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Abstract

The aim of this research is to determine the structural relationship pattern between rehearsal, elaboration, organization and critical thinking strategies and academic achievement. 414 university students attending a public university in Istanbul participated in the study. As a data collection tool, “Motivated Strategies for Learning Questionnaire” was applied to the participants. Academic achievement scores of the students were determined by the English Proficiency Exam (EPE) conducted by the institution. The data obtained from the study were analysed through Structural Equation Modelling (SEM) and by using AMOS 22.0 statistical software program. Findings revealed that rehearsal and elaboration strategies did not predict academic achievement in a meaningful way. On the other hand, critical thinking and organizational strategies were found to be statistically significant in predicting academic achievement. In addition, the results demonstrated that there was a statistically significant and positive relationship between rehearsal, elaboration, organization and critical thinking strategies.

Introduction

The fact that individuals’ talents, skills and competencies alone cannot be sufficient in explaining their academic achievements, has led to the emergence of self-regulated learning, which focuses on the view that self-regulation skills and motivation levels are of great importance (Schunk, 2005). It is claimed that the concept of learning includes cognitive and affective processes and is influenced by a number of social factors. This situation brings together the necessity of individuals to be able to regulate their cognition, motivation and emotions on their own and to be willing to adopt and use self-regulated behaviours to facilitate learning processes (Boekarts, 2010).

Since self-regulated learning includes cognitive, meta-cognitive, behavioural, motivational and affective characteristics of learning (Moldesheva & Mahmood, 2014; Zimmerman & Schunk, 2011), it encompasses a large number of variables (self-efficacy, anxiety, elaboration, rehearsal, cognitive strategies, etc.) in a comprehensive and holistic approach. Self-regulated learning has a central role in human behaviour, including academic achievement and school learning (Panadero, 2017). A large number of literature studies (Alivernini et al., 2019; Azevedo et al., 2004; Harding et al., 2019; Kauffman, 2004), which argue that it positively affects academic achievement emphasizes the idea that it is closely connected to the concept of self-regulation and that

this skill can be acquired through personal effort (Lindner, 1998).

Pintrich (2000) describes self-regulated learning as a process in which individuals set goals for their own learning. Experiences that follow this process include active and constructive work aimed at monitoring, regulating and controlling cognitive processes, motivation levels and behaviours guided by the set goals. In other words, self-regulatory processes help individuals reach their optimum, emotional, behavioural and cognitive potentials based on their feedback from various lives (Cambridge-Williams et al., 2013). The description of self-regulated learning described by Pintrich (2000) finds its equivalent in the three-stage cyclical model proposed by Zimmerman (2002): “forethought, performance and self-reflection”.

In the foresight phase, individuals plan their strategies to analyse and complete a learning task as well as associating emotional states such as goal orientations and intrinsic motivation with anticipated learning outcomes. In other words, the task faced at this stage is analysed, goals are identified and necessary plans are carried out on how to reach them. In the performance stage, individuals fulfil the task in question and during this process, pre-determined learning strategies are employed and how the development progress is observed. In the self-reflection phase, individuals identify and evaluate the possible causes and contributions of their success or failure, as well as their performance, efforts and effective strategy use skills. Put it differently, how the task is performed is examined. The data obtained in the self-reflection phase also determines how individuals will approach the tasks they may encounter in the future, and their motivation as well as their learning behaviours in the self-regulation cycle affects their future lives in positive or negative ways (Liu et al., 2019; Panadero, 2017).

When certain self-regulated learning models are compared, it is seen that each model bases its self-regulatory processes on similar basic assumptions. According to van Den Hurk (2006), the first of these common assumptions is that individuals are constructive and active contributors in their learning processes. Accordingly, individuals create their own meanings, targets and techniques based on their internal or external knowledge. Another assumption is that students have the ability to monitor and manage the characteristics of their own cognition, motivation, behaviour and learning environments. In this sense, those who have a high level of self-regulation skills exhibit better performance in effective goal setting, employing learning strategies, observing and evaluating the progress towards the goal, getting help when needed, displaying more effort and patience for learning, and setting new targets when previous goals are achieved (Ellis & Helaire, 2018). Individuals with self-regulation skills are aware of what their strengths are and what they need to improve their weaknesses along with following individually set goals and the strategies they develop for it. When necessary, they change their studying strategies, observe their behaviour towards the goals, and try to evaluate their level of development (Langley & Bart, 2008).

