



AN INVESTIGATION OF LEARNING APPROACHES AND LANGUAGE LEARNING STRATEGIES: ARE THEY RELATED?

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Abstract:

In related research, learning approaches and learning strategies have been reported as important variables influencing the quality of student learning. The aim of the present study is to investigate the relationship between the learning approaches and the language learning strategies of higher education students. The research was conducted with the participation of 493 freshmen (M=257, F=236) attending various departments at Balikesir University in Turkey. For research purposes, the Turkish versions of Strategy Inventory of Language Learning (SILL) and the Approaches and Study Skills Inventory for Students (ASSIST) were used. After the reliability of both instruments was computed, descriptive and inferential statistics were used to analyze data. The findings showed that students' learning approaches were associated with their learning strategy use. The results provided further evidence that gender and field of study might have an impact on learning approach adoption and language learning strategy use. One of the more significant findings to emerge from this study was that engineering students had the highest total mean scores in deep and strategic approach and made use of learning strategies the most.

Keywords: learning approaches, language learning strategies, gender, grade level, field of study

1. Introduction

Learning approaches (LAs) are considered to have an impact on the quality of student learning (Entwistle & Ramsden, 1983; Marton & Säljö, 1976). Entwistle and Peterson (2004) argue that similar to other broad constructs such as conceptions of knowledge and conceptions of learning, LAs (or learning orientations) also develop and change during the learning process and within different environments. In their review Baeten,

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Kyndt, Struyven and Dochy (2010) present a list of encouraging and discouraging factors that may influence students' orientations to learning (p. 247), where they group them as contextual factors, perceived contextual factors and student factors. Among many other factors, they discuss the influence of discipline or area of study, gender, academic skills and coping strategies, learning habits, and emotions on students' adoption of LAs. So far, a broad range of research has also attempted to focus on many aspects related to LAs. There are studies which have examined differences in LAs based on study time (Kember et al., 1995), impact of workload (Ryan et al., 2004), demographic factors such as age, gender and socioeconomic status (Byrne & Willis, 2008; Duff, 2002), instructional factors such as teaching method, assessment types and procedures (Gijbels & Dochy, 2006; Scouller, 1998), self-efficacy (Gordon & Debus, 2002), achievement (Diseth et al., 2010) and achievement and social goals (King, Ganotice & Watkins, 2014).

On the other hand, language learning strategies (LLSs) have also been reported to contribute to the quality of student learning (Oxford, 1990). Similar to LAs, LLS use is also amenable to change. Oxford and Burry-Stock (1995) suggest that teachers must keep in mind the differences in motivation, learning style, gender and other factors that might affect LLS use. Existing research recognizes those factors and a growing number of publications have focused on the likely relationship between LLSs and several factors or outcomes such as achievement (Yalçın, 2003), proficiency level (Bremner, 1999), motivation (Chang & Liu, 2013), beliefs about language learning (Zare-ee, 2010), learning style (Wong & Nunan, 2011), vocabulary size (Nacera, 2010), goal orientations (Diseth, 2011), cultural background (Grainger, 2012) etc.

Among those factors contributing to the variance in LA adoption and LLS use, there is paucity of empirical research specifically investigating the relationship between these two constructs. Thus, a research examining the possible relationship might give both researchers and teachers an insight on how to enhance student learning.

Additionally, as it will be presented in the subsequent section, specifically in those studies examining the role of gender and field of study in LA adoption and LLS use, the results have been far from univocal. Given these gaps in research on learning orientations and learning strategy use in language education, the current study also discusses the differences in relation to gender and field of study.

2. Literature Review

2.1. Learning Approaches and Language Learning Strategies

Starting with a qualitative research conducted by Marton and Säljö at the University of Gothenburg (Marton & Säljö, 1976, p. 4-8), learning orientations of students have drawn a lot of interest. LAs are the different orientations that students in higher education may adopt depending upon their perceptions of the content, the context and the demands of academic situations (Marton, 1976; Ramsden, 1979). Research on approaches to learning or studying have revealed three learning orientations: deep learners try to have a thorough understanding of the learning content, surface learners try to memorize the

content or spend minimum effort to meet the course requirements and strategic learners use organized study methods to maximize their academic achievements (Biggs, 1987; Entwistle & Ramsden, 1983; Marton & Säljö, 1976; Newble & Entwistle, 1986).

