose of the research and its contributive significance, the important role of research samples in research, and the importance of accuracy and correctness of their opinions

Session 2

Goals

- Students should be able to define the organization and give examples for it.
- Receiving information on various organizing strategies, including categorizing information, indexing content, preparing the titles of a textbook, turning text into a conceptual design or map, among others.

Session 3

At the start of the session. The assignments handed out to the students on organizing were reviewed, and the collective opinions regarding the effects of applying organizing strategies on learning were reviewed.

Goals:

- Students should be able to identify appropriate organizing strategies while reading and employ them while navigating through textbooks.
- Be able to evaluate the organizational strategies using a track sheet form and record his / her opinion.

Session 4

Before administering the contents of this session, the assignments from the previous session on organizing were reviewed. Next, the method of organization was first outlined as the most complete and best study strategy, and hence

information organization and its positive effect on long-term memory and recall were discussed. A variety of organizing strategies were also discussed, including categorizing information, indexing content, preparing the titles of a textbook, translating the text into a conceptual plan and roadmap, among others were. Moreover, students were instructed on how to apply these strategies in their textbooks. In the end, students were given key points and practical tips, as well as assignments on organizing strategies. Ultimately, cognitive strategies were summarized at the end of the session.

Session 5
Goals:

- Students should be able to define planning and give examples, therefore.
- Getting acquainted with different planning strategies, including determining the purpose of the study, brief review before reading the text, asking questions before reading the text, predicting the time required for reading, determining the reading pace, and choosing the appropriate learning strategy.
- Students should be able to identify appropriate planning strategies while reading and apply them while reading their textbooks.
- Be able to evaluate the planning strategies used and record their opinion.

Session 6

Planning strategies (for pre-study preparation) were defined, and students were instructed on a roadmap on different planning strategies, hence a clear picture of these strategies. In the following, different planning strategies, including determining the purpose of the study, brief review before reading the text, asking questions before reading the text, predicting the time required for reading, determining the reading pace, and choosing the appropriate learning strategy were explained. In the end, students were asked to evaluate the application of previous strategies as well as planning strategies and write down their opinions in this regard.

Session 7
Goals:

- Students should be able to define control and supervision and give examples of it.
- Receiving information on various control and monitoring strategies, including evaluation of progress, monitoring attention and comprehension, asking questions while studying and self-assessing, controlling the time and speed of reading and predicting sample questions in the exam.
- Be able to identify appropriate planning strategies while reading and apply them while navigating through textbooks.
- Be able to evaluate the monitoring and control strategies used and record his / her opinion.

In this session, assignments regarding the self-assessment were reviewed, and the strengths and weaknesses of the students were reinforced by the instructor. Then training on control and monitoring strategies then began.

Session 8

In this session, first, the assignments related to the control and monitoring strategies of the students were reviewed, and the regulatory strategies, including the stable metacognitive adaptations and the improvements by the learner following the feedback on errors, were outlined. Finally, the offered contents were summarized and hence reviewed.
One week after the end of the intervention, post-test measurements were performed on all three research groups, while follow-up scores were measured one month after the completion of interventions using the academic buoyancy scale.

Results

Descriptive findings

Table 1
Statistical description of scores of academic buoyancy in three stages of measurement by group

Variable	Group	Stage	Mean	SD
Academic buoyancy	Control	Pre-test	13.50	3.629
		Post-test	14.20	3.393
		Control	14	3.528
	Cognitive learning strategy	Pre-test	12.40	5.441
		Post-test	21	3.464
		Control	20.20	3.190
	Meta-cognitive learning strategy	Pre-test	13	4.055
		Post-test	22.90	2.378
		Control	23.70	2.163

Table 1 illustrates the descriptive statistics corresponding to the mean and standard deviation of scores on Academic buoyancy for the control, cognitive learning strategy, and metacognitive learning strategy groups, in three stages of assessment, that is, pre-test, post-test, and follow-up. The findings indicate that there was no statistically significant difference between the pre-test mean scores of the control group with those of the post-test and follow-up stages, while there was a significant increase in the post-test and follow-up scores of academic buoyancy compared to those of the pre-test.

Normality of the data

	Pre-test		Post-test		Follow-up	
Variable	Kolmogorov Smirnov	Sig. level	Kolmogorov Smirnov	Sig. level	Kolmogorov Smirnov	Sig. level
Academic	0.130	0.642	0.152	0.448	0.143	0.527

buoyancy

Table 2 presents the results of the Kolmogorov-Smirnov test for checking the normality of the distribution of pre-test, post-test, and follow-up scores. The results from the table indicate that the level of significance of the calculated statistics for all variables is greater than 0.05, hence confirming the normal distribution of scores.