Learning strategies, which are seen as an indispensable component of self-regulated learning, are concepts that explain how students acquire knowledge (Alivernini et al., 2019; Richardson et al., 2012; Zimmerman, 2008). Accordingly, learning strategies include various cognitive processes and behavioural skills that determine how information is acquired, stored and recalled in the learning process (Moldesheva & Mahmood, 2014). In another word, learning strategies are related to the mental processes that individuals use to reach a specific goal (Altun

& Erden, 2006; Parnrod & Darasawang, 2018), and these strategies resemble tactics that include planning, competition, direction and moving towards the goal (Oxford, 1990). In this sense, learning strategies are methods that involve motivational, cognitive, meta-cognitive and affective domain features that students use to organize and effectively apply learning processes to achieve satisfactory results related to a particular goal.

Zimmerman (2000) describes self-regulated learning strategies as actions aimed at acquiring or exhibiting personalized purposes and skills, and states that the mentioned processes and actions include cognitive and meta-cognitive strategies. In this context, researchers have suggested that individuals have learning strategies that can be used in different academic and professional environments, such as rehearsal, elaboration, organization, critical thinking, time and environmental management, and getting help (Moldesheva & Mahmood, 2014). While frequently used cognitive learning strategies are classified as rehearsal, organization, elaboration, it is argued that students apply rehearsal strategies to memorize information; elaboration strategies to establish connections with previous information and organizational strategies in the inference of the main ideas to interpret the topics examined (Liu et al., 2019). In other words, organizational strategies include actions such as basic expressions, taking down notes, and creating inferences in the form of summary and schema, as well as extracting key pieces of information that are key to the learning process.

In this sense, rehearsal strategies include repeating memorization of items to be learned or reading a text aloud. With the help of these, students are able to pick important information from texts or passages and actively store the information in their working memories (Bezzina, 2010). Therefore, the information obtained by using such strategies is not subject to deep learning processes; they provide shallow and shallow learning (Pintrich et al., 1993) and are considered as emphasizing performance rather than the intellectual depth of the subject (Bezzina, 2010). Although memorizing learning and rehearsal strategies are considered as cognitive activity strategies, they are accepted as superficial learning strategies (Alivernini et al., 2019; Sorić & Palekčić, 2009).

The elaboration strategies, on the other hand, are used in the process of merging the information gathered from more than one source and establishing the necessary connections between them. These strategies include linking associations between what students already know and what they try to learn, gathering information from several sources, including lessons and readings, and making the necessary connections between them (Alivernini et al., 2019). Sorić and Palekčić (2009) state that individuals who employ deep-processing strategies are individuals who analyse the subject from different perspectives, have subjective organizing skills in learning materials and can establish a number of relationships between information that facilitate learning. Since organizational strategies are part of learning processes that require deep processing, individuals using such learning strategies show a higher academic performance. Academically successful individuals organize their learning materials with their own learning methods and establish necessary connections between previous and new information. In this sense, effective coding of the relationships between old and new information also makes learning and recall processes relatively easy.

Critical thinking is defined as being able to transfer previous knowledge to new and different situations so as to solve the problems faced by individuals, to make decisions or to make critical evaluations (Pintrich, 2004).

Critical thinking skills are considered as another significant cognitive learning strategy that affects students' reflective thinking, decision making and problem-solving skills (Alivernini et al., 2019). According to Valenzuela et al. (2017), critical thinking, which is considered as an alternative to common and ordinary thinking, includes reflective thinking, such as deciding on steps to take and reacting to a new situation. The skills frequently used by individuals in decision making, evaluation and problem-solving situations against any situation or problem are critical thinking skills. Although it is a very laborious process in terms of time, energy and effort, critical thinking is a conscious process that includes the interpretation, evaluation and questioning of knowledge and experiences. This way of thinking containing meta-cognition activities involves conscious use of determination, effort and self-control activities.

It is emphasized that the effective use of learning strategies provides higher academic achievement compared to limited strategy use (Goradia & Bugarcic, 2017; Sun et al., 2018). In addition, self-regulated learning strategies help individuals take more responsibility in their own learning processes and help them regulate their learning speeds (Weinstein et al., 2011). Numerous studies show that individuals who use and employ these strategies effectively have higher academic achievement than those who do not (Broadbent & Poon, 2015; Cambridge-Williams et al., 2013; Kitsantas, 2002; Liu et al., 2019).