On the other hand, language learning strategies became popular in the field of language education in late 1970s. Since then many authors have tried to define and classify them. In her seminal work, Rubin used the term learning strategies to mean "*the techniques and devices which a learner may use to acquire knowledge*" (1975, p. 43). Later, Oxford (1990) defined LLSs as "*specific actions taken by the learner to make learning easier, faster, more enjoyable, more self-directed, more effective, and more transferrable to new situations*" (p. 8). A quick review of related literature reveals different classifications or categorizations of LLSs. For research purposes, the authors of the present study decided to use the taxonomy on LLSs offered by Oxford (1990), where she divides them mainly into two: direct strategies and indirect strategies. In her taxonomy, direct strategies are memory, cognitive and compensation strategies. She labels metacognitive, affective and social strategies under indirect strategies.

2.2. Studies on Learning Approaches and Language Learning Strategies

In the following sections, research on LLSs and LAs is reviewed. The review mainly focuses on studies which have reported findings on gender and field of study.

2.2.1. Review of Research on LAs

There has been little agreement on findings related to students' preferences of LAs in general. In some research, a tendency towards achieving approach was observed (Teoh et al., 2014; Pang, Ho & Man, 2009; Teixeira, Gomes & Borges, 2013). Pang, Ho and Man (2009) suggested that such a result could be due to students' efforts to successfully gain entry into one of the tertiary level institutions (in Hong Kong in their study), in which they "consciously set this aim as their target and did what was necessary to achieve that aspiration" (p. 133-114). Senemoglu (2011) found that Turkish students were mostly inclined to deep approach than strategic and surface approach, whereas in another Turkish context, Ekinçi (2009) gave an account of students' preference to surface and strategic approaches. In an earlier research, Byrne, Flood and Willis (2002) reported higher scores on deep and strategic approach in accounting education.

Taking gender differences on the adoption of LAs, while some research reported no consistent evidence of significant difference between males and females (Ballantine, Duff & McCourt Larres, 2008; Byrne, Flood & Willis, 2002; Heikkilä & Lonka, 2006; Lake & Boyd, 2015; Mogre & Amalba, 2015; Richardson, 1993; Vermunt, 2005; Zeegers, 2001), some other found significant differences. While Xie and Zhang (2015), Veloo et al. (2015) and Andreou, Andreou and Vlachos (2004) found that male students were more likely to adopt deep approach, Montaña et al. (2010) and Karaduman et al. (2015) demonstrated that males scored higher in surface approach. On the other hand, while in a study conducted by Smith and Miller (2005), female students were found to be higher than their male counterparts in achieving strategy, females reported a more surface-oriented approach in another research (Andreou, Andreou & Vlachos, 2004).

Similarly, studies investigating differences in learning orientations based on field of study revealed interesting findings. In many research, higher education students in arts and social sciences were found to have significantly higher deep approach scores than science, engineering, business, medical and accounting students (Abraham et al., 2006; Baeten et al., 2010; Booth, Lockett & Mladenovic, 1999; Kember, Leung & McNaught, 2008; Smith & Miller, 2005; Ullah, Richardson & Hafeez, 2013). However, there were some studies in which no significant difference between disciplines was found (Ballantine, Duff & McCourt Larres, 2008; Edmunds & Richardson, 2009; Lake, Boyd & Boyd, 2015; Watkins & Regmi, 1990).

2.2.2. Review of Research on LLSs

Regarding gender differences in LLS use, there are some inconsistencies. In many LLS studies involving gender, differences between males and females were reported, usually favoring females as more frequent users of strategies (Alhaysony, 2017; Al-Natour, 2012; Dreyer & Oxford, 1996; Goh & Foong, 1997; Lan & Oxford, 2003; Liu, 2004; Yilmaz, 2010). However, a few studies gave accounts of males surpassing females in strategy use (Lou, 1998; Peng, 2001; Tercanlioğlu, 2004; Wharton, 2000). Whilst in some other studies, no empirical evidence was found to support gender factor in LLS preference and use (Griffiths, 2003; Poole, 2000; Shmais, 2003; Szoke & Sheorey, 2002).

Relatively few studies have examined the relationship between field of study and LLS use. Chang (1991) found that compensation strategies were the most commonly used ones, while the affective strategies were the least. Moreover, humanities and social science majors utilized more learning strategies than science majors. Peacock and Ho (2003) reported that English major students made use of strategies the most, while computer science majors used the strategies the least. Having 279 students (260 undergraduate and 19 postgraduate) from 17 different departments in a Taiwanese University, Chang (2012) reported that European Language majors used the strategies the most, while Sports Business Management majors utilized them the least.

