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Reading Strategy Use among ESP Learners: Do Age, Gender, and Major Matter?

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ABSTRACT

This study investigated the influence of age, gender, and academic major on reading strategy use among English for Specific Purposes (ESP) learners at Mazandaran University. Using a quantitative survey design, data were collected from 125 students (humanities and engineering majors) via the Persian version of the Survey of Reading Strategies (SORS). Shapiro-Wilk tests confirmed data normality, and independent samples t-tests and one-way ANOVA were employed for analysis. Results revealed no significant age-based differences in strategy use ($F = 0.851$, $p = 0.434$), suggesting age is not a critical factor in this context. However, gender and major significantly predicted strategy deployment: female students used strategies more frequently than males ($t = -5.15$, $p < 0.001$), and engineering students outperformed humanities students ($t = -4.1085$, $p < 0.001$). Problem-solving strategies (e.g., re-reading, adjusting speed) were most prevalent, followed by support and global strategies, aligning with prior findings (Mokhtari & Sheorey, 2002). The study highlights discipline-specific strategic demands, with engineering students potentially benefiting from their analytical training. These outcomes demonstrate the need for tailored ESP instruction, particularly to address gender gaps and disciplinary disparities in strategy use. The findings offered practical insights for educators to enhance strategic reading instruction in ESP contexts, emphasizing global strategy training for humanities students and metacognitive awareness for male learners.

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Introduction

Academic reading involves purposeful and critical engagement with lengthy discipline-specific texts (Sengupta, 2002), differing significantly from everyday reading practices (Faizah, 2004). As Jiménez et al. (1996) explain, it requires deliberate strategies to effectively comprehend complex material. The growing importance of academic reading skills in recent decades (Levine et al., 2000) stems from their essential role in higher education, making their acquisition crucial for university students.

The study of academic reading strategies began with foundational work by Alderson and Urquhart (1984), Grellet (1981), and Williams (1985), who examined how non-native English speakers approach content-area texts. Over the past thirty years, research has expanded significantly to explore various aspects of learner strategies for academic texts. Within English for Specific Purposes (ESP), studies have investigated multiple dimensions including: the relationship between reading strategies and proficiency levels (O'Malley & Chamot, 1990); cross-linguistic influences on strategy use (Hardin, 2001; Jiménez et al., 1996); and cultural and motivational factors affecting reading approaches (Parry, 1993).

Further research has examined strategy use across different contexts, including testing situations (Cohen, 2006) and various academic purposes (Chou, 2013). Comparative studies have analyzed differences between skilled and less-skilled readers (Yau, 2005) and explored discipline-specific variations among university students (Sohail, 2015; Kasemsap & Lee, 2015; Boonkongsaen et al., 2016). However, as Chou (2013) and Dabiri et al. (2016) note, existing research has not adequately addressed how ESP students' reading strategies vary according to age, major, and gender.

The current study addressed this gap by investigating the reading strategies employed by ESP students at Mazandaran University. Using quantitative methods, it examines strategy use across different academic disciplines while conducting comparative analyses based on gender, major fields of study, and age groups. This approach aims to provide a more comprehensive understanding of how diverse learner characteristics influence academic reading strategies in ESP contexts. In light of the above, the following research questions were formulated:

Is there any significant difference between the ESP students' frequencies of using reading strategy types across age groups?

Is there any significant difference between the ESP students' uses of reading strategy types across genders?

Is there any significant difference between the ESP students' uses of reading strategy types across majors?

Literature Review

Reading Strategies

Research on language learning strategies, particularly reading strategies in both L1 and L2 contexts, has expanded significantly since the 1980s (Block & Pressley, 2002; Brantmeier, 2000, 2002). Numerous studies have examined how reading strategies enhance comprehension (Jimenez et al., 1996; Mokhtari & Reichard, 2002, 2008). As Carrell et al. (1998) explain, this interest stems from how strategies reveal readers' text interactions and their relationship to effective comprehension.

Reading strategies have been defined in various ways. Garner (1987) describes them as deliberate activities to address cognitive challenges, while Paris et al. (1991) view them as goal-oriented actions. Key characteristics include being deliberate, problem-focused, and reader-controlled (Koda, 2005; Afflerbach et al., 2008). This study adopts Mokhtari and Sheorey's (2002) definition from their SORS instrument, which emphasizes intentional techniques for monitoring reading, text interaction procedures, and comprehension support mechanisms.