Comparison of the effectiveness of teaching cognitive and metacognitive learning strategies on the academic buoyancy of students

The results revealed that there is a difference between the effectiveness of teaching cognitive and metacognitive learning strategies on the academic buoyancy of the students. Two-way repeated-measures ANOVA was used to compare the effectiveness of teaching cognitive and metacognitive learning strategies on the academic buoyancy of students. Based on the findings, the significance level of the Box's M test was calculated to be 0.076, and since this value is greater than the significance level (0.05) required to reject the null hypothesis, the null hypothesis, that is, the assumption of homoscedasticity is confirmed.

Table 3
Results of Levene's test for equality of variances

Variable	F	DOF 1	DOF 2	Sig. level
Pre-test academic buoyancy	0.861	2	27	0.434
Post-test academic buoyancy	0.302	2	27	0.742
Follow-up academic buoyancy	0.407	2	27	0.670

Since the values of Levene's test are not significant, the null hypothesis of homogeneity of variance is confirmed.

Table 4
Test results for multivariate within-subject effects for comparison of academic buoyancy of control and intervention groups

Effect		Value	F	DOF of effect	DOF residuals	Sig. level of	Effect size
Repeat	Pillai's trace	0.865	83.228	2	26	0.001	0.865
	Wilks Lambda	0.135	83.228	2	26	0.001	0.865
	Hotelling's Trace	6.402	83.228	2	26	0.001	0.865
	Roy's Largest Root	6.402	83.228	2	26	0.001	0.865
Repeat * Group	Pillai's trace	0.923	11.560	4	54	0.001	0.461
	Wilks Lambda	0.218	14.845	4	52	0.001	0.533
	Hotelling's Trace	2.943	18.395	4	50	0.001	0.595
	Roy's Largest Root	2.705	36.514	2	27	0.001	0.730

Table 4 presents the results of multivariate tests for examining the difference between the mean scores of academic buoyancy of control groups cognitive and metacognitive learning strategies during the treatment process. Results clearly indicate that the values corresponding to all tests are significant, hence indicating the existence of the repetition factor (pre-test, post-test, and follow-up) as well as the interactive effect between groups and repetition (corresponding to the difference between groups during the measurement process).

Table 5
Test results for univariate within-subject effects for comparison of academic buoyancy of control and intervention groups

Source	Independent variable		Sum of squares	DOF	Mean of squares	**F**	Sig. level	Effect size
Repeat	Interval motivation	Sphericity assumed	810.756	2	405.378	143.262	0.001	0.841
		Greenhouse–Geisser correction	810.756	1.362	595.217	143.262	0.001	0.841
		Huynd-Feldt correction	810.756	1.516	534.847	143.262	0.001	0.841
		Lower bound	810.756	1	810.756	143.262	0.001	0.841
Repeat * Group	Interval motivation	Sphericity assumed	353.778	4	88.444	31.257	0.001	0.698
		Greenhouse–Geisser correction	353.778	2.724	129.863	31.257	0.001	0.698
		Huynd-Feldt correction	353.778	3.032	116.692	31.257	0.001	0.698
		Lower bound	353.778	2	176.889	31.257	0.001	0.698
Residual	Interval motivation	Sphericity assumed	152.800	54	2.830			
		Greenhouse–Geisser correction	152.800	36.777	4.155			
		Huynd-Feldt correction	152.800	40.928	3.733			
		Lower bound	152.800	27	5.659			

Table 5 shows the Test results for univariate within-subject effects for comparison of academic buoyancy of control and intervention groups. It is evident from the table that the F values related to the interactive effects between groups and repetition (that is, the existence of differences between groups during the measurement stages) are significant at the alpha level of 0.01 ($p < 0.01$). The significance of the interactive effects indicates the difference between the pace of changes in academic buoyancy scores of control cognitive and metacognitive learning strategies groups during the measurement stages. In order to compare the paired mean scores during the measurement stages, the Bonferroni post hoc test was used, the results of which are presented below.

Table 6
Bonferroni post hoc test

Group	Dependent variable	Stage	Stage	Differences of mean	Standard error	Sig. level
Control	Academic buoyancy	Pre-test	Post-test	-0.700	0.851	1
			Follow-up	-0.500	0.891	1
		Post-test	Follow-up	0.200	0.425	1
Cognitive learning strategies	Academic buoyancy	Pre-test	Post-test	-8.600	0.851	0.001
			Follow-up	-7.800	0.891	0.001
		Post-test	Follow-up	0.800	0.425	0.212
Meta-cognitive learning strategies	Academic buoyancy	Pre-test	Post-test	-9.900	0.851	0.001
			Follow-up	-10.700	0.891	0.001
		Post-test	Follow-up	-0.800	0.425	0.212

Table 6 provides pairwise comparisons to examine the differences between academic buoyancy scores during the intervention phase for control, cognitive and metacognitive groups. The findings from both intervention groups revealed that there is a statistically significant difference between the mean scores of pre-test stage and post-test and follow-up stages ($p < 0.01$). In the post-test and follow-up stages, it has increased significantly compared to the pre-test stage. The difference between the post-test stage scores and the follow-up stage scores was not significant ($p < 0.05$), indicating the constancy of intervention effects over time. Moreover, the difference between the scores of the pre-test stage with the post-test and follow-up stages for the control group and also the difference between the scores of the post-test stage and the follow-up scores were not significant ($p < 0.05$).

