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The Effects of Strategy Instruction on Reading Comprehension in English as a Foreign Language

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Abstract

The present meta-analysis investigated the effects of strategy instruction on reading comprehension in English as a foreign language (EFL) and analysed the moderator variables that influence the outcome of strategy instruction. Nineteen effect sizes were extracted from ten studies that reported true or quasi-experiments on strategy instruction. The calculations revealed an overall positive effect ($g+ = +0.60$), indicating that on average EFL students who received strategy instruction outperformed those who did not on reading comprehension measures. Three moderator variables were identified and discussed: the nature of reading strategies, the length of treatment, and the learners' orthographic background. Suggestions for further research were offered based on three findings. First, instruction on a variety of strategies (cognitive, metacognitive, socio-affective, or test-taking strategies) yielded larger effect sizes. Second, longer treatments were not necessarily more effective. Third, learners with a consonantal first language could benefit more from strategy instruction than learners whose first language was logographic or syllabic.

The literature on second language (L2) acquisition shows that reading is a key to linguistic growth. For instance, Horst (2005) demonstrated that reading could lead to substantial vocabulary gains. Hence, it is necessary

to provide students with the tools to understand written materials, so that they can read extensively, notably authentic texts that are easily accessible on the Internet (Berardo, 2006).

In a quantitative meta-analysis, Taylor, Stevens, and Asher (2006) investigated the effects of explicit strategy instruction on reading comprehension in a second or foreign language. The researchers considered two types of strategies: cognitive strategies and metacognitive strategies. Cognitive strategies were defined as those "used to interact with the L2 text" (Taylor et al., 2006, p. 216), such as inferring the meaning of unknown words from contextual clues, whereas metacognitive strategies were defined as "those used for planning, monitoring or reviewing how the interaction with the L2 text will take place" (Taylor et al., 2006, p. 216). The authors found that overall the students who received explicit strategy training outperformed those who did not. However, the nature of the strategies that were taught – cognitive or metacognitive – did not yield any statistically significant difference.

The purpose of the present paper was to update the meta-analysis conducted by Taylor et al. (2006) by synthesizing the results of studies on reading strategy instruction published after 2006. Three questions guided the present systematic review: What is the effect of strategy instruction on reading comprehension in English as a foreign language (EFL) compared to the absence of strategy instruction? What type of strategy instruction has the most significant effect on reading comprehension in EFL? What are the moderating variables that can influence the outcome of strategy instruction?

METHOD

Borokhovski et al. (2009) underlined the superiority of meta-analyses over narrative and vote-count reviews. In the field of applied linguistics, a growing number of meta-analyses have been published since the 1990s (Oswald & Plonsky, 2010). The present systematic review used meta-analysis to calculate the effect sizes of strategy instruction on reading comprehension in EFL. To be incorporated in this review, studies had to meet the following inclusion criteria:

- Compare the impact of strategy instruction on reading comprehension with the absence of strategy instruction
- Use reading comprehension as one of the outcome measures
- Have either an experimental or a quasi-experimental design

- Be published in a peer-reviewed scholarly journal after January, 1, 2006
- Be conducted in an EFL context
- Present sufficient statistical data so that an effect size could be extracted

Definition of Terms

EFL. Nayar (1997) argues that there is an overlap between the terms "English as a foreign language" (EFL) and "English as a second language" (ESL). According to the author, ESL is the term that was created first and was used to refer to English language learning regardless of the country where it was taught. The term EFL was created later to specifically refer to English language learning in a non-English speaking country. This resulted in an overlap with the term ESL. One problem is that the term "second" does not necessarily imply that the learners only know one language before they start learning English. Despite the use of the term "second", the field of second language acquisition (SLA or L2 acquisition) encompasses the learning of any additional language, regardless of the context and the number of languages that the learners have already studied (VanPatten & Benati, 2010). In order to limit the variables in this meta-analysis, only studies that were conducted in non-English speaking countries were included, thereby using the original definition of EFL. However, for practical reasons, the abbreviations "L1" and "L2" were used to refer respectively to the learners' first language and additional language. Focussing on the ever-growing EFL population (Meyer, 2012) rather than students in ESL settings is relevant because reading may be the main source of language input for learners living in countries where English is not widely spoken (Ghyasi, Safdaria, & Farsani, 2013; Sadeghi & Ahmadi, 2012).

Reading Comprehension. Reading can be defined as the process of decoding printed symbols into phonological forms in order to have access to the meaning of the printed material (Ziegler & Goswami, 2006). However, in order to comprehend a text, one must have sufficient vocabulary knowledge, know how the sentences are constructed in the language, and synthesise the information extracted from the text with prior knowledge (Koda, 2007). Comprehension can be considered the ultimate goal of reading (Koda, 2007). For this reason, reading comprehension was chosen as the dependent variable for this meta-analysis.