As stated above, individuals with self-regulated learning skills are successful in achieving the learning goals they aim or foresee, and using the learning strategies required to change behaviour. These individuals, who have the ability to organize their learning and take responsibility for their learning, benefit most from the education provided to them since their actions are shaped by the will to learn rather than external directions. In this study, it was aimed to identify the pattern of explanatory and predictive relationships between rehearsal, organization, elaboration and critical thinking and academic achievement, which are among the commonly used learning strategies. Although there are many studies that reveal that the effective use of learning strategies in general has a positive and meaningful effect on academic achievement, the number of studies focusing on the effects of cognitive and meta-cognitive strategies such as rehearsal, organization, elaboration and critical thinking, on the academic achievement among university students is scarce.

In order to reach the objectives which are aimed in the process of learning and teaching and to provide the desired efficiency in this process, it is a necessity to examine all the variables that are claimed to have an effect on learning. It is a well-known fact that evaluating and monitoring one's own efforts and improvement will enable individuals to adapt themselves to the needs of ever-changing world. Further, being aware of the mentioned skills will help the learners realize their strengths as well as their needs. Therefore, it is thought that the pattern of explanatory and predictive relationships between the mentioned variables will make a significant contribution to the educational processes. In addition, it is considered that the analysis and results obtained from this research will be beneficial in the context of developing appropriate strategies for individuals to achieve the targeted outcomes in the learning process. In this framework, the problem of the research was determined as "What is the pattern of the relationship between rehearsal, organization, elaboration and critical thinking strategies and academic achievement?"

Method

Research Design

In this study, which aims to determine the pattern of relationship between rehearsal, organization, elaboration and critical thinking strategies and academic achievement, causal research design was applied. This research design provides the opportunity to determine the causes of a current situation or event and the cause-effect relationships between variables, as well as to examine the interaction between independent variables and their impact on the dependent variable (Büyüköztürk et al., 2008).

Study Group

The study group of the research consisted of 414 university students attending a public university in Istanbul in the 2018-2019 academic year. The data of the participants included in the research are presented in Table 1.

Table 1. Demographic Information of the Participants

Demographic Information		<i>f</i>	%
Gender	Female	192	46.4
	Male	222	53.6
Age	17-19	358	86.5
	20-22	46	11.1
	23+	10	2.4
Level	A1 Level	209	50.5
	A2 Level	182	44.0
	B1 Level	23	5.5
Department	% 30 English	343	82.9
	% 100 English	71	17.1
Graduated High School	Anatolian High School	242	58.5
	Science High School	71	17.1
	Religious High School	29	7.0
	Private High School	21	5.1
	Other	51	12.3
Total		414	100

As can be seen in Table 1, 192 of the participants were female and 222 were male, while there were 358 between the ages of 17-19, 46 students between the ages of 20-22 and 10 over the age of 23. Of the 414 participants, 209 are at A1 level (English Beginner Level), 182 at A2 level (Pre-Intermediate Level in English) and 23 are B1 (Intermediate Level in English). In addition, 343 of the participants are enrolled in departments that provide 30% English education, while 71 are enrolled in departments that provide 100% English education. Finally, the majority of the participants completed their high school education in an Anatolian High School ($n =$

242), while the other participants graduated from Science High School (n = 71), Religious High School (n = 29), Private High School (n = 21) and other high school types (n = 51).

Data Collection Tools

The learning strategies of the participants such as rehearsal, organization, elaboration and critical thinking were evaluated using the Motivating Strategies for Learning Questionnaire developed by Pintrich et al. (1993) that measures the level of self-regulated based learning. The scale includes the items evaluating the related cognitive and meta-cognitive learning strategies in seven Likert scales. Items on the scale range from 1 (“not at all true of me”) to 7 (“very true of me”).

Since the focus of this study is to evaluate cognitive learning strategies, four subscales of this measurement tool consisting of rehearsal, elaboration, organization and critical thinking were used. In the calculations made during the adaptation of the scale to Turkish, rehearsal .69, elaboration .76, organization .64 and critical thinking subscales were found to have .80 Cronbach Alpha values (Altun & Erden, 2006). Individuals who score 4, 5, 6 or 7 from the scale use learning strategies more than individuals who score 1, 2 or 3, and the need to get help when the average score is below 3 is emphasized (Liu et al., 2019).

