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Deep Learning Self-Regulation Strategies in the Learning of English as a Foreign Language Among Arab College Students

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Abstract

This study uses Panadero et al.'s (2021) Deep Learning Strategies Questionnaire to discover EFL learners' strategies from a new perspective. The questionnaire is a newly designed self-report instrument with ground-breaking features constructed with validity and reliability to measure students' actual strategies in real situations. The current study is the first in an EFL context to use this innovative tool. It investigates self-regulation strategies for learning English as a foreign language (EFL) among 430 male EFL college students in Saudi Arabia. The questionnaire enabled us to adopt a micro-level inspection of strategy functions based on an innovative model that can help identify possible avenues for strategy interventions. The results mostly showed a high use of deep language learning strategies in all four questionnaire categories: basic learning, visual elaboration and summarizing, deep information processing, and social learning. Consequently, all the categories had a strong, positive, and significant correlation. In addition, the most used strategies were basic learning strategies, whereas the least used were visual elaboration and summarizing. Our findings provide useful pedagogical implications for promoting EFL learning strategies and strategy instruction. Successfully replicating the Deep Learning Strategies Questionnaire scrutinizes this methodological instrument's validity and reliability and encourages other researchers to use it.

Keywords: Self-directed learning, Learning strategies, Situational learning, Self-regulated learning

Using self-regulation strategies that underpin language learning strategies (LLS) facilitates language learning and indicates the learners' involvement in the language learning process using their LLS repertoire. In addition to making learning easier, LLS makes learning more profound, productive, and lasting (Cohen, 2007). Anderson (2010) stated that the primary purpose of using LLS is to improve language learners' proficiency. Similarly, Oxford (2017) stressed the importance of self-regulated strategies in that they make learning faster, more straightforward, more effective, and more enjoyable. There seems to be a relationship between

LLS use and learning success. However, this relationship does not always exist because of the complexity of strategy use, the fluidity of the strategy category, and the variety of success indicators. As argued by Macaro (2019), we need solid and external evidence that learners are making progress because of strategy use. Scholars such as Cohen (2011), Grenfell and Harris (1999), Macaro (2001), and Oxford (1990, 2017) corroborate this association between success and strategy use, believing that good language learners use more LLS than poor language learners.

This study examines EFL students' deep learning self-regulation strategies through Panadero et al.'s (2021) Deep Learning Strategies Questionnaire, which classified students' factual strategies into four categories: basic learning, visual elaboration and summarizing, deep information processing, and social learning. Several confirmatory factor analyses were conducted in the original study (i.e., Panadero et al., 2021) to examine validity and reliability. What is claimed to be unique about this new research tool is the innovative model of classifying learning strategies into four noncyclical factors based on tasks rather than ideal regulation models. It asks for strategies or actions a student can carry out or recognize in real situations rather than general capabilities (Panadero et al., 2021). Most previous groupings conceive self-regulated learning as recursive and cyclical: what happens before learning, what happens during learning, and what happens after learning. (see Yaguarema et al. 2022, p. 2). Self-regulated learning is traditionally viewed as a cyclical process (Zimmerman, 2000) involving phases of planning, performance, and reflection. As a result of this cyclical process, learners can continuously adjust their strategies based on feedback and self-assessment. Nevertheless, Panadero et al. (2021) categorize learning strategies into four noncyclical factors: basic learning, visual elaboration and summarizing, deep information processing, and social learning. Instead of a sequential process of ideal stages of self-regulation, Panadero et al. (2021) classify strategies according to specific tasks in real situations. In essence, the four categories are considered distinct factors, not necessarily linked in sequence. As a result, the focus is on what students do in learning situations rather than what follows a cyclical progression of ideal phases. Every category represents a distinct strategy or action that students might employ regardless of when a strategy or action occurs in the learning process. Moreover, unlike models that view SRL as a series of interconnected phases (preparation, action, reflection), Panadero et al.'s (2021) framework presents learning strategies as discrete, non-sequential components. The strategies are, therefore, seen as tools that can be used independently based on their immediate demands. Learning strategies do not necessarily fit into a before-during-after structure. This approach offers a more flexible and pragmatic framework for understanding and applying learning strategies in a real-world educational setting.

Exploring self-regulated learning strategies through this new approach may contribute to a better understanding of how students deploy LLS while commencing deep learning processes in real and meaningful tasks. Additionally, such an investigation will raise teachers' awareness of their students' strategy use and encourage them to adopt more appropriate strategy instruction programs. We borrowed this questionnaire to gauge to what degree students in the L1 Arabian context use or do not use the four self-regulated strategies while learning English as a foreign language. In addition, since the beginning, the primary goal of LLS research has always been to help language learners improve their learning endeavors (Macaro, 2010), and such an investigation may indeed help students; it can also enable facilitators to design better self-learning modules.