Reading Strategies. Although reading can be primarily seen as a cognitive task, as illustrated by the aforementioned definition, research has proven that good readers employ a variety of strategies to comprehend written materials (Duke & Pearson, 2002). According to Bimmel, van den Bergh, and Oostdam (2001), the more difficult the reading task, the more readers need to regulate their processes of meaning construction, in other words, use reading strategies. The authors define a reading strategy as "a plan of mental actions to achieve a reading goal" (Bimmel et al., 2001, p. 510). Four categories of reading strategies have been identified in the literature (Aghaie & Zhang, 2012; Akkakoson, 2013; Bimmel et al., 2001): cognitive, which can be bottom-up (e.g., scanning) or top-down (e.g., predicting), metacognitive (e.g., comprehension monitoring), socio-affective (e.g., cooperating with others in the reading task), along with test-taking strategies (e.g., reading the test questions before the actual text). However, Phakiti (2003) pointed out the overlap across several strategies. For instance, translating into one's first language is a cognitive strategy that also implies metacognition, as the reader must at the same time monitor if the translated sentence makes sense. Therefore, this meta-analysis was not limited to any type of reading strategy and discussed strategies as study features.

Reading Comprehension: Exemplary study. In Akkakoson's (2013) study, a total of 46 strategies were taught to the treatment group. Although the researcher did not test each strategy independently, the strategies covered the four areas mentioned above: cognitive, metacognitive, socio-affective, and test-taking strategies. He included a detailed list of all the strategies in Appendix C.

Strategy Instruction. Duke and Pearson (2002) provided a model of reading strategy instruction. According to the researchers, teachers must explicitly describe the strategy; in other words, overtly explain its content and its use. Second, a model should be provided. Third, the strategy should be used collaboratively. Finally, the teachers should guide (scaffold) the students and progressively decrease their guidance so that the students become independent users of the strategy. However, it might be argued that collaboration is not a requirement for strategy instruction, as learners taking private lessons may be taught strategies without practicing them with a peer. Therefore, the present meta-analysis included studies that assessed the effects of strategy instruction provided the instruction matched at least one of the criteria of Duke and Pearson's (2002) model.

Strategy Instruction: Exemplary study. Takallou (2011) assessed the effectiveness of a type of strategy instruction divided into five steps: preparation (understanding the students' needs), presentation (overt explanations about the strategy), practice, evaluation, and expansion (explanations about the possibility to transfer the strategy to other tasks).

Search Strategy

In order to locate and select studies for this meta-analysis, electronic searches were performed. Oswald and Plonsky (2010) reported that the most frequently used databases among second language acquisition meta-analysts were, in order of importance, Education Resource Information Center (ERIC), Linguistics and Language Behavior Abstracts (LLBA), and PsycINFO. In order to ensure the retrieval of any studies unique to a resource, a first literature search was conducted through Ebsco (Appendix A), combining the following databases: Academic Search Complete, Education Full Text (H. W. Wilson), Education Research Complete, ERIC, and PsycINFO. A second search (Appendix B) was conducted on LLBA through ProQuest because it is not included in Ebsco, although it is one of the most frequently used databases in the field of applied linguistics (Oswald & Plonsky, 2010).

In both searches, results were limited to studies published in peer-reviewed scholarly journals after January, 1, 2006. Using Boolean features and truncation, the keywords that were entered as search terms were a combination of ("reading" AND "strateg*") with ("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") and terms aiming at limiting the results to quantitative experiments. The number of results yielded by the first and the second search were respectively 30 and 8. The abstracts of the results from both searches were then exported to RefWorks, and the duplicates were deleted, resulting in a total of 29 studies.

The next stage of the search process was the abstract review. Studies that did not meet the inclusion criteria were deleted from the reference list at this point. Since the search terms did not include "instruction" or "training", several studies were discarded because they were focussing on the assessment of students' perceptions of reading strategies or the frequency of students' use of reading strategies. For instance, one study was measuring the increase in students' strategy use, but not their impact on reading comprehension and was thereby excluded. The remaining studies were retrieved through the researcher's institutional library

subscription, and full texts were reviewed. The studies that did not provide sufficient statistical data in order to calculate or estimate an effect size were discarded. As a result, 10 studies were included in this systematic review.

