Original Article

IEEPJ Vol. 4, No. 3, 2022, 516-535

http://ieepj.hormozgan.ac.ir/

Iranian Evolutionary and Educational Psychology Journal

IEEPJ

Metacognitive Strategies Awareness and Use and Reading Comprehension of Iranian EFL University Students: A Structural Equation Modeling Approach

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Abstract: Research on reading comprehension suggests that successful readers are metacognitive. In foreign language contexts, the role of metacognition is more vital. This study sought to investigate the relationship between metacognitive reading strategy awareness and use, and reading comprehension of Iranian English as a foreign language (EFL) learners. In so doing, a non-experimental, correlational design was used. The participants included 238 male and female EFL university students in two central provinces of Iran. The sampling method was convenience sampling. To collect the data, Metacognitive Awareness of Reading Strategies Inventory (MARSI) and the reading comprehension section of Cambridge Michigan Language Assessment (MET) were utilized. Data analysis was conducted using Structural Equation Modeling (SEM). The results of SEM analysis revealed that there are not significant causal relationships between global (GLOB) reading strategy and reading comprehension, and between supportive (SUP) reading strategy and reading comprehension. However, there was a significant causal relationship between problem-solving (PROB) reading strategy and reading comprehension. According to the results, the covariance among all four latent factors were invariant across gender. Moreover, there was no relationship between gender and reading strategy awareness and use. Pedagogic implications stemming from the findings have resonance for teaching reading comprehension.

Keywords: Metacognitive reading strategies, Global strategies, Problem-solving strategies, Support strategies, Reading comprehension

Introduction

Based on Bachman and Palmer's (2010) model of language ability that included strategic competence as a non-linguistic component of language ability and specified metacognitive strategies as the core of strategic competence, several studies have focused on the role of metacognitive processing in performing different language skills (e.g., Anderson, 2012; Daradkeh, 2020, Ghaith & Sanyoura, 2019; Grabe, 2014; Grabe & Stoller, 2011). Parallel to this, Oxford (2011) classified the publications of learning strategies and devoted separate sections to research on language-area strategies, strategy assessment, and research methods. Furthermore, the publication of a special issue of Metacognition and Learning in 2011, exclusively devoted to theoretical and empirical considerations in measuring strategy use, has been a strong indication of interest in measuring reading strategies and discovering the challenges related to assessment of them (Schellings & Van Hout-Wolters, 2011). Additionally, the result of past research on reading comprehension strategies within the framework of constructively responsive reading (e.g., Pressley & Afflerbach, 1995; Pressley & Gaskins, 2006; Mokhtari & Reichard, 2002; Sheorey & Mokhtari, 2001), which considers strategy use as a central feature of

Article information: Received: 2022/03/6 | Accepted: 2022/04/15 | Published: 2022/09/1. https://doi.org/10.52547/ieepj.4.3.516

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[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

constructively responsive reading, has influenced present studies on reading comprehension and the constructive nature of reading. Research on reading suggests that successful readers are metacognitive. Moreover, in foreign language contexts, the role of metacognition is more vital. Additionally, research on the strategic work of reading has revealed that more accomplished readers are more often successful in choosing and using reading strategies, and different reading comprehension strategies are used in combination (e.g., Afflerbach & Cho, 2009). Several studies have indicated that the development of strategic reading requires explicit instruction, continual reminders and support from teachers, and repeated opportunities for practice and reflection (Ardasheva et al., 2017; Fathi & Afzali, 2020; Pressley & Gaskins, 2006; Zhang & Seepho, 2013; Yapp, & van den Bergh, 2021). Moreover, studies on reading strategies have revealed that students use strategies to a different extent in different contexts (e.g., Alhaqbani & Riazi, 2012; Bećirović, 2018; Bråten & Strømsø, 2011; Darjito, 2019; Hadwin et al., 2001; Jafari & Shokrpour, 2012; Marboot et al., 2020; Tavakoli, 2014).

Despite the rapidly expanding research on reading strategies, a limited number of studies have reported the types and patterns of metacognitive reading strategy awareness and use across English as a foreign language (EFL) university population in Iran. EFL university students seem to have the essential language proficiency for college-level reading in English. However, thanks to the differences in their background knowledge about the importance of using reading strategies to improve reading comprehension, they are not expected to be aware of and use reading strategies to a similar extent. The knowledge about strategy instruction as a part of reading instruction appears absent from (EFL) classrooms in Iran. Therefore, exploring EFL university students' metacognitive awareness and use of reading strategies across student populations in less explored contexts such as Iran can reveal differences in awareness or perceived use of reading strategies. The study can reveal the importance of strategy instruction as a reading instruction in the cultural and educational context of Iran. Teachers' knowledge of how metacognitive knowledge is related to reading comprehension can provide them with more information to apply these strategies in their classrooms, and can inform successful reading comprehension instruction programs.

To sum up, drawing on the model of constructively responsive reading and the empirical research on the relationships between metacognitive reading strategies awareness and use and reading comprehension (e.g., Mokhtari & Reichard, 2002; Mokhtari, et al., 2018), a series of relationships between the measured and latent variables, were postulated and a confirmatory factor analytic model was specified. Having specified the model, the model was evaluated against certain criteria, and the specific hypotheses about the model were tested. We first examined the nature of metacognitive processing measured by MARSI. Path standard coefficients were then used to explore how the 3 sets of strategies relate to each other and reading comprehension. In addition, the metacognitive reading strategies awareness and use across males and females were explored.

In fact, different studies have revealed that there is a relationship between metacognitive strategies and reading proficiency (Amini et al., 2020; Daftarifard, & Birjandi, 2015; Guo, 2018; Soodla, 2017; Zhang & Seepho, 2013; Zarei, 2018). Many studies have been conducted to investigate the choice and

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frequency of reading strategies. Pammu et al.'s (2014) study showed the level of metacognitive use on the three sub-scales of MARSI. The findings revealed that participants had a high level of strategy use for problem-solving strategies (PROB) but a medium level for both global (GLOB) and support (SUP) strategies. Similar to Pammu et al. (2014), Daguay-James and Bulusan's (2020) study revealed that Filipino participants used a high level of reading strategies while reading academic texts in English with problem-solving strategies as their prime choice, followed by support strategies, and global strategies.

In a study carried out in China, Guo (2018) used structural equation modeling (SEM) to explore the interrelationships among metacognitive knowledge, first language (L1) reading ability, L2 proficiency, and L2 reading comprehension, using Mokhtari and Reichard's (2002) categories of global reading strategies, problem-solving strategies, and supporting strategies. The results of the study indicated that metacognitive knowledge exerted indirect effects on L2 reading using L1 reading ability and L2 language proficiency. Moreover, it was revealed that "metacognitive knowledge does not function as a stand-alone cognitive ability but serves as a central executive ability that leverages available and relevant language resources to facilitate the reading process" (p. 226). In another recent study, Amini et al. (2020) following Mokhtari and Reichard's (2002) categories, adopted an SEM approach to estimate the causal relationships between three types of metacognitive reading strategies and self-regulation in affecting reading proficiency. The results indicated that higher scores in self-regulation strategies predict higher scores on reading comprehension. They asserted that "no dominant direct correlation was detected between the three types of strategies and reading proficiency, … strategy instruction by itself cannot ensure a high level of reading proficiency" (p.14).