Traditional reading strategies include skimming, contextual guessing, and activating background knowledge (Carrell et al., 1998). Researchers have proposed various classification systems, often using binary divisions "general comprehension" vs. "local linguistic" or "text-level" vs. "word-level" strategies, reflecting top-down and bottom-up processing models. A widely accepted framework distinguishes cognitive strategies (direct text manipulation) from metacognitive strategies (learning process oversight) (O'Malley et al., 1985). However, Grabe (2009) argues against strict divisions, suggesting strategies are used with varying metacognitive awareness. Alternative classifications like Mokhtari and Sheorey's (2002) SORS organize strategies into Global, Problem-solving, and Support categories.

This progression in reading strategy research demonstrates both the complexity of classifying strategic reading behaviors and their recognized importance for comprehension development across different learning contexts. The varying frameworks reflect ongoing efforts to understand how readers optimally engage with texts to construct meaning.

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Related Empirical Studies

Several studies have examined reading strategy use among EFL learners across different contexts. Chen and Chen (2015) investigated 1,259 Taiwanese high school students using the SORS instrument, finding high awareness of reading strategies with a preference for global strategies, and greater strategy use among female students. Rianto (2021) investigated gender differences in metacognitive reading strategies among 602 Indonesian EFL university students during online reading. Using OSORS and proficiency tests, the study found females employed overall, problem-solving, and support strategies more frequently than males, though effect sizes were small. Notably, gender differences were significant only among less-skilled readers, with female strategy use predicting both reading ability and English proficiency, while male use only predicted reading ability. The study highlights female dominance in EFL online reading contexts.

Ajideh et al. (2018) explored learning style-strategy relationships in ESP reading among 313 Iranian Art and Science students. Through PLSPQ and SORS questionnaires, results showed Art students preferred kinesthetic, auditory, visual, and tactile learning styles, while Science students favored only kinesthetic styles. Both groups predominantly used cognitive strategies for ESP reading. Pearson correlation analyses revealed connections between learning styles and strategy choices, emphasizing discipline-specific approaches to academic reading. Bećirović et al. (2018) examined how gender, nationality, and GPA influenced reading strategy use among 228 Bosnian EFL university students. Problem-solving strategies were most frequent, with three-way ANOVA/MANOVA revealing: (a) significant gender effects on overall strategy use and combined strategy types, (b) Nationality × GPA interaction effects on strategy use, and (c) GPA × Gender/Nationality interactions affecting problem-solving strategies. The study underscores the need for strategy instruction tailored to learner profiles.

These studies collectively demonstrate that while reading strategy awareness and use patterns vary across educational levels, cultural contexts, and individual differences, certain consistent findings emerge regarding gender differences and the benefits of specific strategy types for EFL comprehension. The research highlights the complex interplay between learner characteristics, instructional approaches, and reading outcomes in diverse EFL settings.

Method

Participants

One hundred twenty-five university students from different ESP courses in different majors (humanities and engineering) took part in this study. Both male (n= 39) and female (n=86) students from different age groups, adult learners ranging in their ages from 20 to 35 years old in ESP courses in Mazandaran University took part in this study. The age group is classified as 20-25 (n= 78), 25-30 (n= 33) and 30-35 (n= 14). Moreover, they are studying at BA level and have passed General English Course at the university in two broad major groups of humanities (n=71) and engineering (n= 54).

Instrument

The instrument used in this study was the Survey of Reading Strategies (SORS) by Mokhtari and Reichard (2002). This instrument was based on the Metacognitive Awareness of Reading Strategies Inventory (MARSI), which was originally developed by Mokhtari and Reichard (2002) as a tool to measure native English language learners' awareness of reading strategy usage. However, the SORS mainly examines the type and frequency of the use of reading strategies by ESL adolescent and adult students when they read English academic materials such as textbooks and journal articles. The SORS consists of 30 items measuring three categories of English reading strategies: namely, problem-solving strategies, global reading strategies, and support strategies. For this study, it was translated into Chinese, the native language of the participants. The questionnaire items were rated on a five-point Likert type scale: strongly agree (5), agree (4), uncertain (3), disagree (2), and strongly disagree (1). The questionnaire took approximately 10-15 minutes to complete. The score from the questionnaire indicated the frequency of respondents' uses of SORS in general and in each SORS category. It was reported that the Cronbach's the overall SORS was 0.90.