Study Features

In light of the theoretical literature in education (Schunk, 2012), the issues in the field of second language acquisition (Dixon et al., 2012), and more specifically those in reading (Koda, 2007), several study features were extracted in order to analyse the variability of the effect sizes. The study features used in this systematic review included: context (country, type of instructional setting), age of the learners, level of L2 proficiency, nature of the reading strategies taught (cognitive, metacognitive, social), methodology (true experiment or quasi-experiment), type of assessment instrument (standardized, researcher developed, teacher developed), length of intervention, instructor equivalence (same, different), nature of the intervention in treatment and control groups, and type of texts (authentic, inauthentic). The length of texts could not be included as it was only reported in two studies (Hayati & Shariatifar, 2009; Talebi, 2012) and was equivalent (between 257 and 300 words). Gender was also not used as a study feature as it was not systematically reported in the studies, and even when reported, the data were not divided by gender. Only one study reported an experiment conducted solely with male learners (Talebi, 2012).

Effect Size Extraction and Calculation

The methodology for the effect size extraction and calculation was based on Bernard, Abrami, and Borokhovski's (2012) guidelines. After recording the number of participants in the experimental group and the control group of each study, along with the mean scores and the standard deviations, the *d*-family effect size of each study was calculated using Cohen's *d* formula (Figure 1).

$$d = \frac{\bar{Y}_E - \bar{Y}_C}{SD_{Pooled}}$$

Figure 1. Cohen's *d* effect size formula.

Two studies (Aghaie & Zhang, 2012; Fan, 2010) did not provide sufficient statistical data to calculate the effect size with the aforementioned formula. Therefore, the following alternative methods were used. For the former (Aghaie & Zhang, 2012), the effect size was estimated from the *t*-value. Since both groups – treatment and control – had the same sample size, the formula presented in Figure 2 was used. For the second study (Fan, 2010), the effect size was estimated from the *F*-value. Since the sample sizes of the treatment and the control conditions were different, the formula presented in Figure 3 was used.

$$d = t\sqrt{\frac{2}{n}}$$

Figure 2. Effect size calculation from *t*-value (when $n_E = n_C$).

$$d = \sqrt{F\left(\frac{1}{n_E} + \frac{1}{n_C}\right)}$$

Figure 3. Effect size calculation from *F*-value (when $n_E \neq n_C$).

Given the fact that sample sizes in the studies varied from 30 to 192 participants, and that small sample sizes are overestimated by Cohen's *d* (Bernard et al., 2012), once the *d*-family effect sizes of each study were obtained, they were converted to Hedges' *g* according to the formula presented in Figure 4.

$$g \cong d\left(1 - \frac{3}{4N - 9}\right)$$

Figure 4. Converting Cohen's *d* to Hedges' *g*.

As a result, a total of 19 effect sizes were extracted from 10 studies. Additionally, in order to know the overall impact of strategy instruction on reading comprehension and to be able to analyse the moderator variables, it was necessary to calculate the weighted mean effect size (*g*+). To do so, the following calculations were made: the standard error of *g* (Figure 5), which was then squared to obtain the variance (*V*); the inverse variance (*w*), presented in Figure 6; the weighted *g* (Figure 7); and finally, the average *g* (*g*+), which was calculated according to the formula presented in Figure 8.

$$SE_g = \sqrt{\frac{1}{n_e} + \frac{1}{n_c} + \frac{g^2}{2(n_e + n_c)}\left(1 - \frac{3}{4(n_e + n_c) - 9}\right)}$$

Figure 5. Calculation of the standard error of *g*.

$$w_i = \frac{1}{V_i}$$

Figure 6. Calculation of the inverse variance.

$$w_i g_i = w_i \bullet g_i$$

Figure 7. Calculation of the weighted *g*.

$$g+ = \frac{\sum_{i=1}^{k} (w_i)(g_i)}{\sum_{i=1}^{k} w_i}$$

Figure 8. Calculation of the weighted mean effect size (*g*+).

In sum, in the present meta-analysis, the 19 effect sizes (*g*) and weighted mean effect sizes (*g*+) were used to analyse the effectiveness of strategy instruction on reading comprehension and the moderator variables.

RESULTS

Table 1 presents a summary of the effect sizes calculated in this systematic review. The complete table was included in Appendix C. Overall, strategy instruction clearly had a positive impact on reading comprehension in EFL, with a medium weighted mean effect size of +0.60.

Table 1. Summary of the Effect Sizes.