In consensus with earlier research, Lindholm and Tengberg's (2019) study showed that good readers use all types of reading strategies, particularly global strategies, to a greater extent than poor readers, and there are no gender-related differences in terms of reading strategy use. In another study, Muhid et al. (2020), using the Metacognitive Strategy Questionnaire, confirmed that metacognitive strategies had a positive effect on students' reading achievement.

Based on the results of a meta-analysis addressing metacognitive strategies and reading comprehension, Navarro (2021), it was revealed that "the application of metacognitive strategies programs or workshops highly favored reading comprehension, and their application in the reading development phases were planning, supervision and evaluation, which helped to significantly improve the comprehension of texts" (p.1).

As it is seen in the reviewed literature, few studies have directly equated metacognitive strategy awareness and use of EFL learners with their reading comprehension. More importantly, the amount of studies done in this regard in the context of Iranian EFL classes is scarce. Therefore, the present study attempts to fill the gap in literature by hypothesizing a structural model to explore the causal relationship between reading strategies awareness and use and reading comprehension in 298 English major university students in Iran. In our model Global Reading Strategies, Problem-Solving Strategies,

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and Support Reading Strategies are the latent variables. It was hypothesized that the latent variables directly affect the dependent variable (i.e., reading comprehension).

This study tried to address the following research questions:

RQ1. What is the causal relationship between Iranian EFL university students' metacognitive reading strategies awareness or use and their reading comprehension?

RQ2. Is the factorial structure of the strategy awareness and use as measured by the Metacognitive Awareness of Reading Strategies Inventory (MARSI) Version 1.0 invariant across males and females?

To accomplish the objectives of this study and address the formulated research questions, the following hypotheses were formulated.

Hypothesis 1: Global reading strategies awareness or use under the subscale GLOB directly affect reading scores.

Hypothesis 2: Problem-solving reading strategies awareness or use under the subscale PROB directly affect reading scores.

Hypothesis 3: Supportive reading strategies awareness or use under the subscale SUP directly affect reading scores.

Hypothesis 4: The structure of the relationships between learners' strategy awareness and use and reading comprehension is invariant across male and female students.

Figure 1 illustrates the Schematic representation of the model representing the proposed causal relationships among the variables.

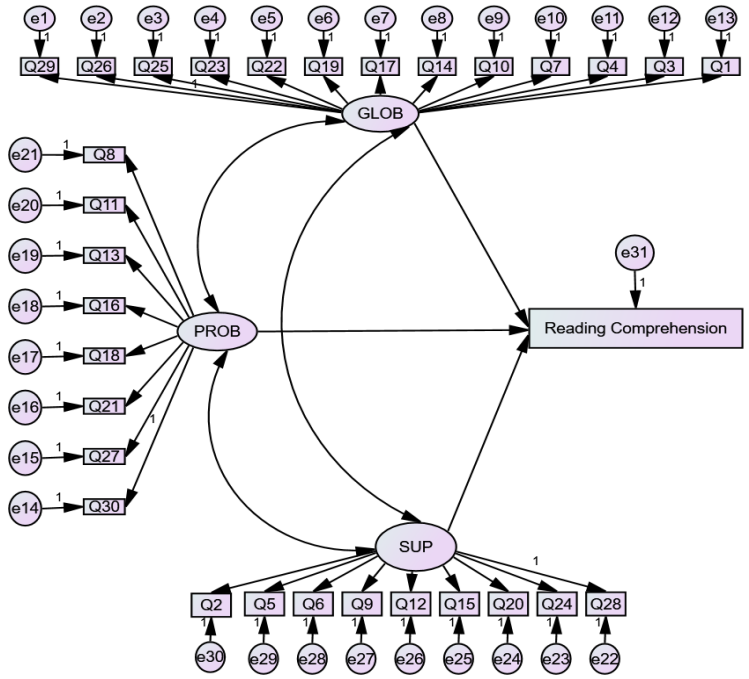

Figure 1. Path Diagram of the General Structural Equation Model of Metacognitive Reading Strategies and Reading Comprehension Scores

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Material and Methods

Participants: The participant pool was composed of 298 male and female BA students at different levels of reading ability as reported in their self-report measures. However, after data screening, deletion of the incomplete questionnaires, resulted in the dropping of 60 cases from the original sample, leaving a sample size of 238. Accordingly, the participants included 238 English major university students studying in two central provinces of Iran and were from different parts of the country. All the participants were native Persian students ranging in age from 18 to 28 studying in the 2019-2020 academic year. The mean age of the students was 22.69 years (SD =4.61). Given the large number of participants required by the research method adopted in this study, and also considering the rule that large samples are required for SEM analyses, the researchers were forced to include all the available students in intact classes; therefore, the students were selected non-randomly based on convenient sampling approach. Descriptive statistics of the participants are shown in Table 1.

Table 1. Participants' Statistics

Variable	Category	Frequency	Percent
Gender	Male	81	34
	Female	157	66
Self-reported Level	Excellent reader	25	10
of Reading Ability	Good reader	40	17
	Average reader	140	59
	Poor reader	33	14

N= 238

As can be seen in Table 1, there were more females than males in the sample. This sample characteristic was unavoidable given the distribution of EFL students majoring in Iran and the use of intact classes in this study. Although the use of intact classes might limit the possibility of tightly controlling learner characteristics, it has the advantage of increasing the similarity of the research participants to the real world.

Design: This study, in line with the nature of the objectives of the study, used a non-experimental correlational design.

Instruments

The following instruments were used for the purpose of data collection:

The reading comprehension section of Cambridge Michigan Language Assessment (MET): A reading comprehension section of Cambridge Michigan Language Assessment was used to assess L2 reading comprehension ability based on 4 different passages on general and academic-related topics. Based on the Reference Levels of the Common European Framework of Reference for Languages (CEFR), the selected reading section of MET was for B1 intermediate levels. Each reading passage was about 100 words long and was followed by five reading comprehension questions in multiple-choice format eliciting a variety of reading skill components including understanding the main idea and identifying purpose, identifying supporting details, understanding vocabulary in context, and

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drawing inferences and conclusions. Students had to select one from four answer choices and each correct answer received a score of one. There is psychometric support for the adequacy of MET across the different MET administrations. For the reading section, the average reliability estimate is 0.86 (Michigan Language Assessment, 2018).