The studies presented thus far provide evidence that gender and field of study may have an impact on students' LAs and LLS use. Overall, the previous studies also suggest that there has been little agreement on the findings regarding the effects of gender and discipline.

2.3. Research Questions

In this respect, this study endeavors to identify and compare the LAs and LLSs of students in higher education and explore the relationship between these two constructs.

The research questions addressed in this study are:

1. What is the level of relationship between students' LAs (deep, surface and strategic) and their LLSs?
2. Do students' adoptions of LAs and their preferences for LLSs change according to gender and field of study?

We hypothesized that students' learning orientations would be closely related to their language learning strategy use. Since students would resort more to LLSs to better

understand the learning content or to achieve high examination grades, deep and strategic approaches would positively correlate with learning strategies. Regarding the changes or variations in LAs and LLSs based on gender and field of study, the results obtained in a Turkish higher education setting were expected to contribute to existing research findings, which are not univocal already. The authors' aim was not to replicate the studies found in literature, but to bring an insight into the relationship between these two constructs and to examine the impact of gender and field of study.

3. Method

3.1. Participants and Procedures

This exploratory study involved students attending various departments at Balikesir University in Turkey. Data were gathered from 493 freshmen (female=236, male=257), who took English as a foreign language as an obligatory course. Students were selected on voluntary basis with convenience sampling. Grant of application was received from the university's board of ethics. The instruments were administered separately to the same students with the assistance of language instructors. The administration of each inventory took 20-25 minutes.

3.2. Measures

For research purposes, the Turkish versions of Strategy Inventory of Language Learning (SILL) (Oxford, 1990) and the Approaches and Study Skills Inventory for Students (ASSIST) (Tait, Entwistle & McCune, 1998) were used.

SILL consists of 50 items under two main constructs of direct (29 items) and indirect (21 items) learning strategies. Direct strategies are subdivided into memory (9 items), cognitive (14 items), and compensation (6 items) strategies, whereas indirect strategies are subdivided into meta-cognitive (9 items), affective (6 items), and social (6 items) strategies. The Turkish version of SILL was adapted by Cesur and Fer (2007) and the alpha coefficient for the whole inventory was computed as .92.

Table 1: Cronbach's Alpha Values of ASSIST and SILL and Their Subscales

Scales	Present Study (N=493)	Turkish Adaptation Study
		(Senemoglu 2011) (N=806)
ASSIST (Entire Inventory)	0.88	0.81
- Deep Approach	0.83	0.81
- Surface Approach	0.70	0.71
- Strategic Approach	0.85	0.81
		(Cesur and Fer 2007) (N=768)
SILL (Entire Inventory)	0.94	0.92
- Memory Strategies	0.78	0.70
- Cognitive Strategies	0.86	0.82
- Compensation Strategies	0.66	0.65
- Metacognitive Strategies	0.86	0.86

- Affective Strategies	0.68	0.59
- Social Strategies	0.66	0.61

ASSIST measures students' approaches to learning on mainly three dimensions as deep, strategic, and surface-apatetic. The inventory is comprised of 67 statements and respondents indicate their agreement with each statement using a five point Likert scale. ASSIST consists of four sections. The first section is a six-item measurement of the student's own conception of what the term "learning" means to them. The second section consists of 52 statements related to three main dimensions. The third section of ASSIST is an eight-item questionnaire measuring preferences for different types of teaching- lectures, courses, exams and books. In the fourth section, the students are asked how well they think their overall performance is assessed. In the present study, the 52-item second section of the inventory was used to find out students' preferences to learning approaches. The Turkish version was adapted by Senemoglu (2011) and has a correlation coefficient of .82 with the original one.

The Cronbach's Alpha computed for the entire inventory and subscales of both ASSIST and SILL in the present study were compared to those values obtained in the Turkish adaptation studies (Table 1). These values could be considered as high internal consistency for both scales.

3.3. Data Analysis

To facilitate efficient analysis, data were coded into SPSS version 21. Both descriptive and inferential statistics were used during analyses. Pearson correlation was run to investigate the relationship between LAs and LLSs. One way between groups multivariate analysis of variance (MANOVA) was performed to determine significance of variation in LAs and LLSs in relation to gender and field of study.