	Study	Independent Variable (nature of reading strategy)	Sample Size			Effect Size (Hedges' *g*)
			n_E	n_C	N	
1	Aghaie & Zhang, 2012	cognitive and metacognitive	40	40	80	0.9782
2	Akkakoson, 2013	cognitive, metacognitive, socio-affective and test-taking	82	82	164	0.7350
3	Alsamadani, 2011	3-2-1 strategy	42	43	85	1.4008
4	Araghi & Yari, 2012	analyzing and reasoning	15	15	30	0.1010
5	Fan, 2010	predicting (CSR)	54	56	110	0.0698
6	Fan, 2010	getting the main idea (CSR)	54	56	110	0.6094
7	Fan, 2010	finding supporting details (CSR)	54	56	110	0.3891
8	Fan, 2010	dealing with vocabulary (CSR)	54	56	110	0.1680
9	Fan, 2010	making inferences (CSR)	54	56	110	0.0555
10	Ghazanfari & Sarani, 2009	summarization	21	21	42	1.1285
11	Ghazanfari & Sarani, 2009	question generation	21	21	42	0.4638

12	Hayati & Shariatifar, 2009	knowledge mapping	20	20	40	1.5363
13	Hayati & Shariatifar, 2009	underlining	20	20	40	2.1162
14	Liu, Chen, & Chang, 2010	computer-assisted concept mapping (good reader)	45	48	93	0.2588
15	Liu, Chen, & Chang, 2010	computer-assisted concept mapping (poor reader)	49	50	99	0.6957
16	Takallou, 2011	planning	31	31	62	0.4755
17	Takallou, 2011	self-monitoring	31	31	62	0.0107
18	Talebi, 2012	collaborative strategic reading (intermediate)	30	30	60	1.6059
19	Talebi, 2012	collaborative strategic reading (advanced)	30	30	60	1.5216
						***g*+ = 0.6042**

The study features that were selected as moderator variables for the discussion section of this review were included in Table 2. The selection was based on the variables that were reported most consistently in the studies. Regrettably, because the studies reported other relevant variables inconsistently, such as the level of L2 proficiency or the types of texts used in the assessment instrument, these could not be included in this meta-analysis. However, it is noteworthy that several variables were similar across the studies. For instance, all the studies included in this systematic review that did report the age of the learners assessed the effect of strategy instruction with young adults between 17 and 25 years old. Hence, it was decided not to use these characteristics as moderator variables.

Table 2. Results of Mixed Effects Analysis of a Selection of Moderator Variables.

Moderator Variable	Weighted Mean Effect Size (*g*+)
Type of strategy taught	
Combination of strategies (3)	0.9501
Cognitive strategies (3)	1.0644
Metacognitive strategies (6)	0.4874
Socio-affective strategies (7)	0.4464
Combined (19)	0.6042
Length of the treatment (in weeks)	
1-4 weeks (5)	1.0037
5-8 weeks (5)	0.9504
9-12 weeks (2)	0.4786
13-16 weeks (7)	0.4183
Combined (19)	0.6042
Length of the treatment (in hours)	
1 hour (2)	1.7993
2-19 hours (5)	0.9504
20-48 hours (9)	0.4300
Combined (16)	0.6058
Nature of L1 writing system	
Consonantal (11)	0.9713
Syllabic (1)	0.7350
Logographic (7)	0.3119
Combined (19)	0.6042

Note. The number reported in brackets is the number of effect sizes.

DISCUSSION

Despite several methodological differences with Taylor et al.'s (2006) meta-analysis on this topic, the present systematic review yielded similar results. Indeed, as Taylor et al., the present meta-analysis revealed an overall positive effect ($g+ = +0.60$), indicating that on average EFL students who received strategy instruction outperformed those who did not on reading comprehension measures. In contrast to Taylor et al. (2006), the present meta-analysis focussed on the EFL context, and it included studies that reported statistical data on the impact of socio-affective reading strategies. Since the nature of the reading strategies taught was different, this moderator variable was discussed in a subsection. Another difference with the previous meta-analysis is that, as mentioned above, several moderator variables could not be included in the discussion because of the inconsistency in the data reported in the set of studies. The scope of this section was therefore narrowed to three moderator variables: the type of reading strategy, the length of the treatment, and the nature of participant's first language writing system.

Type of Reading Strategy

Whereas Taylor et al. (2006) did not find any significant statistical difference among cognitive and metacognitive reading strategies, the present meta-analysis yielded contrasting findings. While socio-affective and metacognitive strategies yielded medium effect sizes (respectively, $g+ = +0.45$ and $+0.49$), cognitive strategies yielded large effect sizes, regardless of whether they were taught in isolation ($g+ = +1.06$) or in combination with other strategies ($g+ = +0.95$). In order to understand why cognitive strategies had such an important impact, the individual studies in this category were examined. It was found that the three studies had severe limitations.

First, the study by Hayati and Shariatifar (2009), which represented the largest effect size in the category of cognitive strategies ($g = +2.12$), was analysed. It consisted in two single 60-minute treatments – one for the cognitive strategy (underlining) and one for the metacognitive strategy (knowledge mapping) – immediately followed by a reading comprehension test. Not only was the length of the treatments extremely short, but the assessment method seemed biased, as the participants were explicitly asked to employ the strategy that they had just learned. In

addition, the authors mentioned: "Before scoring the test, all the three groups' papers were checked by the researchers to make sure that each group had used the required strategy" (Hayati & Shariatifar, 2009, p. 60).