Metacognitive Awareness of Reading Strategies Inventory (MARSI): The MARSI, which was used in this study, was identical to the one employed in some previous studies conducted in different contexts in recent years (Amini et al., 2020; Daguay-James & Bulusan's 2020; Lindholm & Tengberg, 2019; Pammu, 2014). The MARSI was developed based on the constructively responsive reading model proposed by Pressley and Afflerbach (1995) and was designed to assess adolescent and adult readers' metacognitive awareness and perceived use of reading strategies while reading academic or school-related materials. MARSI is fairly easy to read (Flesch Reading Ease=34.7). This 5-point Likert scale consists of three subscales of 30 items in total. All of these items were rated on a Likert scale, ranging from 1 (*I never or almost never do this*) to 5 (*I always or almost always do this*). Definitions of the subscales of MARSI are shown in Table 2.

Table 2. Strategy Category, Description, Example and Item Number

Category	Description	Example	Item number
GLOB	a set of reading strategies	"I have a purpose in	1, 3, 4, 7, 10, 14, 17,
	for a global analysis of a text	mind when I read"	19,22, 23, 25, 26, 29
PROB	a set of reading strategies	"When text becomes difficult	8, 11, 13, 16,
	for solving problems	I re-read to increase understanding"	21,27,30
SUP	outside reference materials,	"I take notes while reading "	2, 5, 6, 9, 12,
	taking notes		15,20, 24, 28

Note. GLOB= Global strategies, PROB= Problem-solving strategies, SUP= Supportive strategies

Based on the questionnaire guideline, the overall score indicates how often participants use reading strategies when reading academic materials, and the score of each subscale indicates the frequency of strategy use.

Many studies conducted to examine various aspects of the MARSI validity have provided support for its validity, its appropriateness for college, and adult readers and its association with the reading ability (Guan, et al., 2011; McNamara, 2007). The internal consistency reliability coefficients of its three subscales are as follow: Global Reading strategies (α =.92), Problem-Solving strategies (α = .79), Support Reading strategies (α = .87), and the overall scale (α =.93) (Mokhtari & Reichard, 2002; Mokhtari & Sheorey, 2002). In the context of Iran, Hossein Chari, Samavi and Kurdistani (2010) calculated the Cronbach's Alpha reliability of the MARSI as .70. Moreover, the confirmed its validity through factor analysis. A self-report level of reading ability section, and a demographic section requesting general information of the participants were also attached to the questionnaire.

Procedure: The original English version of MARSI was administered after the reading test. The questionnaires were put together with the reading test answer sheets. The questionnaire and the test were piloted on one class of participants. Data collection was conducted in five weeks during the autumn semester of 2019-2020 academic year in participants' classes. The participants' anonymity and

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confidentiality were guaranteed. The administration of the reading test and the MARSI was conducted at the beginning of each class period. First, participants were invited to complete the reading test, and then before the completion of the inventory, the researcher provided the participants with a description of the instrument and an explanation of the steps involved in completing it. In all the classes, the researcher read each statement in the inventory, explained it, and in case of any comment on an unclear item, clarified the confusing item and translated it into Farsi, and let the participants know that there were no right or wrong responses to the statements. On average, the participants completed the test and the instrument in about 60-70 minutes. The researcher personally administered and collected most of the questionnaires to the participants.

Data Analysis: First, SPSS (26) was used for data screening. A significance level of .05 was set. Missing data and the outliers were eliminated based on Tabachnick and Fidell's (2007) data screening procedure. Descriptive statistics of research variables were obtained. In the next step, the relationships among all the research variables were explored. To explore the internal consistency of MARSI, Cronbach's alphas for the entire set of 30 items and each of the three subscales were estimated. AMOS 24 was used for SEM. As the first steps in a confirmatory factor analysis, the factor loadings of the indicators that made up the latent constructs were calculated. In addition, to assess the model fit, first, a chi-square statistic was conducted, and the goodness-of-fit indices of the confirmatory factor analytic model were calculated to find out if fit criteria were within the recommended range of acceptability. Based on the results, no post-hoc modifications were conducted. Finally, to address the main research questions and to test hypothesized model, four hypotheses were established and the path analysis was used to test structural equations.

Results

Table 3 shows the results of descriptive statistics of research variables.

Table 3. Descriptive Statistics of Research Variables

Variables	Female					Male					TOTAL			
	M	SD	Max	Min		M	SD	Max	Min		M	SD	Max	Min
GLOB	3.30	0.84	4.92	1.38		3.21	0.80	4.62	1.00		3.27	0.83	4.92	1.00
PROB	3.60	0.82	5.00	1.50		3.66	0.95	5.00	1.13		3.62	0.86	5.00	1.13
SUP	3.18	0.89	5.00	1.22		2.95	0.93	4.78	1.11		3.10	0.91	5.00	1.11
TOTAL	3.35	0.67	4.77	1.60		3.25	0.73	4.67	1.10		3.31	0.69	4.77	1.10
Reading	8.05	3.68	19	0		9.2	4.62	20	2		8.44	4.05	20	0

Note. GLOB= Global strategies, PROB= Problem-solving strategies, SUP= Supportive strategies

The mean scores of the individual strategies ranged from 3.66 to 2.95 for the participants (overall mean = 3.31), indicating a medium overall use of Global and Supportive strategies and high overall use of Problem-solving strategy of metacognitive strategies in reading according to the established strategy usage criteria described by Mokhtari and Reichard (2002).

Table 4 shows the results of correlation coefficients of research variables and the variable of reading comprehension.

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Table 4. Correlations between Three Metacognitive Strategies and Reading Comprehension

Variable	Female	Male	Total
GLOB	0.193*	0.266*	0.21*
PROB	0.36**	0.382*	0.393**
SUB	0.18*	0.15	0.181*

**P <.05. **P <.01.*

The correlation coefficients show positive relationships between MARSI subscales and reading comprehension. All the correlations between the subscales of reading strategies and reading comprehension were significant at the .05 level. However, there was no significant correlation between supportive strategy and reading comprehension of males (r = .15). The highest correlations were found between PROB and Reading comprehension (r=0.393). Table 5 shows the results of the reliability coefficient.

Table 5. Cronbach's alpha for MRASI Subscales

Variable		Female			Male			Total	
		α	Comment		A	Comment		α	Comment
GLOB	*13*	*0.915*	accepted		*0.895*	accepted		*0.911*	accepted
PROB	*8*	*0.843*	accepted		*0.901*	accepted		*0.872*	accepted
SUP	*9*	*0.854*	accepted		*0.88*	accepted		*0.866*	accepted

Note. GLOB = global strategies, PROB = problem-solving strategies; SUP = supporting strategies.

The Cronbach's alpha for all the subscales is above 0.7 which is acceptable (Griethuijsen et al., 2014; Taber, 2018). Table 6 shows the results of assessing the construct validity for each subscale of MARSI.

As Table 6 shows, the standardized factor loading of all the items ranges was above the threshold limit of .5 (Heir et al., 2006). Additionally, all items loaded significantly (p < .05). Subsequently, the hypothesized model was tested using SEM with AMOS 24. As mentioned earlier, the results of Cronbach's alpha statistic and confirmatory factor analysis demonstrated that the overall internal consistency of MARSI is acceptable, and observed variables and latent factors of MARSI subscales are strongly correlated (above .6).