Literature review

Self-Regulation and Deep Learning

Before discussing deep learning self-regulation strategies, it is essential to know what self-regulation is and what theoretical frameworks consolidate deep learning self-regulation strategies. According to Panadero and Alonso-Tapia (2014, pp. 450-451), "self-regulation is the control that students have over their cognition, behavior, emotions, and motivation through the use of personal strategies to achieve the goals they have established." This control involves deploying different mental actions or strategies to be executed. Zimmerman (2000) indicates that self-regulation strategies are "actions" or "processes" that a person conducts for a purpose. This is enhanced by Oxford's (2011, p. 12) definition of self-regulated learning strategies as "deliberate, goal-directed attempts to manage and control efforts to learn." These strategies are "… teachable actions that learners choose from among alternatives and employ for L2 learning purposes." Consequently, self-regulating learners are "highly active cognitively and metacognitively" (Winne, 2011, p. 19).

Deep learning self-regulation strategies are linked to schema, cognitive information processing, and sociocultural theories. In schema theory, many mental structures assist a learner in organizing information. This kind of information organization assists learners in memorizing and remembering quickly (Mandler, 2001). Thus, a strategy like "If possible, I create tables to organize the information contained in texts and assignments" represents the schema theory very well. In the cognitive information-processing theory, declarative knowledge is transformed into procedural knowledge; when a language learner learns a new strategy, it moves from declarative knowledge to procedural knowledge to be automatic and used unconsciously (Oxford, 2011, 2017). As a result, when LLS are used unconsciously as procedural knowledge, they are no longer strategies. As long as social strategies are presented in Panadero et al.'s (2021) survey, Vygotsky's (1981) sociocultural perspective should be considered. In Vygotskian opinion, a learner learns from others who might be more capable, such as a classmate, an instructor, or a parent. Therefore, a strategy such as "I ask the opinion of my classmates on how I am doing on a task" is a good representation of social strategies.

Using deep learning self-regulation strategies in education appears to be an attempt to combine deep learning with strategic learning. Deep learning involves "paying attention to underlying meaning. It is associated with using analytic skills, cross-referencing, imaginative reconstruction, and independent thinking" (Warburton, 2003, p. 45). Strategic learning, however, involves "attempts [we can call them strategies] to maximize academic achievement with minimum effort" (Warburton, 2003, p. 46). Deep learning self-regulation strategies can be connected to the social constructivism of learning theories, in which learners establish knowledge through active and self-regulated learning in real and meaningful situations (Vos et al., 2011).

Language Learning Strategies

Language learning strategies are complex because of their multifaceted mental, physical, and contextual roles. The number of definitions — 33 identified by Oxford in 2017 — underscores a significant reluctance within the academic community to converge on a single, encompassing definition. This diversity of definitions indicates the nuanced understanding required to grasp the full scope of learning strategies. By analyzing these numerous definitions intensively, Oxford offers a comprehensive definition that captures the fluidity and flexibility of Language Learning Strategies (LLS). The approach acknowledges the complex nature of the strategies and provides a framework that accommodates their dynamic and context-dependent nature.

The most comprehensive definition of LLS, which is essential to understanding how learning strategies are utilized in various educational environments is given by Oxford (2018):

> LLS are purposeful, conscious (or at least partially conscious) mental actions that the learner uses to meet one or more self-chosen goals, such as (a) overcoming a learning barrier, (b) accomplishing an L2 (second language) task, (c) enhancing long-term L2 proficiency, and (d) developing greater self-regulation (ability to guide one's own Learning). Like most aspects of L2 learning, LLS occur in real contexts (specific settings), are complex (with multiple interacting factors), and are dynamic (flexible, usable in different ways, and changeable along with learners' changing needs). LLS can be learned with help from a teacher, a friend, a book, or the internet, although many learners creatively and effectively generate their own LLS. (p. 82)

Another contentious issue in the field of LLS is strategy classification, where numerous scholars have attempted to develop an appropriate classification for LLS. Cohen (2011), Cohen and Weaver (2006), O'Malley and Chamot (1990), and Oxford (1990, 2017) are among the scholars who have provided various classifications of these strategies. Some scholars have classified strategies based on their understanding of cognitive theory (O'Malley & Chamot, 1990; Oxford, 1990) and sociocultural theory (Oxford, 2017). The most well-known strategies under these taxonomies are metacognitive, cognitive, affective, and social strategies (Cohen, 2011). Other scholars have classified strategies by language skills and language systems (Cohen & Weaver, 2006), categorized as reading, writing, listening, speaking, vocabulary, and translation strategies. Oxford (2017) provided her updated Strategic Self-regulation Model with a more comprehensive classification for LLS. This classification includes "meta-strategy sets" and "strategy sets" under four domains of the Strategic Self-regulation Model as follows: cognitive domain, motivational domain, social domain, and affective (emotional) domain, and she believes that we need these four domains for effective learning. These different classifications of strategies are due to what Oxford called the flexibility and fluidity in the strategy functions. The appropriate category of a strategy depends on the context, person, and purpose of strategy use (Oxford, 2021). Consequently, Oxford (2017) and Cohen (2011) called on other scholars to focus more on strategy functions than categories. A strategy can shift from one category to another depending on "how and why the learner is using the strategy" (Oxford, 2021, p. 30).