4. Results and Discussion

4.1. Research Question 1: The Relationship between LAs and LLSs

Pearson correlation was performed to find out the level of relationship between students' LAs (deep, surface and strategic) and their LLSs. Based on data from ASSIST and SILL applications (Table 2), as hypothesized, entire SILL scores correlated at medium level (.35) with the scores of deep approach and strategic approach. Both deep and strategic approaches had the highest correlations with memory strategies, .46 and .44 respectively. Accordingly, the only significant correlations between surface approach and the subscales of SILL are memory strategies (.12) and compensation strategies (.12), which are positive but weak. These results might indicate that LLSs and LAs of deep and strategic, as measured with self-report inventories, are intertwined. The findings may further indicate that memory and compensation strategies are slightly generalizable across different learning orientations. Similarly, there are studies (Enwistle & Peterson, 2004) suggesting usage of some memory strategies (e.g. memorizing) at some stages by all students with different LAs. To date, there has been

no solid empirical evidence for the relationship between these two constructs. Thus, these correlations require further discussion in the field of educational psychology.

Table 2: Correlations Between Subscales of ASSIST and SILL

Subscales ASSIST	Entire SILL	Memory	Cognitive	Compensation	Metacognitive	Affective	Social
Deep	,348**	,455**	,278**	,231**	,255**	,259**	,216**
Surface	,072	,121**	,018	,116**	,042	,082	,014
Strategic	,346**	,435**	,244**	,186**	,280**	,341**	,226**

** . Correlation is significant at the 0.01 level (2-tailed).

4.2. Research Question 2: Changes in LAs and LLSs Based on Gender and Field of Study

Having the assumption of univariate normality assessed with Shapiro-Wilk's test ($p > .05$) and box plots, with no multivariate outliers identified, no multicollinearity found and homogeneity of variance-covariance matrices satisfied, a one way between groups multivariate analysis of variance (MANOVA) was performed to investigate differences based on gender and discipline. A Levene's test also verified the equality of variances in the samples (homogeneity of variance) ($p > .05$) (Martin & Bridgmon, 2012). The descriptive statistics based on gender differences are presented in Table 3. Considering the LAs, there was statistically no significant difference between males and females on the combined dependent variables, $F(3, 489.000) = 2.38$, $p = 0.069$ Wilk's Lambda = 0.99, partial eta squared = 0.014. However, when deep, surface and strategic approaches were considered separately, a significant difference was observed in surface approach: $F(1, 491) = 4.26$, $p < 0.05$, partial eta squared = 0.009. Mean scores of females were significantly higher than those of males. Though not significant, the males scored higher in deep approach, whereas mean scores of females were higher than those of males in strategic approach. This finding indicates that both males and females were equally motivated for achievement, organizing their studies, monitoring their understandings and managing their time (strategic approach) more than the other approaches. And compared to males, females were significantly in favor of surface approach. Even though the differences were not significant, the males were slightly more inclined to deep approach, whereas the females preferred strategic approach slightly more.

Table 3: Descriptive Statistics Obtained from ASSIST and SILL Based on Gender and Field of Study

		Male (n=257)	Female (n=236)	Engineering (n=166)	Health Sciences (n=98)	Economics and Administration (n=164)	Education (n=65)
Deep Approach	M	55,76	55,30	58,04	54,95	53,41	55,54
	sd	11,22	9,39	10,79	9,39	10,79	8,32
Surface Approach	M	48,98	50,71	50,01	50,91	50,35	46,28
	sd	9,39	9,26	9,89	10,24	8,48	7,94
Strategic Approach	M	70,56	71,28	74,36	69,71	68,54	69,88
	sd	13,71	10,70	13,69	10,33	12,35	9,58

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SILL (Entire)	M	148,30	137,60	152,44	130,33	146,05	131,66
	sd	34,44	31,79	29,88	33,62	34,43	31,77
Memory Strategies	M	27,45	26,55	28,39	25,78	27,34	24,58
	sd	7,20	6,77	6,64	7,20	7,35	5,83
Cognitive Strategies	M	40,20	36,11	40,34	35,01	38,90	36,09
	sd	11,42	10,03	9,97	10,92	11,75	10,10
Compensation Strategies	M	18,47	17,41	18,84	16,91	18,22	16,66
	sd	4,75	4,70	4,59	4,99	4,74	4,36
Metacognitive Strategies	M	27,64	25,10	28,89	22,78	27,27	23,51
	sd	8,00	7,77	7,23	7,61	7,59	8,62
Affective Strategies	M	16,46	15,73	17,38	14,29	16,51	14,63
	sd	5,05	4,74	4,64	4,89	5,11	3,92
Social Strategies	M	18,08	16,70	18,60	15,57	17,81	16,18
	sd	4,89	4,73	4,40	5,21	4,91	4,28