In the next step, to assess the reliability and validity of the measurement model, first, a chi-square statistic was conducted, and goodness-of-fit indices for the measurement model were computed.

A reasonably good fit is supported when the following fit criteria are met: CFI ≥ .95, TLI ≥ .95, and RMSEA ≤ .06 (Bentler, 2007, Marsh, et al., 2004). Less stringent criteria of a reasonable data fit (CFI ≥ .90, TLI ≥ .90, and RMSEA ≤ .08,) can also be useful in some practical applications (e.g., Marsh, et al., 2004). Table 7 shows goodness-of-fit indices for the measurement model.

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Table 6. Results From a Factor Analysis of the Metacognitive Awareness of Reading Strategies Inventory (MARSI)

Scale	Item	Female		Male		Total	
		Factor loading	SE	Factor loading	SE	Factor loading	SE
GLOB	Q1	**0.647**	0.05	**0.647**	0.084	**0.657**	0.038
	Q3	**0.65**	0.061	**0.74**	0.056	**0.688**	0.043
	Q4	**0.677**	0.042	**0.586**	0.091	**0.649**	0.037
	Q7	**0.704**	0.039	**0.595**	0.073	**0.651**	0.032
	Q10	**0.65**	0.049	**0.603**	0.078	**0.642**	0.035
	Q14	**0.668**	0.04	**0.541**	0.088	**0.636**	0.037
	Q17	**0.697**	0.039	**0.666**	0.078	**0.694**	0.034
	Q19	**0.685**	0.054	**0.656**	0.076	**0.685**	0.038
	Q22	**0.734**	0.039	**0.661**	0.066	**0.71**	0.037
	Q23	**0.688**	0.043	**0.719**	0.054	**0.682**	0.044
	Q25	**0.659**	0.057	**0.669**	0.066	**0.643**	0.039
	Q26	**0.652**	0.052	**0.605**	0.089	**0.615**	0.041
	Q29	**0.63**	0.049	**0.541**	0.075		
PROB	Q8	**0.62**	0.059	**0.072**	0.071	**0.665**	0.42
	Q11	**0.673**	0.047	**0.762**	0.077	**0.717**	0.037
	Q13	**0.587**	0.053	**0.72**	0.063	**0.648**	0.037
	Q16	**0.693**	0.064	**0.858**	0.046	**0.762**	0.038
	Q18	**0.528**	0.065	**0.676**	0.085	**0.59**	0.048
	Q21	**0.529**	0.056	**0.612**	0.078	**0.578**	0.047
	Q27	**0.739**	0.052	**0.788**	0.065	**0.765**	0.036
	Q30	**0.735**	0.046	**0.723**	0.065	**0.713**	0.037
SUB	Q2	**0.651**	0.051	**0.662**	0.662	**0.666**	0.04
	Q5	**0.635**	0.043	**0.583**	0.583	**0.629**	0.037
	Q6	**0.627**	0.058	**0.75**	0.75	**0.657**	0.038
	Q9	**0.579**	0.048	**0.659**	0.659	**0.607**	0.036
	Q12	**0.669**	0.05	**0.601**	0.601	**0.661**	0.043
	Q15	**0.592**	0.06	**0.682**	0.682	**0.628**	0.048
	Q20	**0.686**	0.046	**0.756**	0.756	**0.695**	0.035
	Q24	**0.583**	0.06	**0.727**	0.727	**0.638**	0.044
	Q28	**0.645**	0.052	**0.628**	0.628	**0.651**	0.044

Note. N=30. SE= standard error, GLOB= global strategies, PROB= problem-solving strategies, SUP= supportive strategies. Factor loadings above the threshold .5 are in bold.

Table 7. Goodness-of-Fit Indices for the Measurement Model of Metacognitive Reading Strategies and Reading Comprehension

Fit indices	X^2	Df	df /X2	GFI	AGFI	CFI	NFI	IFI	TLI	RMSEA
Value	2006.99	1287	1.559	0.8	0.78	0.9	0.75	0.89	0.88	0.034

Note. GFI= goodness-of-fit-index; AGFI= adjusted fit index; CFI= comparative fit index; NFI= normed fit index; IFI= incremental fit index; TLI= Tucker and Lewis Index; RMSEA= root- mean- square error of approximation

The fit of the hypothesized model to the sample data was tested. The fit indices are well within the recommended range of acceptability and provide evidence that the hypothesized model is relatively good-fitting. The model according to Joreskog (1993, as cited in Byrne, 2010) is *strictly confirmatory* in which the researcher either rejects or fail to reject the model. Therefore, no post-hoc modifications were conducted.

These results demonstrated that the hypothesized correlational model represents the relationship between the three subscales of metacognitive reading strategies and reading comprehension. Furthermore, it represents interrelationship between GLOB, PROB, and SUP. In the next step, the four established hypotheses formulated to examine research questions were tested separately. The

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established hypotheses claim that in the population from which the sample came, relationship between variables is not zero. Tables 8, 9, and10 show the path standard coefficients between the variables GLOB, PROB, SUP and reading comprehension.

Table 8. Relationship Between Global Reading Strategy Use and Reading Comprehension

Group	Relationship	B	SE_ β	P-Value
Female	GLOB →Reading	-0.036	0.106	0.734
Male	GLOB →Reading	0.077	0.148	0.603
Total	GLOB →Reading	-0.026	0.077	0.736

Note: GLOB= latent variable consisting of 13 manifest variables, Reading= latent variable consisting of the manifest variable of reading comprehension scores. β = path standard coefficients, SE_ β = standard error of standardized coefficient.
**P <.05*

Table 8 shows that the path standard coefficients between the variable GLOB and Reading comprehension in females, males, and the overall population are -0.036, 0.077, and -0.026, respectively. Additionally, it indicates that the effect of GLOB on reading comprehension in females (p-value=0.734), males (p-value= 0.603), and overall population (p-value=0.736) are above significance. The negative coefficient means that as the GLOB score increases, reading comprehension is predicted to decrease. It is established that there is not a significant causal relationship between Global reading strategy and reading comprehension, and accordingly, hypothesis one is rejected.

Table 9. Relationship between Problem-solving Reading Strategy Use and Reading Comprehension

Group	Relationship	B	SE_ β	P-Value
Female	PROB →Reading	0.389	0.091	***<0.001
Male	PROB →Reading	0.447	0.172	***<0.001
Total	PROB →Reading	0.429	0.077	***<0.001

Note: PROB= latent variable consisting of 8 manifest variables, Reading= latent variable consisting of the manifest variable of reading comprehension scores. β = path standard coefficients, SE_ β = standard error of standardized coefficient
***P<0.001, **P<0.01

The second hypothesis that problem-solving reading strategies awareness or use under the subscale PROB directly affects reading comprehension was supported by the path standard coefficients between the variable PROB and Reading comprehension with 0.389, 0.447, and 0.429 in females, males, and the overall population respectively. Table 9 indicates the significant effect of PROB on reading comprehension in females (p<0.001), males (p<0.001), and total population (p<0.001). All the p-values are below the significance level. Therefore, the second hypothesis is affirmed. It can be said that there is a significant causal relationship between problem-solving reading strategy and reading comprehension.