We cannot survey the literature without discussing the initial classification of strategies: cognitive, metacognitive, affective, and social. Cognitive strategies are mental processes such as sensations, reasoning, conceptualization, awareness, perception, identification, grouping, retention, memorizing. These help learners build up and adapt their knowledge of the language and culture (Cohen, 2011; Oxford, 2017). Metacognitive strategies control and handle cognition. They regulate and monitor cognitive facets of learning, such as paying attention, planning, using resources, evaluating, and summarizing (Oxford & Schramm, 2007; Oxford, 2017; Susar & Akkaya, 2009). They improve language proficiency and autonomy (Carson & Longhini, 2002; Dreyer & Oxford, 1996; Green & Oxford, 1995) and help comprehend and retain information (Susar & Akkaya, 2009). Social strategies are "means employed by learners for interacting with other learners and native speakers" (Cohen, 2011, p. 19). These include asking questions, asking for explanations, and cooperating with other learners. Engaging in social strategies can help learners feel more confident and involved in the communication process (Vandergrift, 1997). Furthermore, Nakatani and Goh's (2007) review highlighted the integral role of social strategies in oral communication, emphasizing the need for both interactionist and psycholinguistic approaches in understanding and teaching these strategies.

Affective strategies aim to "help students regulate their emotions, motivation, and attitudes" and also assist learners to "reduce anxiety and provide self-encouragement" (Cohen, 2011, p. 19). This category of strategies is not covered in the present study, as it was omitted from the questionnaire of Panadero et al. (2021). The claim is that such strategies might not be explicit

enough for students to be aware of or reflect upon when processing their learning in a task-based situation because they might occur in microseconds. In addition, some affective strategies might involve metacognitive and cognitive strategies at the functional levels (Cohen, 2021). Consequently, the typical vagueness around affective strategies might affect the validity and reliability of the questionnaire items if they are included.

The literature lacks studies that use highly valid and reliable LLS research instruments in real situational contexts. As Cohen (2021, p. 19) states, "The time has come for LLS educators to undertake more studies that provide micro-level inspection of the functions of any given strategy." We hope this study can help address these gaps by using the metric created by Panadero et al. (2021) and applying it to different contexts.

Deep Learning Strategies Questionnaire

The current study uses Panadero et al.'s (2021) questionnaire because it is a newly designed self-reporting instrument with ground-breaking features that might bridge the aforementioned gap of validity and reliability. While most self-regulated learning (SRL)/LLS literature instruments are designed based on ideal and theoretical models or frameworks for measuring general cognitive, metacognitive, affective, and social strategies (Schellings, 2011; Veenman, 2011), Panadero et al.'s (2021) questionnaire was constructed to measure students' actual strategies in real situations, and several confirmatory factor analyses were successfully conducted to examine its validity and reliability.

In addition, and as a response to the call for a new perspective in LLS classifications (Cohen, 2011; Oxford, 2017), the current study aimed to investigate the LLS of EFL learners from the perspective of deep learning self-regulation strategies in real and meaningful task-based situations, as outlined in the Deep Learning Strategies Questionnaire of Panadero et al. (2021). The questionnaire classified the 30 learning strategies into four categories based on their functions: basic learning, visual and summarizing learning, deep information processing, and social learning. One might argue that there is an immense resemblance between the basic learning strategies and the previous metacognitive strategies or that the visual and summarizing strategies and deep information processing strategies are a combination of cognitive and metacognitive strategies. Such a conundrum is solved via attributes such as flexibility and fluidity, proposed by Oxford (2017). LLS, by their nature, are somewhat difficult to classify into a single category; a strategy can be classified under two categories at the same time; for instance, reading a book for fun is a cognitive or metacognitive strategy, or listening to music to relax is a cognitive or affective strategy. Indeed, using the terms flexibility and fluidity assisted in solving this issue regarding strategy classification. Oxford (2017) suggests that having formal LLS categories and labels will facilitate communication about LLS, but it should not restrict strategies from existing outside these categories and labels, stressing that "strategies, in reality, confound all scholarly attempts to put them into small boxes, locked up tight." (p. 163)

We failed to find any studies on language learning that used Panadero et al.'s (2021) tool to investigate deep learning strategies. This may be because this questionnaire has not yet become widely known in language learning, as it has primarily only been used in two studies in education and educational psychology: Panadero et al.'s (2021) questionnaire validation with a Spanish sample and Yaguarema et al.'s (2022) investigation of the validity of the questionnaire among Ecuadorian students.

Research Questions

Based on the discussion above, it is possible that using Panadero et al.'s (2021) deep learning strategies survey may offer new insights into self-regulated LLS for EFL students. However,

much is still unknown about this area, specifically how replicable Panadero et al.'s results are in the Saudia Arabian context and which strategies students need there to facilitate their learning processes. Therefore, we pose the following two research questions.

1- What are Saudi Arabian EFL students' basic learning self-regulation, visual elaboration and summarizing, deep information processing, and social learning self-regulation strategies?

2- Are there any correlations between any of the strategy categories?

Methods

This study adopted an exploratory quantitative approach to ascertain the most used EFL learning strategies as perceived in Panadero et al.'s (2021) questionnaire. It was conducted with college students learning EFL in Saudi Arabia. The items used in our questionnaire are expected to be more task-related than the items in most existing SRL questionnaires, which are expected to aid teachers' interventions for SI and increase comparability across similar studies.