Procedure

After piloting the questionnaire among 10 learners, the researcher removed the possible sources of misunderstanding in the questionnaire in Persian. The researcher approached the students who have already passed ESP courses in English based on convenient sampling method. After explaining the intention of the research and confirming the fact that the data would be confidential and be used for research purposes, the researcher asked them to fill out the questionnaire. The researcher was present to prevent any misunderstanding

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of the items on the questionnaire. Considering the purpose of the study, there was no time limitation for answering the items and the participants could not share their ideas with one another while answering the questionnaire.

Results

Results for the First Research Question

The first research question of the study was:

Is there any significant difference between the ESP students' uses of reading strategy types across age groups?

In order to investigate the answer to this research question, the descriptive statitics were calculated according to each item of the questionnaire in general and then the statistics were reported for each age group. The results are shown in Table1 to Table 4.

Table 1. Descriptive statistics for Problem Solving Strategies

StrategyProblems solving	M		SD
7I read slowly and carefully to make sure I understand what I am reading.	4.11		0.84
9I try to get back on track when I lose concentration.	4.12		0.94
11I adjust my reading speed according to what I am reading.	3.93		1.00
14When text becomes difficult, I pay closer attention to what I am reading.	4.28		0.70
16I stop from time to time and think about what I am reading.	3.58		1.10
19I try to picture or visualise information to help remember what I read.	3.76		1.10
25When text becomes difficult, I re-read it to increase my understanding.	4.47		0.72
28When I read, I guess the meaning of unknown words or phrases.	3.65		1.19

Considering the kind of Problem Solving Reading Strategies, the students claimed to have no problems with solving reading difficulties. They indicated that when the text is difficult, they re-read it (Strategy 25, M = 4.47); paid close attention to it (Strategy 14, M = 4.28); slowly and carefully tried to understand the text (Strategy 7, M = 4.11), and tried to regain concentration (Strategy 9, M = 4.12). They also, interestingly, controlled their reading speed (Strategy 11, M = 3.93); and used visual, guessing, and thinking skills to solve reading problems (Strategies 19, M = 3.76; 28, M = 3.65; and 16, M = 3.58). All the above Problem Solving strategies are reported at high use.

Table 2. Descriptive statistics for Support Reading Strategies

	Support Reading Strategies	M		SD

2.	I take notes while reading to help me understand what I read.	3.78		1.14
5.	When text becomes difficult, I read aloud to help me understand what I read.	3.62		1.50
10.	I underline or circle information in the text to help me remember it.	4.08		1.10
13.	I use reference materials (e.g. a dictionary) to help me understand what I read.	3.38		1.10
18.	I paraphrase (restate ideas in my own words) to better understand what I read.	3.76		1.01
22.	I go back and forth in the text to find relationships among ideas in it.	3.43		1.15
26.	I ask myself questions I would like the text to answer.	3.37		1.25
29.	When reading, I translate from English into my native language.	2.53		1.37
30.	When reading, I think about information in both English and my mother tongue.	2.87		1.41

Regarding Support Reading Strategies, the students reported high use of Strategy 10 (M = 4.08), Strategy 2 (M = 3.78), and Strategy 18 (M = 3.76). The students used these strategies to underline and circle information, take notes and paraphrase or restate ideas in their own words. Given the above, these students qualified as proficient readers because proficient readers aid reading through note-taking, underlining and highlighting textual information (Mokhtari & Sheorey (2002). To further support the argument that the students were very skillful readers, they reported lower medium use of thinking about information in both English and mother tongue, and translating English into their native languages.

In addition, these students reported medium use of reference materials, and asking themselves questions. It could be argued that these students were in the process of acquiring research skills, which include use of a variety of resources, because they were still at the beginning stages of academics.

As far as Global Reading Strategies are concerned, these students reported high use of reading with a purpose,

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using personal experiences and background knowledge, and reading closely to decide what to take and what to ignore. However, it is important to note that these students reported medium use of Strategy 24 (M = 3.23) where they guessed the content of the text when they read, and also medium use of Strategy 27 (M = 3.39) where they checked to see if their guesses about the text were right or wrong. It is also worth noting that in this subscale, the students also reported medium use of important strategies such as Strategy 20 (M = 2.96), Strategy 15 (M = 2.82), and Strategy 21 (M = 3.14) where they used typographical features such as bold face and italics to identify key information, tables, figures, and pictures in the text to increase understanding; and to critically analyze and evaluate the information presented in the text. They also reported medium use of reviewing text by noting characteristics such as its length and organization (Strategy 8, M = 2.65).

Table 3. Descriptive Strategies for Global Reading Strategies.