In a similar fashion, the study by Ghazanfari and Sarani (2009) consisted in two single sessions of treatment: one for the cognitive strategy (summarization) group and one for the metacognitive strategy (question-generation) group. One week after the experiment, the two treatment groups and the control group were asked reading comprehension questions on the same short stories as those that were used during the experiment. Hence, it could be argued that the positive effect sizes – +1.13 for the cognitive strategy and +0.46 for the metacognitive strategy – were not surprising, as the students in the treatment condition were more engaged with the reading task than the control group participants, who were not asked to apply any specific strategy. Interestingly, none of the aforementioned articles (Ghazanfari & Sarani, 2009; Hayati & Shariatifar, 2009) reported any limitations.

The last study in the category of cognitive strategies was that by Araghi and Yari (2012). It was the only study in this meta-analysis that was not conducted in an academic context. While other studies were conducted in high schools, colleges, or universities, Araghi and Yari's (2012) experiment was implemented in a private language school. The authors pointed out the lack of motivation and the high socioeconomic status of the participants as the main causes for the relative failure of strategy instruction in this context. However, this study was problematic due to the numerous mistakes in the written language, the use of casual idioms, and what could be qualified as a lack of professionalism. For instance, the authors mentioned: "high socio-economical status of these subjects made them so lazy and uninterested-in-learning students that hardly any method of language teaching or strategy training would be effective to them" (Araghi & Yari, 2012, p. 803).

A new calculation of the effect sizes was made after discarding these studies (Table 3). The overall weighted mean effect size remained positive ($g+ = +0.55$), but it was no longer possible to compare the effect of cognitive and metacognitive strategies as in Taylor et al.'s (2006) meta-analysis. However, the results showed that metacognitive and socio-affective strategies had a similar impact on reading comprehension, with a positive effect of +0.38 and +0.45 respectively. The fact that combinations of strategies had the largest effect size ($g+ = +0.95$) suggested that strategy instruction was more efficient when students were provided with a variety of strategies from which they could choose according to their

needs, their preferences, and the reading task. This is consistent with the fact that good readers employ a variety of strategies to comprehend written materials (Duke & Pearson, 2002). Although some might have preferred to see the results for each individual strategy instead of a global result for a combination of strategies, such a breakdown might not have been relevant. Indeed, as mentioned in the definition section, there are considerable overlaps across reading strategies (Phakiti, 2003).

Table 3. Results of a Second Mixed Effects Analysis of Moderator Variables.

Moderator Variable	Weighted Mean Effect Size (*g*+)
Type of strategy taught	
Combination of strategies (3)	0.9501
Metacognitive strategies (4)	0.3832
Socio-affective strategies (7)	0.4464
Combined (14)	0.5499

Note. The number reported in brackets is the number of effect sizes.

Length of the Treatment

One interesting finding of Taylor et al.'s (2006) meta-analysis was that the length of the treatment did not have any particular influence on the outcome. The present meta-analysis contradicted their results, as it showed that the longer the treatments lasted in weeks, the smaller the effect sizes were. In order to ensure that these results were accurate, the weighted mean effect sizes were subsequently calculated for another moderator variable, namely the length of the treatment in hours. Again, the calculation showed that the longer the treatments lasted in hours, the smaller the effect sizes were. Discarding the problematic studies mentioned in the previous section, which were the shortest in terms of duration, did not change this result.

However, this finding must be interpreted with caution due to the variability across the effect sizes depending on the nature of the strategy

taught. For instance, the different effect sizes that were extracted from Fan's (2010) study showed that, despite an identical length of treatment (14 weeks or 42 hours), instruction on the main idea extraction strategy yielded a medium effect size of +0.61, whereas instruction on the inferencing strategy had almost no effect (g = +0.06).

Although the length of treatment appeared to be of minor importance in comparison with the nature of reading strategies, this finding has significant implications for further research, if not for instruction. One possible interpretation would be that certain strategies might be more difficult to master and require long-term practices in order to be fruitful. Incidentally, this was how Fan (2010) interpreted her results, attributing the small effect of the inferencing strategy to the difficulty for the students to activate prior knowledge in order to make predictions. Longitudinal studies would be necessary to shed light on the relation between strategic reading behaviours and the time required to be able to apply these strategies autonomously. Another possible interpretation would be that the most decisive aspect of strategy instruction might be the first phase – which is when teachers tend to raise students' awareness of reading strategies – rather than the practice phase, at least for certain strategies. This could be tested by having two treatment groups receiving the same type of strategy instruction, but for shorter or longer periods. If a shorter period does prove to be as efficient as (or more efficient than) a longer period of exposure to strategy instruction, this would imply that it is possible to change significantly students' strategic reading behaviours in a relatively short period of time.