Research Instrument

In investigating learning strategies, previous studies have used self-report instruments, such as questionnaires/interviews, and instant instruments, such as observation/think-aloud protocols. Despite the eligible critique against self-report instruments, they are the most popular instruments for research because they can provide better accessibility to the psychological process than other methods (Pekrun, 2020). We contacted the authors of Panadero et al. (2021) and received permission to use their questionnaire in the present study.

We chose this survey because it was developed based on a solid self-report questionnaire that was tested empirically for its validity and reliability. In addition, the survey was proposed to "measure students' actions while studying in more realistic situations, closer to tasks they have to perform on a regular basis" (Panadero et al., 2021, p. 2). It was developed to solve the problem of existing tools created from theoretical models to measure the general capabilities of self-regulation strategies in ideal situations. According to Panadero et al. (2021), the survey identified:

> […] four areas that the questionnaire needed to address […]
> (1) basic learning self-regulation strategies (preparatory strategies including task analysis and planning, among others; performance strategies, where the task is executed while monitoring progress; and appraisal, in which students evaluate their results);
> (2) visual elaboration and summarizing strategies [creating conceptual maps, tables, bullet points, summaries, and outlines to organize information into key points for more efficient processing];
> (3) deep information processing strategies (the association of new information to already existing information and the restructuring of existing information); and
> (4) social learning self-regulation strategies [exploring positive strategies that are socially shared to regulate learning such as asking for guidance or feedback to the teacher or peers, strategies that are positive for learning] (pp. 2-3)

Each questionnaire item was rated on a five-point Likert scale comprising five responses: strongly agree = 5, agree = 4, uncertain = 3, disagree = 2, or strongly disagree = 1. The current study's researchers translated the 30 questionnaire items from English into Arabic for the students' convenience and better understanding of meaning.

Data Collection and Analysis

The data for this study were analyzed using SPSS and collected using a platform called Qualtrics, which allowed the survey to be accessed electronically, and provided assurances that humans were truly completing the survey. Two methods of descriptive analysis were used (frequency tables and measures of central tendency and dispersion) to summarize the frequencies and means of the data. Since the scores were sufficiently normal, we used a correlation matrix of Pearson's *r* and interpreted *r* values according to Lehman et al. (2005). The *r* value of 60 – 79 indicates a strong relationship between the variables. In addition, we used Spring's (2022) website to measure ANOVA and calculate the effect size of strategy categories.

According to Qualtrics analysis, the response quality of the collected data was 98%, with a reCAPTCHA score between 0.60 and 1.00. A score greater than or equal to 0.5 means the respondent is likely to be a human. A score of less than 0.5 means the respondent is likely a bot or survey "cheater," and therefore, such responses were flagged and filtered before the results were analyzed to ensure greater data reliability. We also conducted a Cronbach's alpha test and found the survey had high internal reliability; $\alpha = .95$.

Participants

The participants were English language learners from an English language institute in Saudi Arabia. They were learning EFL in their preparatory year after high school to join the Jubail Industrial College, where the medium of instruction was English. The English program in the preparatory year follows the first four levels (A1, A2, B1, and B1+) of the Common European Framework of Reference for Languages. The participants at the institute were from all levels. Participants were informed about the study and invited to participate via an electronic link sent to their Blackboard accounts. Each student had access to a computer and the Internet in the language labs where they took e-learning lessons, and they could also access their accounts at home. The questionnaire was posted on the link, the study was explained in writing, and the e-learning teachers helped answer any questions or misunderstandings. All students were free to decline participation and were not obligated to answer questions. Data was kept confidential and used only for research purposes. The questionnaires were filled out anonymously, and no identifying information was collected. Six hundred three participants responded to the survey; 173 incomplete questionnaires were removed after a 15-day waiting period, leaving complete data from 430 participants for analysis.

Results

General Findings

This study aimed to determine the strategies used in the earlier research questions. However, the collected data revealed some interesting findings that were not directly related to the research questions. Most participants were from the A2 level ($n = 341$). Then came the students in the B1+ level ($n = 59$). 11 students were from the A1 level, and 19 were from the B1 level. However, regardless of their levels, the majority in each level reported using most of the strategies stated in the questionnaire.

In addition, Table 1 shows the descriptive statistics and the reliability measure of the scales and the subscales in the instrument initially designed by Panadero et al. (2021). It is clear from the table that the items within the scales, the subscales, and the entire research instrument have high internal reliability for measuring self-regulated learning strategies. This is evidenced by the fact that the α values were all between .84 and .95. Consequently, we can confidently infer from the means of the responses that the participants have mostly high levels of strategy use

when learning English as a foreign language. In addition, the most used strategies are the basic learning strategies (*M* = 3.96), followed by deep information processing strategies (*M* = 3.84), self-regulated strategies, and social strategies (*M* = 3.69). Conversely, visual elaboration and summarizing were the least used self-regulated learning strategies (*M* = 3.38).