English Proficiency Exam

The academic achievement of students was determined in this research by means of the English Proficiency Exam (EPE) held at the end of the academic year. The EPE, which is conducted in two stages based on the language user levels specified in the European Common Language Framework Program (CEFR), is prepared to determine whether students have the competence to follow the courses they will have to take in English in the departments where they are enrolled. The exam in question measures grammar and vocabulary as well as reading, listening and writing skills for academic purposes and is equivalent to the language proficiency and language skills at B1 + level defined in the European Common Language Framework Program (CEFR).

Data analysis

The data obtained from the research were analysed by Structural Equation Modelling (SEM) and the necessary calculations were made through the AMOS 22.0 statistical software program. Although similar to linear regression analysis, the SEM makes it possible to reveal the relationship between latent variables that cannot be measured directly, to consider measurement errors in observed variables, and to analyse relatively complex models with two or more variables. This method is also very useful in terms of revealing the direct and indirect relationships between the variables in the presented model (Civelek, 2017). While there is no consensus on the appropriate sample size for the SEM (Raoprasert & Islam, 2010); Hoe (2008) and Kline (2005) state that a sample size of more than 200 will provide sufficient statistical value for modelling analysis. Hoelter (1983) expresses the critical sample size as 200 in this analysis method.

Findings

In Figure 1, the structural relationship model between rehearsal, organization, elaboration and critical thinking strategies and academic achievement is presented.