Table 7
Results of between-groups effects to compare the mean scores of academic buoyancy groups

Source of change	Sum of squares	DOF	Mean squares	F	Sig. level
Group	553.356	2	276.678	8.410	0.001
Error	888.300	27	32.900		

Table 7 presents the results of the between-subject effects for studying the mean scores for academic buoyancy for control, cognitive and metacognitive learning

groups. Based on the results, the F-value for the variable of academic buoyancy is significant (P <0.01).

Table 8
Results of Bonferroni Test

Dependent variable	Group 1	Group 2	Mean difference	Standard error	Sig. level
Academic buoyancy	Control	Cognitive strategy	-3.967	1.481	0.037
		Metacognitive strategy	-5.967	1.481	0.001
	Cognitive strategy	Metacognitive strategy	-2	1.481	0.564

Table 8 shows pairwise comparisons for the mean scores of academic buoyancy of control, cognitive and metacognitive learning groups. Based on the results, the difference between the mean scores of academic buoyancy in the groups of cognitive strategy and metacognitive strategy with the control group is significant (p <0.05).

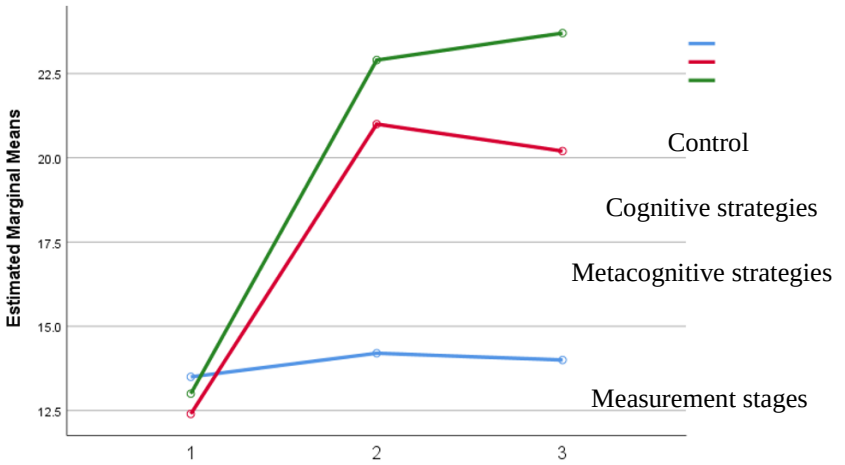

Figure 1. Mean scores of academic buoyancy in three measurement stages by group

Figure 1 plots the mean score for academic buoyancy in three measurement phases (pre-test, post-test, and follow-up) separately for groups of control, cognitive learning intervention, and metacognitive learning intervention. The findings indicated that the mean scores of both groups of cognitive and metacognitive learning strategies increased following the intervention.

Discussion and Conclusion

Findings showed that there is a difference between the effectiveness of teaching cognitive and metacognitive learning strategies on the academic buoyancy of

students. In order to compare the effectiveness of teaching cognitive and metacognitive learning strategies on students' academic buoyancy, Two-Way Repeated-Measures ANOVA was used. Based on the results obtained from the cognitive and metacognitive intervention groups, there were statistically significant differences between the mean scores of the pre-test stage and the post-test and follow-up stages. That is, the mean scores for academic buoyancy in the post-test and follow-up stages have increased significantly compared to those of the pre-test stage. Furthermore, the findings revealed that the difference between the post-test stage scores and those of the follow-up stage scores was not significant, thus indicating the stability of the effects of intervention over time. Ultimately, the difference between the scores of the pre-test stage with the post-test and follow-up stages for the control group and also the difference between the scores of the post-test stage and the scores of the follow-up phase was not statistically significant.

To test the within-group consistency, the average academic scores of controls cognitive and metacognitive intervention groups were examined using. Based on the results, the variable of academic buoyancy had a proper consistency. The findings on the mutual effects between groups and repeatability of the test (i.e., the existence of differences between groups during the measurement steps) are significant at the alpha level of 0.01. The significance of interactive effects indicates the difference between the trend of changes in academic buoyancy scores of groups of control cognitive and metacognitive intervention during the measurement stages. That is, the mean scores of academic buoyancy in both groups of cognitive and metacognitive learning strategies have increased during the intervention process.

Considering the effectiveness of teaching cognitive and metacognitive learning strategies, health psychology counseling centers are advised to employ the corresponding procedures to improve and enhance the quality of academic materials. Given that this research has been conducted on students, the results should be extended to other communities with caution. Finally, in order to increase the background of studies in this field, it is suggested to conduct research in the field of comparing these two educational approaches on other components of psychological variables and compare the results with the results of this research.

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