Table 1. Means, standard deviations, level of strategy use, and Cronbach alpha values for the scales and subscales included in the questionnaire

	M	*SD*	Level of Use	Cronbach's alpha
Basic learning strategies	3.96	.921	High*	.93
Visual elaboration and summarizing strategies	3.38	.870	Medium**	.84
Deep information processing strategies	3.84	.899	High	.93
Social learning strategies	3.69	.971	High	.90
All strategies	3.72	.780	High	.95

Note: n=430; <3.5 = High; ** <2.5 = Medium

Furthermore, the findings showed that between half to two-thirds of the participants reported using positively loaded strategies (45.5%–74%). However, four strategies (10, 11, 14, and 15) were negatively loaded (written in a negation form) into the questionnaire for validity and reliability. Almost two-thirds of the participants (66–75%) agreed with or were uncertain about the negatively loaded strategies.

EFL Students' Basic Learning Self-Regulation Strategies

Table 2 shows the means and standard deviations of each basic learning self-regulation strategy, where a higher mean refers to a higher use of the strategy and vice versa. The means of all strategies in this group lie between 3.79 and 4.06, which matches the "Agree" option in the survey. This indicates a more significant use of these eight basic learning self-regulation strategies among the participants of the present study. Table 2 also shows the total agreements, where the number and percentage of "strongly agree" and "agree" are added. Almost two-thirds of the participants (64–74%) reported using these strategies. For example, in Table 2, item 3, 317 participants out of 430 (74%) reported using the strategy "While I perform a task, I check if the steps I am taking are appropriate," with a mean agreement of 4.06. This strategy is the top used one in this category. The remaining participants (*n* = 313) either disagreed or were neutral about this strategy. However, the strategy that is the least used in this category is related to the deep analysis of a language task.

Table 2. Means of basic self-regulation strategy use

Strategies	*M*	*SD*	Total Agreement	
			n	%
3- "While I perform a task, I check if the steps I am taking are appropriate."	4.06	1.06	317	74%
6- "At the end of a task, I review what I have done to evaluate if I did it correctly."	4.05	1.11	309	72%
2- "When I figure out what I have to do, I try to visualize it and follow through."	4.02	1.07	308	72%
5- "When I am working on a task, I stop to check if I am progressing as planned."	4.03	1.15	305	71%
8- "I read instructions for the assignments and exams as many times as necessary to understand what is required."	3.98	1.11	297	69%
7- "Before I start working on a task, I carefully plan what to do."	3.93	1.12	296	69%
4- "If the teacher gives me a tool to self-assess I would use it."	3.92	1.16	296	69%
1- "I analyze in depth the task I have to complete so that it is clear to me what I have to do."	3.79	1.12	273	63%

EFL Students' Visual Elaboration and Summarizing Strategies

Table 3 shows the means and standard deviations of each visual elaboration and summarizing strategy. This table lists the strategies that are most and least used according to their means. Higher means refer to the top-used strategies, and vice versa. However, some strategies (14, 11, 15, and 10) in this category were negatively loaded to reduce participants' acquiescent response bias. Consequently, higher means for such strategies refer to lower use, and vice versa. Table 3 also shows the total agreements, where the number and percentage of "strongly agree" and "agree" are added. However, "uncertain" cases were added for the negative items because they are closer to negativity than positivity. As shown in Table 3, most visual elaboration and summarizing strategies were used less frequently than other strategies in this study. Almost half of the participants used the positively loaded strategies, leaving the other half either not using them or uncertain about them. In addition, almost two-thirds of the participants (66%–75%) either agreed or were uncertain about the negatively loaded strategies (10, 11, 15, and 14). As discussed in the next section, this might have implications for raising students' awareness of these strategies through strategy instruction.

Table 3. Means of visual elaboration and summarizing strategy use

Positively Loaded Strategies				
			Total Agreement	
	M	***SD***	***n***	**%**
13- "I usually study using different strategies (memorize, make diagrams, etc.) depending on the subject in question."	3.72	1.17	251	58.5%
12- "When I study for an assessment task (e.g., exam), I write short summaries with the main ideas and concepts of readings."	3.70	1.20	249	58%
16- "If possible, I create tables to organize the information contained in texts and assignments."	3.53	1.18	220	51%
9- "I often make diagrams or drawings to represent what I study."	3.40	1.23	195	45.50%
Negatively Loaded Strategies				
			Uncertainty	
10- "I do not usually organize information that I study in tables because it does not help me to learn (negative item)."	3.04	1.36	285	66%
11- "Unless the teacher asks me, I do not usually summarize the texts I study (negative item)."	3.21	1.37	307	71.5%
15- "I do not usually make graphs or diagrams while studying or solving problems because they do not help me learn (negative item)."	3.21	1.31	314	73%
14- "I do not usually make concept maps to relate the concepts I study because they are of little use (negative item)."	3.29	1.28	323	75%

EFL Students' Deep Information Processing Strategies

Table 4 shows the means and standard deviations of the deep information processing strategies, listed according to their mean scores. The means of all eight deep information processing strategies are within the range of the "Agree" option (3.71–4.06), which indicates a higher use of these strategies among the participants. Almost two-thirds of the participants (56.50%–71%) reported using these strategies. However, approximately one-third of participants either do not use these strategies or are uncertain about them.