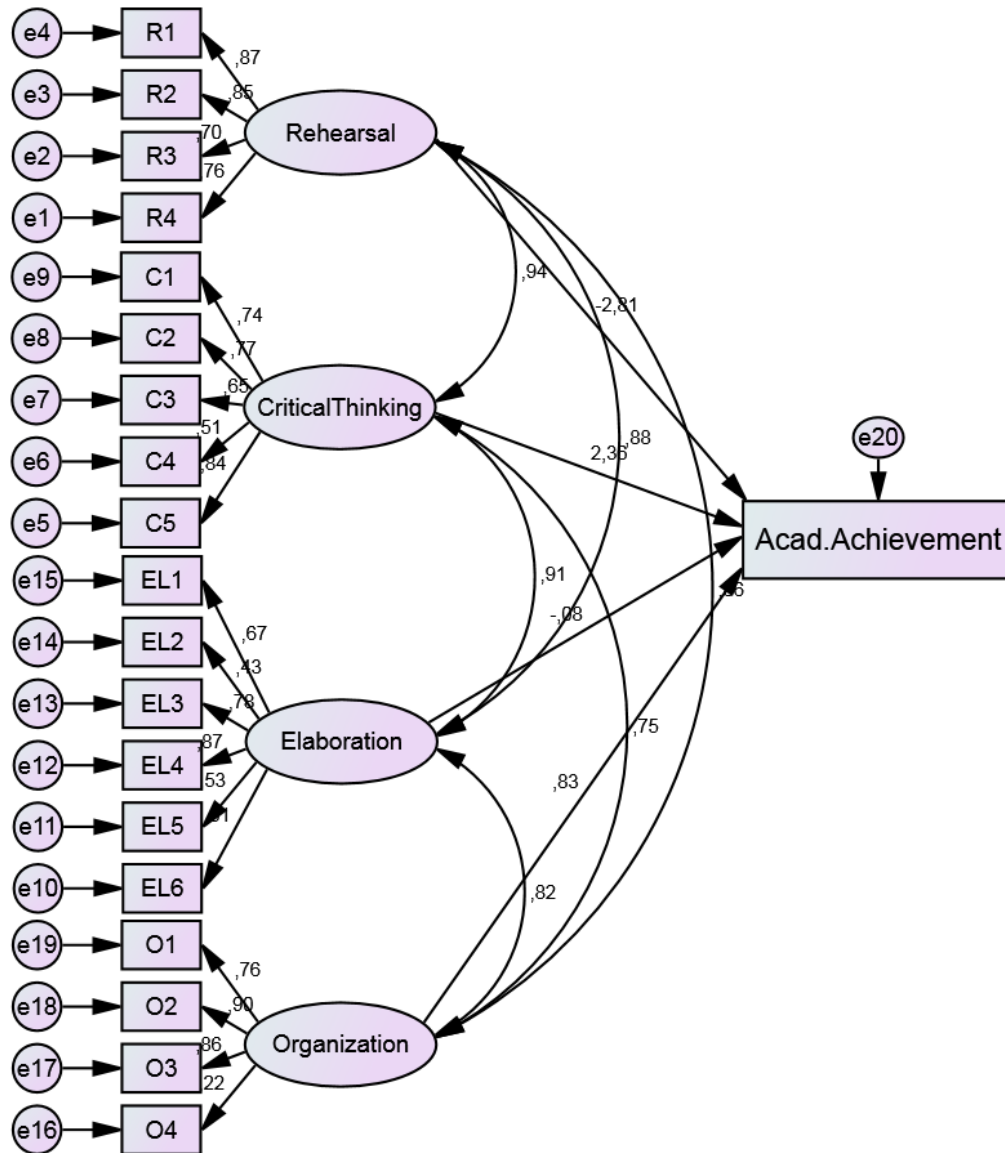


Figure 1. The Structural Relationship between Rehearsal, Organization, Elaboration and Critical Thinking Strategies and Academic Achievement

The model in question in Figure 1 was tested in the maximum likelihood method (“maximum likelihood method”) through the AMOS 22.0 software program and necessary calculations were made. While using the maximum probability method, a number of fit indices required by the system should be taken into consideration and these values and the fit values obtained in the model should be consistent with each other (Bayram, 2013). CMIN (“The likelihood Ratio Chi-Square Test”), which is one of the frequently used fit indices, shows the harmony between the proposed model and the real model, and the CMIN / DF ratio is expected to be less than 3

and the chi-square value is meaningless. It is an acceptable value that the RMSEA (“Root Mean Square Error of Approximation”), which is the measure of fit in the main mass and which is the mean square root, is between .05 and .08. On the other hand, the NFI (“Normed Fit Index”) index gets a value between 0 and 1, and it is stated that values higher than .90 indicate acceptable fit. Similarly, the value of GFI (“Goodness of Fit Index”), which shows variance and covariance degrees, is considered as an acceptable indicator over .90 in the range of 0 to 1. AGFI (“Adjusted Goodness of Fit Index”) is the sample volume indicator and a value above .90 is considered as a good fit indicator (Civelek, 2018).

In Table 2, the fit indices recommended and the calculated fit indices of the model are given (Schermelleh-Engel, Moosbrugger and Maüller, 2003).

Table 2. The Fit Indices Recommended and the Values of the Model

Measures	Good Fit	Acceptable Fit	The Model Values
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 \leq \chi^2/df \leq 3$	1.9
RMSEA	$0 \leq RMSEA \leq .05$	$0 \leq RMSEA \leq .08$.07
NFI	$.95 \leq NFI \leq 1.00$	$.90 \leq NFI \leq .95$.91
CFI	$.97 \leq CFI \leq 1.00$	$.95 \leq CFI \leq .97$.97
GFI	$.95 \leq GFI \leq 1.00$	$.90 \leq AGFI \leq .95$.92
AGFI	$.90 \leq AGFI \leq 1.00$	$.85 \leq AGFI \leq .90$.86

When Table 2 is examined, it is seen that the fit indices of the model are within acceptable limits. The RMSEA value of the model under test ($0 \leq RMSEA \leq .08$) .07; NFI value ($.90 \leq NFI \leq .95$) .91; CFI value ($.95 \leq CFI \leq .97$) .97; GFI value ($.90 \leq GFI \leq .95$) was calculated as .92 and AGFI value ($.85 \leq AGFI \leq .90$) was calculated as .86. Considering the data, it is seen that the mentioned model values are compatible with the recommended values.

In Table 3, the regression, standard error, critical ratio and “p” values calculated for the model are given.

Table 3. The Regression, Standard Errors, Critical Ratios and “p” Values of the Model

		Regression Weight	Standard Error	Critical Ratio	p Value
Rehearsal	→ Acad.	-2.8	.21	-1.55	.10
Achiev.					
Crit. Think.	→ Acad.	.21	.02	6.51	.00**
Achiev.					
Elaboration	→ Acad.	-.64	.19	-.06.55	.94
Achiev.					
Organization	→ Acad.	.23	.35	4.20	.00**
Achiev.					