Strategy Global reading strategies	**M**	**SD**	
1	I have a purpose in mind when I read.	4.29	0.83
3	I think about what I know to help me understand what I read.	3.91	0.96
4	I take an overall view of the text to see what it is about before reading it.	3.39	1.19
6	I think about whether the content of the text fits my reading purpose.	3.89	1.02
8	I review the text first by noting its characteristics like length and organization.	2.65	1.30
12	When reading, I decide what to read closely and what to ignore.	3.59	0.98
15	I use tables, figures, and pictures in text to increase my understanding.	2.82	1.43
17	I use context clues (evidence or hints from background knowledge) to help me better understand what I am reading.	3.56	1.11
20	I use typographical features like bold face and italics to identify key information.	2.96	1.30
21	I critically analyze and evaluate the information presented in the text.	3.14	1.15
23	I check my understanding when I come across new	3.68	0.99

	information.		
24	I try to guess what the content of the text is about when I read.	3.23	1.23
27	I check to see if my guesses about the text are right or wrong.	3.39	1.28

As already noted, in the Problem-solving strategy subscale the students reported high use of guessing the meaning of unknown words and phrases, and from time to time thinking about what they were reading. Here in the Global Reading scale, however, at a medium level, the students guessed the content of the text, and also checked to see if their guesses were right or wrong. It could be argued that the students' guessing and thinking skills were limited to deducing vocabulary meanings rather than digging deep into the gist of the text to infer, interpret and analyze it. In other words, the students were still not yet proficient in terms of critically interrogating the subject matter of academic texts. Furthermore, they still lacked understanding of the role of length and organization, especially when summarizing academic materials. The following table shows the descriptive statistics for the age groups included in this study.

Table 4. Descriptive Statistics for Age Groups

Age groups	**M**	**SD**
20-25	3.82	.92
25-30	3.71	1.06
30-35	3.77	1.13

As shown in the table above, the mean scores are very close. Shapiro-Wilk test was run to ensure the normality of the distribution of the scores obtained from the strategy questionnaire.

Table 5. Shapiro-Wilk Test for Testing Normality of Distribution

Groups		**Shapiro-Wilk**		
		Statistic	df	Sig.
Reading Strategy		.917	125	.119

As shown in Table 5, the distributions of the data were normal due to the fact that the observed significance level was larger than .05. In other words, one-way ANOVA could be used for comparing the three age groups. The results are shown below:

Table 6. One-way ANOVA for the Age Groups

	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	4.600	2	2.300	.851	.434
Within Groups	116.204	123	2.702		
Total	120.804	125			

The results of the one-way ANOVA test run for the scores of reading strategy (F= 85, p= .43) shows that there is no significant difference among the groups in terms of their strategy use. It can be argued that the groups are similar in terms of their reading strategy use. That is the first hypothesis was supported.

Results for the Second Research Question

The second research question was:

Is there any significant difference between the ESP students' uses of reading strategy types across genders?

To answer this research question the descriptive statistics for each gender was reported. The results are shown below in Table 7.

Table 7. Descriptive for Male and Female Students

Gender	M	SD
Male	3.68	1.65
Female	3.87	.86

As shown in the table above, the mean scores are very close for male and female learners. Since the results in Table 5 supports the fact that the distribution was normal, independent samples t-test was used to test the second null hypothesis of the study. The results are shown below.

Table 8. Independent Samples t-test for Male and Female Students

	Male (M)	Female (M)	t	P-value
Reading Strategy	3.68	3.87	-5.15	.000

According to Table 8, female students used reading strategies significantly more often than male students (t = -5.15, p= .00). That is, male (M =3.68) and female (M= 3.87) students used reading strategies differently in ESP courses. Based on these facts, the second null hypothesis of the study was not supported.

Results for the Third Research Question

The third research question was as follows:

Is there any significant difference between the ESP students' uses of reading strategy types across majors?

To answer this research question the descriptive statistics for each gender was reported. The results are shown below in Table 9.

Table 9. Descriptive for Different Majors

Gender	M	SD
Humanities	3.67	1.33
Engineering	3.81	1.45

As shown in the table above, the mean scores are rather different for students of humanities and engineering. Since the results in Table 9 supports the fact that the distribution was normal, independent samples t-test was used to test the third null hypothesis of the study. The results are shown below.

Table 10. Independent Sample t-test for Different Majors

	Humanities (M)	Engineering (M)	t	P-value
Reading Strategy	3.67	3.81	-4.08	.000

According to Table 10, engineering students used reading strategies significantly more often than humanities students (t = -4.1085, p= .00). That is, engineering students (M =3.81) and humanities students (M= 3.67) used reading strategies differently in ESP courses. Based on these facts, the third null hypothesis of the study was not supported.