Table 4. Means of deep information processing strategy use

Strategies	*M*	*SD*	Total Agreement	
			n	%
19- "When I study, I relate the material I read to what I already know."	4.06	1.06	306	71%
18- "I relate what I am learning in class to my own ideas."	3.94	1.07	287	67%
20- "I relate ideas from the class with other ideas whenever possible."	3.89	1.08	275	64%
22- "When studying, I look for possible relations between what I study and the situations to which it could be applied."	3.87	1.06	269	62.5%
24- "I usually study trying to visualize the task context."	3.80	1.06	257	60%
23- "I look for situations to apply course content."	3.80	1.05	247	57.5%
21- "When studying, I often mentally relate the content I am working on to other subjects."	3.71	1.15	244	57%
17- "When I read or hear an idea or a conclusion in class, I think of possible alternatives."	3.71	1.07	243	56.5%

EFL Students' Social Learning Self-Regulation Strategies

Table 5 shows the descriptive data regarding social learning self-regulation strategy use. According to the data, more than half of the participants used social strategies (57%–64%). However, social strategy number 27 was one of the less frequently used strategies in this study, along with strategies 14, 15, 11, 10, 9, and 16, which were visual and summarizing. As explained in the discussion, the lower use of such strategies might be due to several reasons.

Table 5. Means of social learning self-regulation strategy use

Strategies	*M*	*SD*	Total Agreement	
			n	%
29- "If I do not do a good job on a task or an exam, I ask the teacher to give me more information about how to improve."	3.89	1.12	276	64%
28- "If the teachers provide us with presentations, I take notes in them because it makes everything clearer."	3.75	1.15	254	59%
30- "Whenever I can, I try to discuss with my classmates ideas or aspects of what I have been studying to learn more."	3.73	1.16	247	57.50%
26- "I usually participate in class discussions, asking questions or making comments to the teacher."	3.70	1.17	244	57%
25- "I often discuss with my classmates ideas or aspects of what I have been studying."	3.69	1.17	246	57%
27- "I ask the opinion of my classmates on how I am doing on a task."	3.38	1.32	192	45%

Correlations between Strategy Categories

To answer research question two, a correlation matrix was created and presented in Table 6. According to this analysis, there are strong, positive, and significant correlations among all the different categories of strategies used by the participants in the current study. They correlate at the p =.001 level. The strongest correlation is between deep information processing strategies and the basic learning strategies. They correlate at the .75 level. The second strongest correlation is between deep information processing strategies and the social strategies. They correlate at the .69 level. Similarly, all the other categories correlate positively and significantly with each other. The lowest correlation, however, is between the basic learning strategies and the visual elaboration and summarizing strategies (p =.54).

Table 6. Correlation between the categories included in the questionnaire

	Basic learning	Visual elaboration and summarizing	Deep information processing	Social learning
Basic learning	--	.549**	.759**	.630**
Visual elaboration and summarizing		--	.607**	.603**
Deep information processing			--	.699**
Social learning				--

Note: Pearson's r, n= 430; ** p =.001.

In addition, a one-way repeated measures ANOVA was conducted to determine if there were significant differences between the learning strategy groups. A Shapiro-Wilk test confirmed the data's normality, which is also suggested by the skewness and kurtosis, justifying the use of ANOVA for the paired data. The results of the ANOVA are presented in Table 7, along with 95% confidence intervals and normality data. The results indicate a significant difference between the strategies, with a medium effect size. This suggests that the differences between the groups were of moderate practical significance. Post-hoc analysis using Holm's method revealed the following significant differences:

- Basic learning strategies have the highest mean score.
- Visual elaboration and summarizing strategies have the lowest mean score.
- Deep information processing strategies and social learning strategies fall in between.

Table 7. Confidence intervals, normality, and one-way repeated measures ANOVA results

Group	95% C.I.	Skewness	Kurtosis
Basic Learning Strategies	3.884 ~ 4.059	-1.129	1.373
Visual elaboration, and summarizing Strategies	3.307 ~ 3.471	0.16	0.41
Deep Information Processing Strategies	3.764 ~ 3.934	-0.671	0.52
Social Learning Strategies	3.599 ~ 3.783	-0.424	-0.246

Note: Significance Testing: $F[3, 429] = 90.37$, $p < 0.01$, $\eta^2 = 0.17$

Discussion

Basic Learning Strategies

The results of Tables 1, 2 and 7 show that basic learning self-regulation strategies (as generally metacognitive strategies) were the most frequently used strategies with the highest means, and more than two-thirds of the participants reported that they used these strategies. This is similar

to Panadero et al.'s findings (2021), where the means of basic learning self-regulation strategies were between 3.74 and 4.05, ranking second in the order of frequency. Additionally, other previous studies have also reported that basic learning strategies were amongst the most common metacognitive strategies used by students, e.g., Carson and Longhini (2002), Dreyer and Oxford (1996), and Green and Oxford (1995). Employing metacognitive strategies is a conscious process involving awareness, intention, attention, and effort (Schmidt, 1995), indicating that students in the present study intentionally used these strategies even though they might be unfamiliar with the term "strategy." The highest means of basic learning self-regulated strategies in the present study might probably be attributed to the strategies' benefits in assisting students in controlling cognitive strategies, deploying other strategies, and checking if strategies work as expected (Oxford, 2017). The results also show that basic learning self-regulation strategies are likely used more often than deep information-processing strategies. This could probably indicate that the participants had their preferred learning approach. Although basic self-regulation strategies are metacognitive, they are essential for independent and classroom-based learners (Chamot, 2004; Rubin, 2001). Therefore, the remaining participants in the present study (less than one-third) who reported whether they were likely not using or were likely uncertain about using these strategies should not be neglected. They should be introduced to these strategies to increase their opportunities for utilizing better learning tools.