Table 10. Relationship between Supportive Reading Strategy Use and Reading Comprehension

Group	Relationship	B	SE_ β	P-Value
Female	SUP→Reading	0.06	0.104	0.565
Male	SUP→Reading	-0.16	0.188	0.396
Total	SUP→Reading	0.005	0.07	0.943

Note: SUP= latent variable consisting of 9 manifest variables, Reading= latent variable consisting of the manifest variable of reading comprehension scores. β = path standard coefficients, SE_ β = standard error of standardized coefficient. **P <.05*

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Table 10 shows that the path standard coefficients between supportive strategies and reading comprehension in females, males, and the overall population are 0.06, -0.16, and 0.005 respectively, and the effect of SUP on reading scores in females is 0.565, in males, 0.396, and in total population, 0.943. Therefore, there was not a significant causal relationship between support reading strategy and reading comprehension, and hypothesis three was rejected.

Figures 3, 4, and 5 illustrate the standard path coefficients for females, males, and overall population respectively.

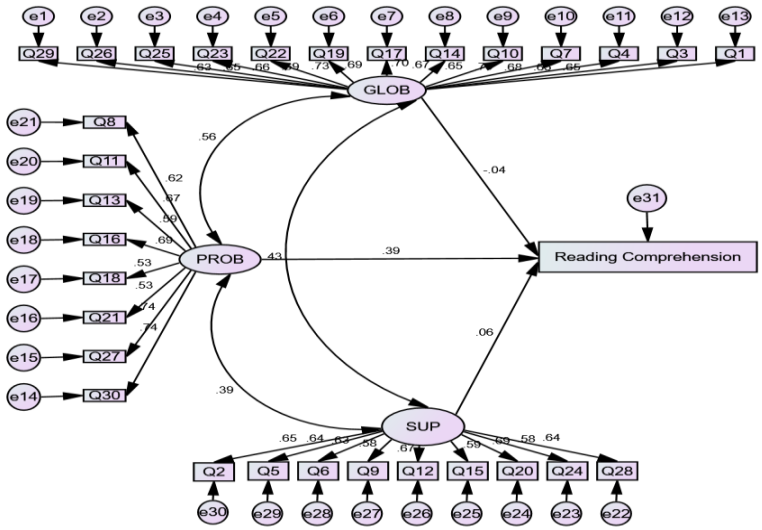

Figure 3. Standard Path Coefficients for Females

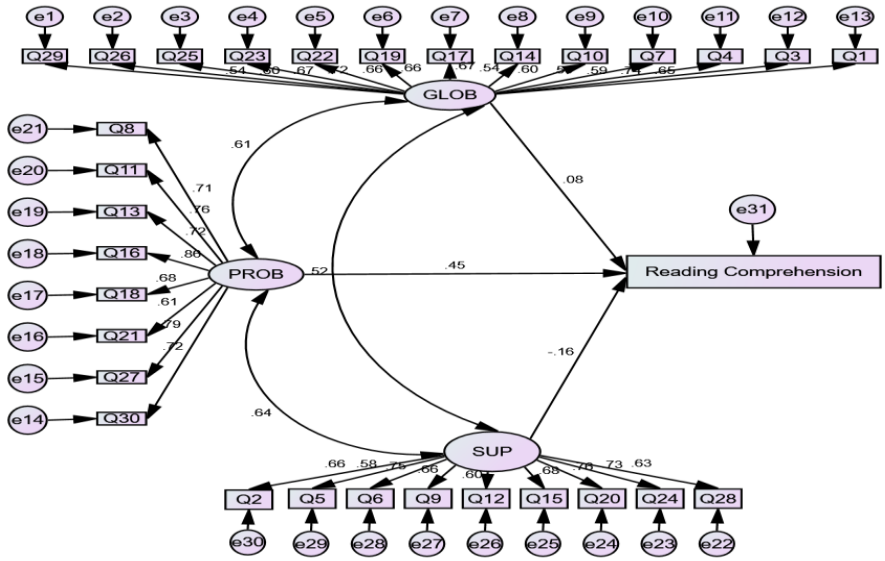

Figure 4. Standard Path Coefficients for Males

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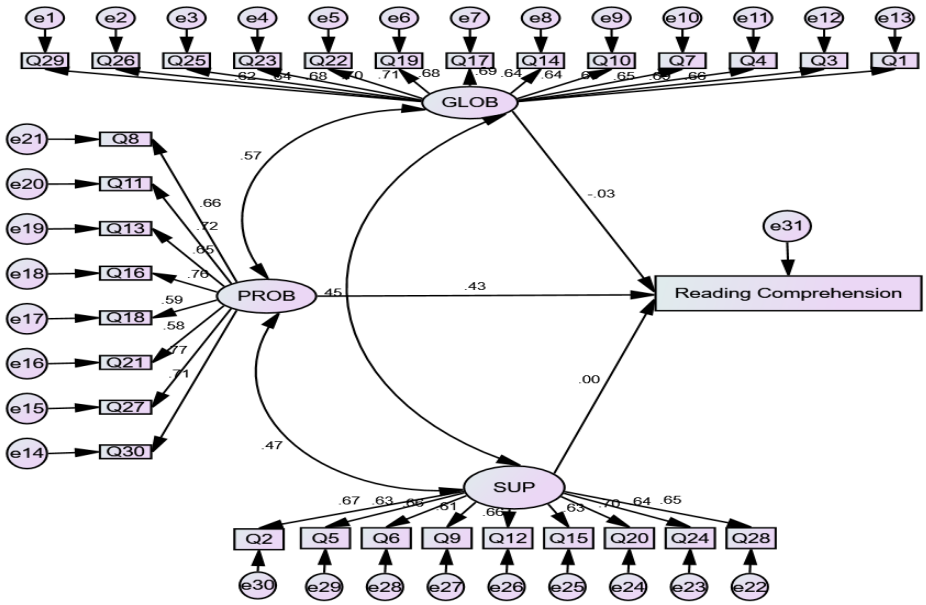

Figure 5. Standard Path Coefficients for Overall Population

In sum, the strengths of the causal relationships among the variables were examined through standardized path coefficients, and the relative magnitude of change associated with different paths in the model was compared. The schematic representation of the model showing the awareness or use of the three types of metacognitive reading strategies and reading comprehension is shown in Figure 5. The figure demonstrates that the three types of metacognitive strategy use are significantly related to each other, but are not significantly related to reading comprehension. The closer the magnitude to 1.0, the higher the correlation and the greater the effect of the variable. The model reveals that there are no positive and significant causal relationships between Iranian EFL learners' awareness or use of two types of metacognitive reading strategies (GLOB reading strategies: β = -.03, and SUP reading strategies: β = .00) and reading comprehension. Only the PROB strategies (β =.43) are positively and significantly related to reading scores.