Overall, these results seem to be consistent with those in the literature, which suggests that gender has an impact on students' LAs and LLS use (Alhaysony, 2017; Hong-Nam & Leavell, 2006; Smith & Miller, 2005; Teixeira, Gomes & Borges, 2013; Veloo et al., 2015; Wharton, 2000; Xie & Zhang, 2015). Considering the LAs and LLSs together, although the females were equally inclined to strategic approach as a learning orientation, the reports showed that they used the learning strategies less than their male counterparts.

The results also showed that both males and females favored the strategic approach more than the other two approaches. LAs are not fixed traits, but are prone to change depending on the learning environment and the assessment tasks (Enwistle & Peterson, 2004). It seems that the test-like, assessment-driven nature of the learning context would possibly influenced students' preferences, where students having the aim of getting high grades from exams tended to adopt the strategic approach. It is essential to point out that the participating students had just gained entry to a higher education institution after succeeding in the university entry exam, which is set as a target for achievement by almost all students in their last years of secondary education in Turkey. Such assessment-driven, test-achieving behaviors were also reported in other studies (Ekinçi, 2009; Karaduman et al., 2015; Pang, Ho & Man, 2009).

Taking the majors or disciplines of students into account (Table 3), MANOVA was performed again to investigate the differences in students' LAs and their LLSs. For analysis purposes, the students majoring at different disciplines were grouped under four fields of study as independent variables.

Considering the learning approaches, there was a statistically significant difference between majors on the combined dependent variables, $F(9, 1185.381) = 3.97$, $p > 0.001$ Wilk's Lambda = 0.93, partial eta squared = 0.024. Pair wise post hoc analyses showed that; for deep approach, students majoring in engineering had significantly higher total mean scores than the students studying economics and administration; for surface approach, students studying education had significantly lower total mean scores than students enrolling in health sciences and economics and administration; for strategic approach, students majoring at engineering departments had significantly higher total mean scores than students studying health sciences and economics and

administration. Overall, these findings indicated that students at different disciplines were more inclined towards strategic approach. A further outcome that emerged was that students in health sciences tended to use surface approach more than the other disciplines, while students studying at education faculty were the ones favoring the surface approach the least. Perhaps the most interesting finding to emerge from the analysis was that engineering students had the highest total mean scores in deep and strategic approach. This finding is contrary to previous studies (Baeten et al., 2010; Hayes & Richardson, 1995; Kember, Leung & McNaught, 2008; Richardson & Hafeez, 2013) in which students in the arts and social sciences were more likely to adopt a deep approach to studying compared to their counterparts in science disciplines.

As Biggs, Kember and Leung (2001) suggest, students adjust their approaches to studying according to the demands of the course that they enroll in. Hence, it has been reported in many research that students in different disciplines or area of study may adopt different learning approaches. A good review of research findings on encouraging and discouraging factors stimulating language approaches can be found in Baeten et al. (2010) study, where the authors show that students in various disciplines differ in their approach to learning, with students in human sciences in general adopting the deepest approach. In his longitudinal study, Zeegers (2001) also concludes that student approach to learning is dynamic and amenable to change as a result of the learning experience. However, Smith and Miller (2005) consider whether “*the difference in learning approach might be due to students adapting their learning approach to the learning environment, or to a bias for students to enroll in a particular discipline that best suits their predisposed learning style*” (p. 45). Debate continues to exist on this issue and the findings in related research are far from univocal.