Visual Elaboration and Summarizing Strategies

Second, the results showed that visual elaboration and summarizing strategies were the least used. Around half of the participants reported less use of the four positively loaded strategies, and the other half reported not using or being uncertain about using these strategies. Panadero et al. (2021) found similar patterns, as visual elaboration and summarizing strategies were the least used, with means between 2.33 and 3.91. The lower use of these strategies might be attributed to the higher mental processing required to deploy them (Susar & Akkaya, 2009). It should be considered that this higher level of mental processing might require higher language proficiency or senior language learners, which was not the case in the present study, as most of the participants were still at the A2 level. In addition, students might lack the "required sensitivity for summarizing" (Susar & Akkaya, 2009, p. 2498), resulting in less use or uncertainty in using such strategies. The lower use of these visual elaboration and summarizing strategies is significant because it demonstrates that the target students were limited in their self-regulation learning strategies. Therefore, EFL teachers should consider adjusting and diversifying their instructional activities and methods.

Raising students' awareness of how to use visual elaboration and summarizing strategies is crucial, as using these strategies will enable them to have better comprehension, transfer knowledge to long-term memory, read with better understanding, distinguish between ideas, and express themselves (Susar & Akkaya, 2009). Raising students' awareness of such strategies is highly recommended by many scholars, including Chamot (2004), Cohen (2011), O'Malley and Chamot (1990), and Oxford (2017) because it helps students to acquire 21st-century skills and delve into lifelong learning (Karatas & Zeybek, 2020). It can be applied through different activities, such as surveys, discussions, games, lectures, and workshops in carefully designated strategy instruction programs.

The remaining four negatively loaded strategies (i.e., written in a negation form) in the visual elaboration and summarizing group were introduced to the survey to ensure a low level of acquiescent response bias. Over two-thirds of the participants reported agreement or uncertainty about using these four negatively loaded strategies.

Deep Information Processing Strategies

Third, deep information processing strategies ranked second after basic learning self-regulation strategies with high means, and two-thirds of the participants reported agreement on using these strategies. Oxford (2017) claims that metacognitive strategies can contribute to deep processing. Consequently, in the present study, the higher use of basic self-regulation strategies, which are generally metacognitive, might have contributed to the higher use of deep information processing strategies, which are generally cognitive strategies. This indicates that students who regularly use these deep information-processing strategies are intrinsically motivated, perform better, and can regulate their learning (Deci & Ryan, 2013). Students who adopt deep information processing strategies, which is the case for two-thirds of the participants in the present study, tend to personalize academic activities, process information to compare relationships between ideas, build on or activate their previous knowledge, and succeed in selecting strategies (Oxford, 2017). In addition, the high use of deep information processing strategies indicates that the participants likely had high problem-solving and thinking skills. This also indicates that most participants probably can retain learning EFL both short- and long-term. They can also likely integrate, synthesize, and reflect on language learning. Although two-thirds of the participants in the present study reported higher use of deep information processing strategies, one-third reported not using or being uncertain about using these strategies. Therefore, teaching such students about deploying deep information processing strategies in the early stages of their language learning is helpful (Lee & Oxford, 2008).

Social Learning Strategies

Fourth, the results showed that the use of social learning self-regulation strategies is less than that of the previous two categories (basic learning self-regulation strategies and deep information processing strategies) but more than that of visual elaboration and summarizing strategies. This is similar to the findings of Panadero et al. (2021), where social strategies ranked third place, with means between 3.03 and 3.68. More than half of the participants reported using these strategies, and less than half reported not using or being uncertain about using these strategies. The slight decrease in using these strategies might be caused by the limited linguistic knowledge among students, which might divert them from relying on other strategies (Vandergrift, 1997). Some factors may play an essential role in using social strategies, such as learning style, learning experience, affective factors, and metacognitive knowledge (Nakatani & Goh, 2007). Indeed, these factors can affect the use of all categories of deep learning self-regulation strategies, not just social ones. Some learner variables such as motivation, personality, gender, belief, autonomy, culture, and aptitude also play essential roles in using strategies (Griffiths, 2008; Griffiths, 2013). These factors or learning variables might contribute to the reduced use of social strategies among the participants, which requires deeper investigation beyond the scope of the present study.