The noteworthy features of Fig. 5 are the negative (-.03) path coefficients between GLOB and reading scores, and (0.0) between SUP and reading scores. The path coefficient of -0.03 means that when GLOB strategy awareness and use increases by one standard deviation from its mean, reading comprehension would be expected to decrease by 0.03 of its own standard deviations from its own mean while holding all other relevant connections constant. The zero path coefficient suggests that there is no causal relationship between SUP strategies and reading comprehension. The schematic representations of the relationship between strategy awareness and use and reading comprehension across gender shown in Figure 3 and Figure 4, demonstrate that there is no relationship between gender and strategy use, and the difference is only attributed to selecting a strategy and using it efficiently.

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Discussion

The objectives of the present study were to determine relationship between Iranian EFL university students' metacognitive reading strategies awareness and use and their reading comprehension, and whether the factorial structure of the strategy awareness and use is invariant across males and females. The research questions were addressed by examining the proposed model with SEM.

As the results indicated, Iranian EFL university students had moderate and low levels of GLOB and SUP metacognitive strategy awareness and use. In addition, it was shown that PROB strategies had the highest causal effect on their reading comprehension. This finding corroborates previous research conducted in EFL settings. Anderson (2005) revealed a high level of the use of PROB strategies by EFL learners. Yüksel and Yüksel's (2012) study identified that Turkish university students mostly used PROB strategies, and the least used strategies were SUP strategies. Veloo et al., (2014) reported that PROB strategies were more applied compared to the other metacognitive reading strategies, with the GLOB reading strategy as the least frequently used strategy. Al-Qahtani (2021) reported that the level of strategy use differed based on reading abilities. However, the pattern of strategy use for the entire sample was high level of PROB, medium level of GLOB and SUP, with overall medium use. In another study, Bećirović et al., (2018), revealed moderate to high awareness of reading strategies, with the highest level of PROB strategies. Likewise, Alkhateeb, et al., (2021) reported high levels of metacognitive reading strategies awareness, with PROB strategies as the most frequently used strategies.

The findings are also compatible with some recent studies conducted to compare female and male EFL students in terms of their metacognitive reading strategies. Many studies reported no gender-related differences or non- significant differences in terms of reading strategy use. *Deliany and Cahyono (2020) reported* that there are not any significant differences in all subscales of metacognitive reading strategies use across gender. Likewise, Lindholm and Tengberg (2019) in their longitudinal study showed no gender-related differences in relation to reading strategy use. Contrary to this, Becirovic, et al., (2017) revealed that gender has a significant effect on the use of metacognitive reading strategies. In another study, Veloo et al., (2014) revealed that there is no significant difference between males and females for using PROB and GLOB strategies.

The results are incongruent with Rastegar et al.'s study (2017) which revealed a significant and positive relationship between overall metacognitive reading strategies use and reading comprehension achievement. Tavakoli (2014) reported that Iranian EFL students were moderately aware of reading strategies and the most frequently used strategies were the SUP reading strategies, followed by the GLOB reading strategies, and the PROB strategies. The study also revealed that there was no significant difference between male and female language learners in the use of reading strategies. It is worth noting here that the generalized or contextualized use of self-report instruments is the issue that needs to be addressed through further research. We are not certain that similar levels of metacognitive awareness would be found across different students' populations and different settings.

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Furthermore, the findings revealed that Iranian EFL learners were not aware of metacognitive reading strategies and did not use them to regulate their learning. We can attribute Iranian EFL learners' difficulties when reading academic materials to this lack of knowledge of metacognitive strategies and control of reading. It can be argued that the participants who used fewer strategies were less able to monitor comprehension. The authors believe that university EFL learners' less effective or unsuccessful results in reading comprehension were somewhat due to their low to moderate levels of overall strategy awareness and use. Hence, it may be claimed that students did not have knowledge about the factors improving their reading comprehension, so they were not willing to employ metacognitive strategies in their reading. The lack of ability to use reading strategies can also be attributed to the Iranian socio-cultural context in which classes are teacher-centered, and students only follow teachers' instructions. This teacher-centered approach to reading contrasts with current models of reading which emphasize constructively responsive and thoughtful reading. Constructively responsive and thoughtful reading necessitates transferring responsibility for monitoring learning from teachers to students themselves.

That the PROB strategies had the highest causal effect on their reading comprehension can be attributed to the mediating role of some cognitive and affective factors such as engagement, self-direction, creativity, criticality, higher order thinking, and self-evaluation whose closed association with a variety of PROB strategies has been evidenced in the previous studies (e.g., Adamura, 2021; Andujar et al., 2020; Teoh et al., 2019).

In sum, with a view to the significant association between metacognitive strategies and reading comprehension level of learners in EFL contexts as documented in the existing literature, the findings of the present study are not promising. What complicates the matters more is the pivotal role of reading comprehension in learning EFL for different purposes, both academic and non-academic ones. Indeed, the findings are reflective of the matter that metacognitive strategies have been neglected in teaching EFL in the context of Iran. With the presence of traditional mainstream teaching or instructional methods in teaching English reading comprehension in the educational system of Iran, the findings were not unexpected.

Conclusion and Implications: As the results indicated, Iranian EFL university students had moderate and low levels of GLOB and SUP metacognitive strategy awareness and use. In addition, it was shown that PROB strategies had the highest causal effect on their reading comprehension. This is while no significant causal relationship was found between SUP and GLOB strategies and reading comprehension.

To sum up, the present level of EFL learners' metacognitive awareness needs to be improved. Routinized simultaneous and autonomous use of strategies can to some extent guarantee better reading achievement. However, this should be supported by interventionist programs wherein metacognitive strategies are taught explicitly to learners. The improvement of metacognitive awareness necessitates some modifications in the instructional and curricular approaches to reading comprehension. Iranian EFL learners need to gain declarative metacognitive knowledge for these strategies. Graesser (2007)

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asserted that reading strategies as cognitive strategies if practiced eventually become automatized. Declarative metacognitive strategy knowledge can help them to start using and practicing strategies.

These points imply that for strategies to become routinized, intervention from the part of teachers is needed. To be more specific, effective comprehension-strategy instruction necessitates teachers to be trained and learn how to teach reading strategies which involve "consistent modeling, scaffolding, extensive practice, and eventually independent use of strategies by students" (Grabe, 2009, p. 240).

Moreover, material developers need to consider that the focus of reading lessons should be on reading comprehension, strategy instruction, and content learning. They need to recognize that strategies are one component of effective comprehension and they have to integrate strategy instruction into reading curricula.

The current research had some limitations which need to be acknowledged. Firstly, reading comprehension is a broad concept that cannot be determined through a single exam. Reading comprehension is affected by the interaction of many factors, and strategy use is only one factor affecting reading comprehension. Secondly, although the samples were from all over the country, and diverse in terms of their L2 abilities, the convenient selection of samples from four universities in the central part of Iran is likely to affect the generalizability of the findings. And, finally, the self-report questionnaire approach would have provided more information to better understand the nature of strategic reading if it had been supplemented with some degree of qualitative data.