**p<.01

When Table 3 is analysed, the level of rehearsal variable predicting academic achievement is -2.8; critical thinking .21; it is seen that the elaboration is -.64 and the organization is .23. In addition, according to the data obtained, the power of rehearsal to predict academic achievement is not statistically significant (Critical Ratio = -1.55, $p < .05$), and elaboration in the same way does not significantly predict academic achievement (Critical Ratio = -06.55, $p < .05$). On the other hand, it is understood that the variables of critical thinking (Critical Ratio = 6.51, $p < .05$) and organization (Critical Ratio = 4.20, $p < .05$) predict academic achievement at a statistically significant level.

Correlation, standard error, critical ratio and “p” values calculated for the model are given in Table 4.

Table 4. Correlation, Standard Error, Critical Ratio and ‘p’ Values of the Model

	Correlation	Standard	Critical	p
	Weight	Error	Ratio	Value
Rehearsal ↔ Crit. Think.	.70	.17	4.16	.00**
Rehearsal ↔ Elaboration	.67	.19	3.42	.00**
Crit. Think. ↔ Elaboration	.62	.17	3.60	.00**
Crit. Think. ↔ Organization	.50	.13	2.48	.02*
Elaboration ↔ Organization	.48	.11	3.13	.00**
Rehearsal ↔ Organization	.47	.15	3.06	.00**

* $p < .05$; ** $p < .01$

When Table 4 is analysed, it is seen that there is a positive and statistically significant relationship between rehearsal, critical thinking, organization and elaboration strategies. The relationship between rehearsal and critical thinking (Critical Ratio = 4.16; $p < .01$); between rehearsal and elaboration (Critical Ratio = 3.42; $p < .01$); between critical thinking and elaboration (Critical Ratio = 3.60; $p < .01$); between critical thinking and organization (Critical Ratio = 2.48; $p < .05$); between elaboration and organization (Critical Ratio = 3.13; $p < .01$) and between rehearsal and organization (Critical Ratio = 3.06; $p < .01$) are statistically positive and significant.

Discussion

This research is theoretically based on self-regulated learning and in this framework, the pattern of structural relationships between rehearsal, elaboration, organization and critical thinking strategies and academic achievement were analysed. The findings revealed that rehearsal and elaboration did not meaningfully predict academic achievement, however, organization and with critical thinking were found to predict academic achievement at a statistically significant level. Learning strategies is a concept that explains how individuals acquire knowledge (Alivernini et al., 2019; Richardson et al., 2012) and includes various cognitive processes and behavioural skills (Moldesheva & Mahmood, 2014) that explain how information is acquired, stored, and recalled in the learning process. It is emphasized that its efficient use enhances academic achievement (Al-Khatip, 2010; Alotaibi et al., 2017; Cabı, 2015; Pintrich & De Groot, 1990; Zimmerman & Martinez-Pons,

1988; Zimmerman & Schunk, 2011). It is stated that rehearsal strategies involving repeated memorization of the subjects or aloud listening or reading of a text (Warr & Downing, 2000) is an approach that does not require deep processing and involves a superficial learning rather than a high level of perception (Pintrich, 1993). In this sense, the finding that rehearsal strategies do not predict academic achievement significantly is in line with the expressions of the literature. In addition, it is observed that the rehearsal strategy does not significantly predict academic achievement in the studies conducted. Richardson et al. (2012) stated that rehearsal strategies did not have a significant predictive level of achievement and, similarly, Wang and Wu (2008) concluded that rehearsal strategies did not predict achievement significantly. In a meta-analysis study conducted by Crede and Phillips (2011), it was emphasized that rehearsal strategies did not have a significant effect on academic achievement. On the other hand, Puziferro (2008) and Nabizadeh et al. (2019), in their studies, concluded that the relationship between the variables in question was significant and that rehearsal strategies predicted academic achievement significantly. One could suspect that the contradiction might be linked with the assessment tools, particularly with the ones that assess academic achievement. Another reason would be related to the study fields of the participants. Participants, especially from language classes might find rehearsal strategies helpful while learning new vocabularies.