Nature of L1 Writing System

Four countries were represented in the set of studies, namely Iran, Saudi Arabia, Taiwan, and Thailand. In other words, the participants had different types of orthographic backgrounds. According to Cook and Bassetti's (2005) classification of writing systems, these were either consonantal (Iran or Saudi Arabia), logographic (Taiwan), or syllabic (Thailand). This distinction is important since the literature showed that the orthographic background had an impact on the way readers process a text written in a foreign language (Mori, 1998; Sparks, Patton, Ganschow, Humbach, & Javorsky, 2008) and that learners transfer their L1 reading strategies to the L2 (Koda, 1990). The present meta-analysis revealed that reading strategy instruction was more effective when learners had a consonantal orthographic background (g+ = +0.97), even when the three

problematic studies (Araghi & Yari, 2012; Ghazanfari & Sarani, 2009; Hayati & Shariatifar, 2009) were excluded from the calculation (g+ = +0.96). Since only one effect size (+0.74) could be extracted for the syllabic orthography (Akkakoson, 2013), it would have been difficult to draw conclusions regarding the overall effect of strategy instruction on reading comprehension when learner's L1 writing system is syllabic.

However, the small effect size (g+ = +0.31) of strategy instruction for learners who had a logographic background was thought-provoking. A tentative explanation was the level of L2 proficiency. Regrettably, Fan's (2010) study was the only one reporting a low to intermediate level of L2 proficiency, and Liu, Chen, and Chang's (2010) was the only one in the high-intermediate category, making it impossible to compare participants who had a similar level but who received strategy instruction in different contexts. In addition, because Liu et al.'s (2010) study was the only one involving the use of technology, this might have been an influential variable. Further research is needed to understand the impact of technology on the acquisition of the concept-mapping strategy. Nevertheless, one comparison between the studies involving participants with a consonantal background and those conducted with logographic-background learners was possible. Indeed, two studies (Fan, 2010; Talebi, 2012) assessed the impact of Collaborative Strategic Reading (CSR), which consisted in assigning roles to the students and having them work collaboratively on the reading task while discussing and applying reading strategies. The effect sizes extracted from Talebi's (2012) study were +1.61 for the intermediate-level participants and +1.52 for the advanced level, while those calculated from Fan's (2010) data ranged from +0.06 to +0.61 (g+ = +0.25). Several interpretations could be proposed to explain this gap. On the one hand, collaboration might yield varying results depending on the cultural context. On the other hand, learners' L1 might impact the way they apply the strategies acquired through CSR. Again, this meta-analysis revealed potential areas for future research.

LIMITATIONS

The findings of the present meta-analysis must be considered with the following limitations. First, the findings may not be generalizable to all EFL contexts, since no study was conducted in primary educational contexts or in countries other than Iran, Saudi Arabia, Taiwan and Thailand. Second, although an overall positive effect on reading

comprehension was found for strategy instruction, it remains unclear whether or not strategy instruction has long-lasting effects. Indeed, in all the studies included in this systematic review, the researchers tested the outcome of instruction very shortly (no more than one week) after the treatment. Only one study (Ghazanfari & Sarani, 2009) included a second post-test, but its only goal was to assess how much the participants remembered the content of the short stories used during the experiment. In other words, no study tested if EFL learners continued to apply reading strategies several weeks or months after the treatment. Third, the inclusion criteria of the meta-analysis limited the number of studies, thereby resulting in the impossibility to draw conclusions regarding the overall effect of strategy instruction on reading comprehension when learner's L1 writing system is syllabic, although the orthographic background does appear to be a significant variable, given the data on learners with a consonantal or logographic background. A fourth limitation to the present analysis comes from the inconsistency in the data reported by the studies, as mentioned earlier. Due to this lack of information, several moderator variables that were identified by Taylor et al. (2006) could not be discussed. For instance, Takallou (2011) showed that the authenticity of texts had a positive effect on reading comprehension, which has been pointed out in Taylor et al.'s (2006) meta-analysis. However, because only a few studies reported the types of texts that were used, this variable could not be discussed in this paper.

Overall, the decisions that were made regarding the inclusion criteria had an impact on this systematic review. One difficulty was to maintain a sufficient number of studies to conduct credible quantitative analyses, while limiting the number of variables and at the same time selecting only high-quality studies. Other researchers might have preferred to include only experiments that lasted more than a month, while broadening the scope to any language context (EFL, ESL, or other L2). However, the flaws in the methodologies of the studies that were included in this meta-analysis were analysed throughout the discussion, and, when necessary, new calculations were made in order to ensure that no individual study biased the overall findings.