An investigation into why problem –solving strategies are more highly used in EFL contexts would shed light on the contextual factors affecting strategy use. Combined, different methodologies would assist researchers in developing highly refined interpretations to describe the complexity of reading strategies and the influence of contextual variables on them.

Conflict of interest: The authors state no conflict of interest in the study.

Financial sponsor: The authors acknowledge that they have not received any financial support for all stages of the study, writing and publication of the paper.

Acknowledgements: The researchers wish to thank all the individuals who participated in the study.

References

Adamura, F. (2021). Problem-based learning in real number topic for practicing critical and creative thinking. *Journal of Physics: Conference Series, 1742*(1), 13-158.

[Downloaded from ieepj.hormozgan.ac.ir on 2026-02-18]

[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

Afflerbach, P., & Cho, B. Y. (2009). Identifying and describing constructively responsive comprehension strategies in new and traditional forms of reading. *Handbook of research on reading comprehension*, 69-90.

Afflerbach, P., Pearson, P. D., & Paris, S. G. (2008). Clarifying differences between reading skills and reading strategies. *The Reading Teacher*, *61*(5), 364-373.

Alhaqbani, A., & Riazi, M. (2012). Metacognitive awareness of reading strategy use in Arabic as a second language. *Reading in a Foreign Language*, *24*(2), 231-155. http://www.nflrc.hawaii.edu/rfl/October2012/articles/alhaqbani.pdf

Alkhateeb, H. M., Abushihab, E. F., Alkhateeb, R. H., & Alkhateeb, B. H. (2021). Reading strategies used by undergraduate university general education courses for students in US and Qatar. *Reading Psychology*, *42(6)*, 1-17.

Al-Qahtani, A. A. (2021). Reading English as a foreign language: The interplay of abilities and strategies. *Indonesian Journal of Applied Linguistics*, *10(3)*, 580-589. https://doi.org/10.17509/ijal.v10i3.31738

Amini, D., Anhari, M. H., Ghasemzadeh, A., & Tarnopolsky, O. (2020). Modeling the relationship between metacognitive strategy awareness, self-regulation and reading proficiency of Iranian EFL learners. *Cogent Education*, *7*(1), 1-17. https://doi. org/10.1080/2331186X.2020.1787018

Anderson N.J. (2012) Metacognition: Awareness of Language Learning. In: Mercer S., Ryan S., Williams M. (E) *Psychology for language learning* (pp. 169-187). Palgrave Macmillan, London. https://doi.org/10.1057/9781137032829_12

Anderson, N. J. (2005). L2 learning strategies. In E. Hinkel (Ed.), *Handbook of research in second language teaching and learning* (pp. 757–771). Mahwah, NJ: Erlbaum.

Andujar, A., Salaberri-Ramiro, M. S., & Cruz Martínez, M. S. (2020). Integrating flipped foreign language learning through mobile devices: Technology acceptance and flipped learning experience. *Sustainability*, *12*(3), 111-120.

Ardasheva, Y., Wang, Z., Adesope, O. O., & Valentine, J. C. (2017). Exploring effectiveness and moderators of language learning strategy instruction on second language and self-regulated learning outcomes. *Review of Educational Research*, *87*(3), 544-582.

Bachman, L. F. & Palmer, A. S. (2010). *Language assessment in practice: Developing language assessments and justifying their use in the real world*. Oxford University Press.

Bećirović, S., Brdarević-Čeljo, A., & Dubravac, V. (2018). The effect of nationality, gender, and GPA on the use of reading strategies among EFL university students. *Sage Open*, *8*(4), 2158244018809286.

Becirovic, S., Brdarevic-Celjo, A., & Sinanovic, J. (2017). The use of metacognitive reading strategies among students at international Burch University: A case study. *European Journal of Contemporary Education*, *6*(4), 645-655.

Bentler, P. M. (2007). On tests and indices for evaluating structural models. *Personality and Individual Differences*, *42(5)*, 825-829.

[Downloaded from ieepj.hormozgan.ac.ir on 2026-02-18]

[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

Bråten, I., & Strømsø, H. I. (2011). Measuring strategic processing when students read multiple texts. *Metacognition and Learning*, *6*(2), 111-130.

Byrne, B. M. (2010). Structural equation modeling with AMOS: basic concepts, applications, and programming (multivariate applications series). *New York: Taylor & Francis Group*, *396*(1), 73-84.

Daftarifard, P., & Birjandi, P. (2015). Lower intermediate readers and their use of cognitive and metacognitive strategies. *Sino-US English Teaching*, *12*(10), 757-761.

Daguay-James, H., & Bulusan, F. (2020). Metacognitive strategies on reading English texts of ESL freshmen: A sequential explanatory mixed design. *TESOL International Journal*, *15*(1), 20-30.

Daradkeh, A. A. (2020). The use of reading strategies in predicting reading comprehension: A case study of EFL university Saudi students. *International Journal of Linguistics, Literature and Translation*, *3*(4), 121-133.

Darjito, H. (2019). Students' metacognitive reading awareness and academic English reading comprehension in EFL context. *International Journal of Instruction*, *12*(4), 611-624.

Deliany, Z., & Cahyono, B. Y. (2020). Metacognitive reading strategies awareness and metacognitive reading strategies use of EFL University students across gender. *Studies in English Language and Education*, *7*(2), 421–437. https://doi.org/10.24815/siele.v7i2.17026

Fathi, J., & Afzali, M. (2020). The Effect of Second Language Reading Strategy Instruction on Young Iranian EFL Learners' Reading Comprehension. *International Journal of Instruction*, *13*(1), 475-488.

Geva, E., & Ryan, E. B. (1993). Linguistic and cognitive correlates of academic skills in first and second languages. *Language Learning, 43(1),* 5-42.

Ghaith, G., & El-Sanyoura, H. (2019). Reading comprehension: The mediating role of metacognitive strategies. *Reading in a Foreign Language*, *31*(1), 19-43.

Grabe, W. (2009). *Reading in a second language*. Cambridge, CUP.

Grabe, W. (2014). Key issues in L2 reading development. In *Proceedings of the 4th CELC Symposium for English Language Teachers-Selected Papers* (pp. 8-18).

Grabe, W. P., & Stoller, F. L. (2011). *Teaching and researching: Reading*. Routledge.

Graesser, A. C. (2007). An introduction to strategic reading comprehension. In D.S. McNamara (Ed.), *Reading comprehension strategies: Theories, interventions, and technologies* (pp. 3–26). Erlbaum.

Griethuijsen, R. A. L. F., Eijck, M. W., Haste, H., Brok, P. J., Skinner, N. C., Mansour, N., et al. (2014). Global patterns in students' views of science and interest in science. *Research in Science Education*, *45*(4), 581–603. Doi:10.1007/s11165-014-9438-6.