Discussion

Research indicates that engineering students employ reading strategies more frequently than humanities students, with statistically significant differences observed between these academic disciplines. This discrepancy may stem from engineering students' potentially higher motivation, interest, and proficiency in English reading comprehension. Additionally, engineering students might possess greater familiarity with teaching and learning methodologies, enabling them to better understand the purpose, application, and timing of various reading strategies, thereby facilitating more active strategy utilization. Notably, problem-solving strategies were the most frequently reported, followed by support and global strategies. This pattern mirrors findings by Mokhtari and Sheorey (2002), who identified problem-solving techniques (e.g., re-reading, adjusting reading speed) as critical for navigating challenging ESP texts. The lower use of global strategies (e.g., previewing text structure) may indicate a need for explicit instruction in higher-order strategic skills, particularly for humanities students, who showed comparatively weaker engagement with such approaches.

Academic major played a decisive role, with engineering students outperforming humanities students in strategy use ($t = -4.1085$, $p < 0.001$). This finding resonates with Chen and Chen's (2015) observation that discipline-specific demands—such as technical vocabulary and dense conceptual content in engineering texts—may necessitate more deliberate strategy application. Engineering students' higher mean score ($M = 3.81$ vs. $M = 3.67$ for humanities) could stem from their training in analytical problem-solving, which may transfer to their approach to reading comprehension (Mokhtari & Reichard, 2002). Regarding academic discipline's influence on reading strategy use, these findings align with limited existing research. While few studies have examined this relationship specifically for L2 reading strategies, Wu's (2005) investigation of Taiwanese undergraduates revealed that applied foreign language and education majors employed reading strategies more frequently than those in food beverage management and applied mathematics. However, broader research on general L2 learning strategies demonstrates significant disciplinary differences (Dreyer & Oxford, 1996; Lee, 2007; Park, 1999). Interestingly, some findings contradict the current study, such as Lee's (2007) conclusion that humanities and social science students use language learning strategies more frequently than those in technical fields like engineering and computer science.

Gender emerged as a significant predictor of reading strategy use, with female students employing strategies more frequently than their male counterparts ($t = -5.15$, $p < 0.001$). This aligns with prior research (Sheorey & Mokhtari, 2001; Wu, 2005) suggesting that female learners tend to adopt more metacognitive and problem-solving approaches in L2 reading. The higher mean score for females ($M = 3.87$) compared to males ($M = 3.68$) may reflect greater engagement with strategic reading practices, possibly due to motivational or socio-cognitive factors (Poole, 2005). This disparity also may reflect male students' reluctance to employ cognitively demanding strategies or could relate to variations in reading proficiency between genders. Existing research presents conflicting findings regarding gender differences in strategy use, with some studies reporting significant variations (Al-Nujaidi, 2003; Poole, 2006; Sheorey & Mokhtari, 2001; Wu, 2005) while others found no notable differences (Brantmeier, 2000; Poole, 2005; Young & Oxford, 1997). However, when gender differences are identified, they consistently show females employing reading strategies more frequently, a pattern supported by the current study's findings.

Conclusion

This research offers comprehensive insights into EFL reading strategy utilization among Mazandaran University students when engaging with English for Specific Purposes (ESP) texts. The findings indicate frequent employment of reading strategies, with problem-solving approaches being most prevalent, followed by support strategies, while global strategies were less commonly used. The study identified notable gender and disciplinary differences, revealing that female students demonstrated greater strategic awareness than males, and engineering students employed strategies more effectively than their humanities counterparts.

The study's outcomes advance existing literature by substantiating the correlation between language proficiency and moderate strategy use. It proposes further investigation into faculty-specific and gender-based strategy differences, particularly in ESL environments, along with longitudinal tracking of participants' strategy development across academic levels. These insights can assist secondary school EFL educators in comprehending students' current strategic approaches and implementing targeted interventions to enhance reading comprehension.

For optimal reading achievement, the research emphasizes the dual importance of both frequent and effective strategy application. The study recommends three key directions for future research: (1) employing observational methods and follow-up interviews to examine actual strategy implementation and effectiveness, (2) conducting proficiency-based comparisons to enhance students' strategic self-regulation, and (3) implementing action research to evaluate strategy efficacy in improving EFL reading comprehension among high school learners.

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