According to the results for the entire inventory and subscales of SILL, there was a statistically significant difference among the majors of students on the combined dependent variables: $F(18, 1369.444)=3.50$, $p<0.001$; Wilk's Lambda=0.88, partial eta squared=0.041. Pair wise post hoc analyses indicated that based on entire inventory of SILL, students studying engineering and economics and administration had significantly higher total mean score than students majoring in health sciences and education. For the direct strategies of memory, cognitive and compensation, the students studying at engineering departments had significantly higher total mean scores than the students in health sciences and education. And for the indirect strategies of metacognitive, affective and social, students majoring at engineering and economics and administration departments had significantly higher total mean score than students in health sciences and education. From the findings above we can see that students studying at engineering departments made use of language learning strategies the most, while the students enrolling at health sciences departments resorted to them the least. Interestingly, students majoring in education had the lowest total mean scores in memory and compensation strategies.

Overall, comparison of the findings with those of other studies (Andreou, Andreou & Vlachos, 2004; Baeten et al., 2010; Ekinci, 2009; Kember, Leung & McNaught, 2008; Laird et al., 2008; Senemoglu, 2011; Smith & Miller, 2005; Ullah,

Richardson & Hafeez, 2013) confirms that students' choice of LAs might change based on their field of study or discipline. The results also accord with earlier research (Chang, 1991; Chang, 2012; Peacock & Ho, 2003) which showed that field of study could play a role in students' language strategy use. Considering the LAs and LLSs together; engineering students not only had the highest total mean scores in deep and strategic approach, they also made use of learning strategies the most.

4.3. Limitations and Directions for Future Research

Taken together, the present study presents some preliminary findings; however there are some limitations, which also point out directions for future research. First, this study aimed to investigate the relationship between LAs and LLSs and the changes in these constructs based on discipline and gender. However, learning is much more complex and many other interrelated factors might have direct or indirect influence on learning. This study could be considered as an effort to explore the factors influencing these two constructs and the relationship between them. The analysis of other direct or indirect factors should be the subject of further research. Second, this quantitative research is based on data obtained from the applications of questionnaires on LAs and LLSs only. Third, the findings in the present study should be approached carefully since they were based on a sample of Turkish students, cultural and educational experience of whom may have particular influence on their LAs and LLSs in a foreign language. Fourth, the participants were all freshmen taking the English as a Foreign Language Course and they didn't have any overt training on strategy use. Thus, their level of strategy use is just considered as a natural development. The repetition of this study with groups having explicit language strategy use instruction and those having none at all would reveal different results. Fifth, approaches to learning are dynamic and open to change depending on learning experiences. So, a longitudinal study that would observe changes in orientations through different grades could help educators identify the possible factors (teaching methodology, assessment type, etc.) generating those changes and assist learners better in the learning journey.

In conclusion; given that the previous and present research suggest mixed findings on factors like gender and field of study, there is a need for more research to explore the relationship between learners' studying approaches and their LLSs. Later, those results obtained might be utilized to design the courses for individual students with varying types and levels of LA and strategy use, thus provide students instructional support in a constructive way. Finally, as mentioned in the introduction part, since learning orientations are amenable to change according to many factors such as field of study, instructional method, assessment type etc., it is quite feasible to expect different predispositions across varying learning situations and subject domains. Hence, comparing the findings of the present research with strategy use and learning approach investigations in other non-English contexts would suggest interesting results concerning several topics including context-specificity.

5. Conclusion

This exploratory study used quantitative data from two scale applications to investigate the relationship between students' LAs and their LLS use. Further, this research set out to examine the differences taking gender and field of study as basis. The results of the research showed that students' LAs were associated with their LLS use. There was a positive correlation between all components of LLSs and deep and strategic approaches, while the only significant correlations between surface approach and language strategies were memory and compensation strategies. The results further showed that the ASSIST and the SILL identified differences between gender groups and fields of study. Although males and females predominantly adopted the strategic approach in their initial years of tertiary education, separate analysis of learning approaches revealed that females were significantly more in favor of surface approach. For the LLSs, male students were inclined to use them more than the females, except for memory and affective strategies, where both genders resorted to them at similar levels.

Considering students' field of study in overall, students at different disciplines were more inclined to adopt the strategic approach. Perhaps the most striking finding was that students enrolling at engineering faculties (a science discipline) had the highest total mean scores in deep and strategic approach. Further, students in health sciences tended to use surface approach more than the other disciplines, while students studying at education faculty were the ones favoring the surface approach the least. On the other hand, students studying at engineering departments made use of LLSs the most, while the students enrolling at health sciences departments resorted to them the least. Another finding that emerged from the data was that students majoring in education had the lowest total mean scores in memory and compensation strategies.

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ARE THEY RELATED?

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