Guan, C. Q., Roehrig, A. D., Mason, R. S., & Meng, W. (2011). Psychometric properties of meta-cognitive awareness of reading strategy inventory. *Journal of Educational and Developmental Psychology*, *1*, 120-134. https://doi.org/10.5539/JEDP.V1N1P3

Guo, L. (2018). Modeling the relationship of metacognitive knowledge, L1 reading ability, L2 language proficiency and L2 reading. *Reading in a Foreign Language*, *30*(2), 209-231.

[Downloaded from ieepj.hormozgan.ac.ir on 2026-02-18]

[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

Hadwin, A. F., Winne, P. H., Stockley, D. B., Nesbit, J. C., & Woszczyna, C. (2001). Context moderates students' self-reports about how they study. *Journal of Educational Psychology*, *93*(3), 477-487.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. (2006). *Multivariate data analysis*. Pearson Prentice Hall.

Hossein Chari, M., Samavi, A., & Kurdistani, D. (2010). Adaptation and investigation of psychometric indices of Metacognitive Awareness of Reading Strategies Inventory (MARSI) among high school students. *Psychological Studies, 6*(1), 164-184.

Hudson, T. (2007). *Teaching second language reading*. Oxford University Press.

Jafari, S. M., & Shokrpour, N. (2012). The reading strategies used by Iranian ESP students to comprehend authentic expository texts in English. *International Journal of Applied Linguistics and English Literature*, *1*(4), 102-113.

Jöreskog, K. G. (1993). Testing structural equation models. *Sage Focus Editions*, *154*, 294-294.

Lindholm, A., & Tengberg, M. (2019). The reading development of Swedish L2 middle school students and its relation to reading strategy use. *Reading Psychology*, *40*(8), 782–813. https://doi.org/10.1080/02702711.2019.1674432.

Marboot, K., Roohani, A., & Mirzaei, A. (2020). Investigating Iranian EFL students' metacognitive online reading strategies, critical thinking, and their relationship: A mixed-methods study. *Issues in Language Teaching*, *9*(1), 151-182.

Marsh, H. W., Hau, K. T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11(3)*, 320-341.

McNamara, D. S. (Ed.) (2007). *Reading comprehension strategies: Theories, interventions, and technologies*. Lawrence Erlbaum.

Michigan Language Assessment (MET). (2018). https://michigan-test.com/reading-comprehension/

Mokhtari, K., & Reichard, C. (2004). Investigating the strategic reading processes of first and second language readers in two different cultural contexts. *System*, *32*(3), 379-394.

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology*, *94*(2), 249-259. DOI: 10.1037//0022- 0663.94.2.249

Mokhtari, K., & Sheorey, R. (2002). Measuring ESL students' awareness of reading strategies. *Journal of Developmental Education*, *25*(3), 2–10.

Mokhtari, K., Dimitrov, D. M., & Reichard, C. A. (2018). Revising the metacognitive awareness of Reading strategies inventory (MARSI) and testing for factorial invariance. *Studies in Second Language Learning and Teaching*, *8*(2), 219–246 https://doi.org/10.14746/ssllt.2018.8.2.3

Muhid, A., Amalia, E. R., Hilaliyah, H., Budiana, N., & Wajdi, M. B. N. (2020). The Effect of metacognitive strategies implementation on students' reading comprehension achievement. *International Journal of Instruction*, *13*(2), 847-862.

[Downloaded from ieepj.hormozgan.ac.ir on 2026-02-18]

[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

Navarro, Z. I. T. (2021). Metacognitive strategies for reading comprehension in basic education students. *Asian Journal of Education and Social Studies*, 34-46. DOI: 10.9734/ajess/2021/v14i430362

Oxford, R. L. (2011). Strategies for learning a second or foreign language. *Language Teaching*, *44*(2), 167-180.

Pammu, A., Amir, Z., & Maasum, T. N. R. T. M. (2014). Metacognitive reading strategies of less proficient tertiary learners: A case study of EFL learners at a public university in Makassar, Indonesia. *Procedia-Social and Behavioral Sciences*, *118*, 357-364. http://dx.doi.org/10.1016/j.sbspro.2014.02.049

Pressley, M., & Afflerbach, P. (1995). *Verbal protocols in reading: The nature of constructively responsive reading.* Erlbaum.

Pressley, M., & Gaskins, I. W. (2006). Metacognitively competent reading comprehension is constructively responsive reading: How can such reading be developed in students? *Metacognition and Learning*, *1*(1), 99-113.

Rastegar, M., Kermani, E. M., & Khabir, M. (2017). The relationship between metacognitive reading strategies use and reading comprehension achievement of EFL learners. *Open Journal of Modern Linguistics*, *7*(02), 65. DOI: 10.4236/ojml.2017.72006

Schellings, G., & Van Hout-Wolters, B. (2011). Measuring strategy use with self-report instruments: theoretical and empirical considerations. *Metacognition and Learning*, *6*(2), 83-90.

Sheorey, R., & Mokhtari, K. (2001). Differences in the metacognitive awareness of reading strategies among native and non-native readers. *System*, *29*(4), 431-449.

Soodla, P., Jõgi, A. L., & Kikas, E. (2017). Relationships between teachers' metacognitive knowledge and students' metacognitive knowledge and reading achievement. *European Journal of Psychology of Education*, *32*(2), 201-218.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th Ed.).Allyn and Bacon.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, 48(6), 1273-1296.

Tavakoli, H. (2014). The effectiveness of metacognitive strategy awareness in reading comprehension: The case of Iranian university EFL students. *The Reading Matrix*, *14*(2), *314-336*.

Teoh, M. L., Ansarian, L., Tik, O. L., & Nair, A. B. (2019). The effects of problem-based language learning on the listening comprehension skills of Malaysian Undergraduate Students. *Journal of Asia TEFL*, *16*(3), 996-1010.

Veloo, A., Rani, M. A., & Krishnasamy, H. N. (2014). The role of gender in the use of metacognitive awareness reading strategies among biology students. *Asian Social Science*, *11*(1), 67-73.

Yapp, D., de Graaff, R., & van den Bergh, H. (2021). Effects of reading strategy instruction in English as a second language on students' academic reading comprehension. *Language Teaching Research*, 210-245.

[Downloaded from ieepj.hormozgan.ac.ir on 2026-02-18]

[DOR: 20.1001.1.25884395.2022.4.3.10.4]

[DOI: 10.52547/ieepj.4.3.516]

Yüksel, İ., & Yüksel, İ. (2012). Metacognitive awareness of academic reading strategies. *Procedia-Social and Behavioral Sciences*, *31*, 894-898.

Zarei, A. A. (2018). On the relationship between metacognitive reading strategies, reading self-efficacy, and L2 reading comprehension. *Journal of English Language Teaching and Learning*, *10*(22), 157-181

Zhang, L., & Seepho, S. (2013). Metacognitive Strategy Use and Academic Reading Achievement: Insights from a Chinese Context. *Electronic Journal of Foreign Languages Teaching*, *10*(1), 54-69.

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