Another finding obtained from the data is that critical thinking (Pintrich, 2004), which is defined as another important cognitive learning strategy that affects individuals' reflective thinking, decision making and problem-solving skills, significantly predicts academic achievement. Studies in the literature also show the supporting results. Oliveira and Rodríguez-Fuentes (2016) stated that there was a statistically significant relationship between critical thinking and academic achievement. Similarly, Taghva et al. (2014), Ip et al. (2000) as well as Karagöl and Bekmezci (2015) stated that the relationship between academic achievement and critical thinking was statistically significant and positive. On the other hand, Shirazi and Heidari (2019) in their study found no statistically significant relationship between critical thinking and academic achievement. The contradiction between the findings could stem from the complex and comprehensive nature of critical thinking. Cultural differences might also be another factor that affects the perception of critical thinking as in some cultures the lack of inquiry-based practices could explain the contradiction.

In this study, it was concluded that the elaboration strategies (Alivernini et al., 2019) used in the process of combining the information gathered from more than one source and establishing the necessary connections between them did not predict academic achievement. When the literature is examined, it is seen that the results obtained from the studies on this subject differ from each other. For example, in a study conducted by Nabizadeh et al. (2019) on university students, it was concluded that elaboration strategies had a significant relationship with academic achievement and predicted it. Similarly, Richardson et al. (2012) stated that elaboration has a positive and meaningful relationship with academic achievement. However, Klingsieck et al. (2012), Kizilcec et al. (2017) and Wang and Wu (2008) found that there was no significant relationship between the two variables in their studies. Although in the related literature there are a number of studies revealing that elaboration strategies facilitate deep learning and thus enhance academic achievement (Alivernini et al., 2019), the studies that show non-significant or negative correlations could have participants who use poor quality or inadequate elaboration techniques.

Organizational strategies, which are another variable of the research, are defined as the strategies that individuals seek to organize their learning materials in a unique way and to establish the best possible connections between previous information and new information (Sorić & Palekčić, 2009). The findings of the present study demonstrated that organizational strategies predicted academic achievement positively and statistically significant. In the literature, it is seen that there are no consistent findings on this issue. In the research conducted by Nabizadeh et al. (2019) and Cheng and Chau (2013), organizational strategies had a significant relationship with academic achievement and predicted academic achievement. On the other hand, in a meta-analysis study conducted by Broadbent and Poon (2015), it was found that the relationship between organizational strategies and academic achievement was not significant. Similarly, Richardson et al. (2012) found that organization did not have a significant correlation with academic achievement. One relevant reason for this contradiction could be that, sometimes learners find it easier to memorize what they are taught instead of creating outlines or preparing tables.

That the rehearsal strategies do not affect academic achievement or that there is a weak correlation between the two variables could be due to the fact that the two of the items measuring rehearsal strategies in the related measurement tool focus on the memorization, and the other two items focus on repetition strategies. In this sense, it is assessed that individuals with high academic achievement levels will not need to use strategies to use repeat memorization or the subjects repeatedly and similarly individuals with low academic achievement levels may not have the adequate level of motivation to use these strategies. In addition, it should be taken into consideration that strategies such as rehearsal and elaboration do not predict academic achievement could be on account of the fact that the exams may not be suitable criteria to measure such strategies. Being a multiple choice, the assessment criteria (EPE) might make the use of critical thinking or organization strategies unnecessary for individuals. Therefore, it should not be ignored that the possibility that the qualifications of the assessment criteria used to measure academic achievement may also affect the use of learning strategies.

In line with the findings obtained from the research data, it is necessary to inform the educators about using appropriate teaching methods in order to ensure and use the learning strategies effectively. In addition, since learning strategies affect the learning processes and responses of individuals in different situations, it should not be neglected that individual differences should be considered in the use of strategies, and what is more, the characteristics of assessment criteria (exams) should also be identified and its main focuses have to be prioritized. In addition, providing of learning environments for the individuals, who have the ability to regulate their learning, to keep their inner learning demands alive rather than external orientations may help.

Conclusion

To conclude, the structural relationship pattern between rehearsal, elaboration, organization and critical thinking strategies and academic achievement has revealed that rehearsal and elaboration strategies did not predict academic achievement in a meaningful way. However, critical thinking and organizational strategies were found to be statistically significant in predicting academic achievement. The findings support, partly, that the strategies involving deep learning processing enhance learning and academic achievement. Nonetheless, further research

to comprehend the functions of the strategies in details would be helpful to reach a more reliable generalization.

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