Reliability and Correlation

The value of Cronbach's alpha in the present study ranged between $\alpha = .84$ for the visual elaboration and summarizing strategies and $\alpha = .93$ for basic learning and deep information processing strategies, indicating a high internal reliability of the questionnaire. Regarding the correlation between scales, the analysis suggests that the four groups of learning strategies are likely interconnected, with a particularly strong and positive relationship between deep information processing and other strategies. This could indicate that learners who engage in deep information processing strategies are likely to also engage in basic learning, visual elaboration and summarizing, and social learning strategies. Oxford's concept of flexibility and fluidity in strategy functions can be pointed out here. Scholars should focus on the function of

learning strategies rather than categories (Oxford, 2017) since learners apply them in practice, while researchers categorize them in theory. A learner's strategy can change its category based on how and why it is used (Oxford, 2021, p. 30).

The ANOVA results, however, might imply a natural order of strategy use. Students might start with basic strategies first, and then they begin to use deep information processing strategies followed by social strategies, whereas visual and summarizing strategies develop much later. These findings suggest that educational programs should consider the unique impacts of each strategy type when designing curriculum and instructional methods.

Implications for EFL Contexts

This study of deep learning in an EFL context reveals several implications for language learning outcomes, student success, and instructional design. First, EFL students actively monitor and control their learning processes through basic learning self-regulation strategies, which are metacognitive. Metacognitive strategies can help students succeed by improving their cognitive skills, problem-solving skills, and learning tactics. Through proactive engagement, language learners will better understand and retain the material. Second, given the preference for basic learning strategies (metacognitive) over deep information processing strategies, EFL instructional designs should incorporate activities promoting metacognition. This can include teaching techniques explicitly addressing planning, monitoring, and evaluating learning strategies. For instance, educators might integrate tasks that require learners to reflect on their learning processes and outcomes or adjust their strategies based on their reflections. Additionally, although social learning strategies were used less frequently than the above two, they are essential for language learning because they allow students to share knowledge and learn from their peers. Therefore, the instructors should encourage the development of such strategies. For example, group activities, peer review, and collaborative learning projects may enhance the use of these strategies in EFL contexts with limited real-life practice opportunities. Since most of the participants were from the A2 level, we can assume that visual elaboration and summarizing strategies (due to their cognitive demands) were the least frequently used by learners with lower proficiency levels (e.g., A2). To counteract this problem, the instructor can introduce these strategies gradually through scaffolded instruction, where task complexity increases with students' proficiency. These strategies are essential to academic success because they can help students improve their ability to understand and express themselves.

Furthermore, the data suggest that many learners do not use some strategies or are uncertain about their use. As a result, educators must ensure that all students are aware of and can use various learning strategies. To provide equitable educational opportunities, strategy training programs should be inclusive and cater to different learning preferences and needs. The effectiveness of these strategies depends on a robust assessment and feedback system. This can involve developing various assessment methods that measure their impact on language learning.

Limitations

Some limitations may have affected the overall conclusions of this study. One limitation of the current study was the absence of affective strategies. As mentioned earlier, affective strategies are not included in the borrowed instrument, and we consider this a drawback in the questionnaire, regardless of the reasonable justifications stated by the designers (for details, see Pandero et al. 2021). Affective strategies and generating emotional reactions are among the three essential phases or aspects of self-regulation learning, as proposed by experts in the field (Zimmerman, 2002; Zimmerman et al., 2017).

Another limitation of the present study is the issue often referred to as response bias, where respondents might give answers that they believe are expected or desirable rather than what is faithful to their actual behavior. For example, in some questionnaire items, a student might perceive a particular strategy as something they should be doing and then claim to do it, even if that is not entirely accurate. It is not necessarily intentional dishonesty but rather a tendency to portray a more idealized version of their learning experience. We must consider the complexity of survey design when interpreting survey data, particularly in educational studies where perceptions of 'correct' or 'aspired' behaviors can affect responses. Although we received a high response to some strategies (e.g., basic learning strategies), the response to other strategies did not seem as overwhelming. Researchers, therefore, should incorporate neutral phrasing or qualitative methodologies for future research to cross-validate their findings.

In addition, no questionnaire was administered after a learning session, and academic performance metrics were not included in the study. Future research needs to replicate this study with controls for learning task performance and more controls for proficiency knowledge since most of the participants were from the A2 level.

Conclusion

This study investigated the self-regulation strategies of EFL learning in four dimensions: basic learning, visual elaboration and summarizing, deep information processing, and social learning. The results showed high self-regulated strategy use, except for visual elaboration and summarizing strategies. In addition, a strong, positive, and significant correlation was found between all of the strategy categories, indicating that students who are likely to use at least one strategy are likely to use multiple strategies.

While the context should be considered, the emphasis on basic learning self-regulation strategies highlights their crucial role in academic settings, especially since the results of this study mirrored several others. These strategies might help EFL students manage their learning processes effectively, making them crucial for independent and classroom learners. In addition, EFL students might benefit from a greater focus on visual elaboration and summarizing strategies to improve their comprehension and retention since the results of this study and many others show that these strategies are underused by many students. Raising awareness about those underutilized strategies through structured strategy instruction could equip students with practical learning.

For future research, longitudinal studies, combining quantitative surveys with qualitative interviews or focus groups, could provide a more insightful understanding of how and why students choose specific strategies and how they correlate with language proficiency levels over time. This could address limitations in current research related to students' strategy choices. Such studies could further investigate how students' strategy use and attitudes are affected by external factors, such as gender (male and female).

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