CONCLUSION

The purpose of this systematic review was to update Taylor et al.'s (2006) meta-analysis in order to assess the effects of strategy instruction on

reading comprehension in English as a Foreign Language. In accordance with Taylor et al.'s (2006) results, the findings of the present paper showed that strategy instruction had a positive effect in a variety of contexts, be it in high schools or at the university level, in the Middle-East or in Asia. Meanwhile, in contrast with Taylor et al.'s (2006) conclusions, the present meta-analysis revealed that the nature of the strategies was an important moderator variable, underlining the fact that providing the students with a variety of strategies was the most effective type of instruction. This paper also offered suggestions for further research. One aspect is the need for longitudinal studies in order to understand the relation between the types of reading strategies and the time required to master them. Such longitudinal studies would also shed light on the all-important question of the effects of strategy instruction over the long term. This suggestion is based on three factors. First, longer treatments did not necessarily yield greater effect sizes. Second, this result could be attributed to the nature of the strategies that were taught. Third, no study conducted a second post-test after a few weeks or months to assess if strategy instruction had long-lasting effects. Another aspect that would provide useful insights is the investigation of the relation between reading strategies and the learners' cultural context or orthographic background, as this paper showed that strategy instruction was overall more effective with participants with a consonantal background.

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APPENDIX A

LITERATURE SEARCH 1 (EBSCO)

Wednesday, December 04, 2013 4:13:33 PM

#	Query	Limiters/Expanders	Last Run Via	Results
S4	TI ("strateg*" AND "reading") AND AB (("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") AND ("treatment" OR "Control group*" OR "Experimental group*" OR "Matched group*" OR "Quasi experiment*" OR "research methodolog*" OR "statistical analy*" OR "Longitudinal Stud*" OR "quantitative stud*" OR "quantitative data" OR "quantitative analy*" OR "quantitative measur*" OR "quantitative methodolog*" OR "quantitative research" OR "empirical stud*" OR "experimental stud*" OR "experiment*"))	Limiters - Scholarly (Peer Reviewed) Journals; Published Date: 20060101-20141231 Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - Academic Search Complete;Education Full Text (H.W. Wilson);Education Research Complete;ERIC;PsycINFO	30
S3	TI "strateg*" AND "reading"	Limiters - Scholarly (Peer Reviewed) Journals; Published Date: 20060101-20141231 Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - Academic Search Complete;Education Full Text (H.W. Wilson);Education Research Complete;ERIC;PsycINFO	1,289

S2	TI "strateg*" AND "reading"	Limiters - Scholarly (Peer Reviewed) Journals Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - Academic Search Complete;Education Full Text (H.W. Wilson);Education Research Complete;ERIC;PsycINFO	3,100
S1	TI "strateg*" AND "reading"	Search modes - Boolean/Phrase	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - Academic Search Complete;Education Full Text (H.W. Wilson);Education Research Complete;ERIC;PsycINFO	4,456

APPENDIX B

LITERATURE SEARCH 2 (LLBA)

ProQuest

Recent Searches

To save a search, select **Save search** from the **Actions** menu. Learn more

Combine searches: Search

Examples: 1 AND 3 or "6" Search tips
(1 AND 3) OR (1 AND 2)
3 NOT treatment

	Set	Search	Databases	Results	Actions
	S4	ti("strateg*" AND "reading") AND ab(("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") AND ("treatment" OR "Control group*" OR "Experimental group*" OR "Matched group*" OR "Quasi experiment*" OR "research methodolog*" OR "statistical analy*" OR "Longitudinal Stud*" OR "quantitative stud*" OR "quantitative data" OR "quantitative analy*" OR "quantitative measur*" OR "quantitative methodolog*" OR "quantitative research" OR "empirical stud*" OR "experimental stud*" OR "experiment*")) Limits applied	Linguistics and Language Behavior Abstracts (LLBA)	**8°**	Actions
	S3	ti("strateg*" AND "reading") AND ab(("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") AND ("treatment" OR "Control group*" OR "Experimental group*" OR "Matched group*" OR "Quasi experiment*" OR "research methodolog*" OR "statistical analy*" OR "Longitudinal Stud*" OR "quantitative stud*" OR "quantitative data" OR "quantitative analy*" OR "quantitative measur*" OR "quantitative methodolog*" OR "quantitative research" OR "empirical stud*" OR "experimental stud*" OR "experiment*")) Limits applied	Linguistics and Language Behavior Abstracts (LLBA)	**19°**	Actions
	S2	ti("strateg*" AND "reading") AND ab(("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") AND ("treatment" OR "Control group*" OR "Experimental group*" OR "Matched group*" OR "Quasi experiment*" OR "research methodolog*" OR "statistical analy*" OR "Longitudinal Stud*" OR "quantitative stud*" OR "quantitative data" OR "quantitative analy*" OR "quantitative measur*" OR "quantitative methodolog*" OR "quantitative research" OR "empirical stud*" OR "experimental stud*" OR "experiment*")) Limits applied	Linguistics and Language Behavior Abstracts (LLBA)	**34°**	Actions
	S1	ti("strateg*" AND "reading") AND ab(("second language" OR "L2" OR "Foreign Language" OR "FL" OR "ESL" OR "EFL") AND ("treatment" OR "Control group*" OR "Experimental group*" OR "Matched group*" OR "Quasi experiment*" OR "research methodolog*" OR "statistical analy*" OR "Longitudinal Stud*" OR "quantitative stud*" OR "quantitative data" OR "quantitative analy*" OR "quantitative measur*" OR "quantitative methodolog*" OR "quantitative research" OR "empirical stud*" OR "experimental stud*" OR "experiment*"))	Linguistics and Language Behavior Abstracts (LLBA)	**54°**	Actions

° Duplicates are removed from your search and from your result count.

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APPENDIX C

EFFECT SIZE CALCULATION

	Study	Independent variable (nature of reading strategy)	n_E	n_C	N	Effect size (Cohen's d)	Effect size (Hedges' g)	Standard Error (SE_g)	Variance (V_g)	Inverse Variance (w_i)	Weighted g (g_i)(w_i)
1	Aghaie & Zhang, 2012	cognitive and metacognitive	40	40	80	0.9877	0.9782	0.2343	0.0549	18.2132	17.8156
2	Akkakoson, 2013	cognitive, metacognitive, socio-affective and test-taking	82	82	164	0.7384	0.7350	0.1606	0.0258	38.7653	28.4916
3	Alsamadani, 2011	3-2-1 strategy	42	43	85	1.4136	1.4008	0.2399	0.0576	17.3761	24.3403
4	Araghi & Yari, 2012	analyzing and reasoning	15	15	30	0.1038	0.1010	0.3555	0.1264	7.9124	0.7991
5	Fan, 2010	predicting (CSR)	54	56	110	0.0703	0.0698	0.1895	0.0359	27.8607	1.9460
6	Fan, 2010	getting the main idea (CSR)	54	56	110	0.6136	0.6094	0.1937	0.0375	26.6414	16.2346
7	Fan, 2010	finding supporting details (CSR)	54	56	110	0.3918	0.3891	0.1912	0.0365	27.3601	10.6450

8	Fan, 2010	dealing with vocabulary (CSR)	54	56	110	0.1692	0.1680	0.1897	0.0360	27.7796	4.6675
9	Fan, 2010	making inferences (CSR)	54	56	110	0.0559	0.0555	0.1894	0.0359	27.8669	1.5478
10	Ghazanfari & Sarani, 2009	summarization	21	21	42	1.1502	1.1285	0.3260	0.1063	9.4098	10.6189
11	Ghazanfari & Sarani, 2009	question generation	21	21	42	0.4727	0.4638	0.3068	0.0941	10.6221	4.9263
12	Hayati & Shariatifar, 2009	knowledge mapping	20	20	40	1.5674	1.5363	0.3527	0.1244	8.0382	12.3487
13	Hayati & Shariatifar, 2009	underlining	20	20	40	2.1591	2.1162	0.3871	0.1498	6.6737	14.1228
14	Liu, Chen, & Chang, 2010	computer-assisted concept mapping (good reader)	45	48	93	0.2610	0.2588	0.2066	0.0427	23.4186	6.0617
15	Liu, Chen, & Chang, 2010	computer-assisted concept mapping (poor reader)	49	50	99	0.7011	0.6957	0.2054	0.0422	23.7020	16.4886
16	Takallou, 2011	planning	31	31	62	0.4815	0.4755	0.2543	0.0647	15.4597	7.3504
17	Takallou, 2011	self-monitoring	31	31	62	0.0108	0.0107	0.2508	0.0629	15.8963	0.1695

18	Talebi, 2012	collaborative strategic reading (intermediate)	30	30	60	1.6270	1.6059	0.2931	0.0859	11.6439	18.6986
19	Talebi, 2012	collaborative strategic reading (advanced)	30	30	60	1.5416	1.5216	0.2894	0.0837	11.9415	18.1699
						***g*+ =**	**0.6042**			**356.5815**	**215.4431**