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Metacognitive reading strategies and its relationship with Filipino high school students' reading proficiency: insights from the PISA 2018 data

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Learners' metacognitive reading strategies support their attempts to draw meaning from texts and to overcome comprehension difficulties. For second language readers, such strategies may compensate for lack of language proficiency while reading. Taking a sample from a country that ranked last in the PISA 2018 reading assessment, this study aims to investigate potential discrepancies in how students evaluate the usefulness of specific reading strategies and how these conceptions are associated with related to the students' reading proficiency. We explored the association between metacognitive reading strategies with reading proficiency by analysing data from a nationally representative sample of 15-year-old students who participated in the PISA 2018 ($N = 6591$). Awareness of different reading strategies was compared using repeated measures ANOVA; relationships with reading proficiency were examined using regression analysis. Self-reports on metacognitive reading strategies accounted for a significant portion of the variation in Filipino students' English reading proficiency, after controlling for SES, sex, and number of books at home. The reading strategies perceived as most useful were not the most strongly associated with reading proficiency, suggesting that students may not be aware of which reading strategies are helpful in learning to read in English. The results indicate variations in the students' awareness of which strategies aid in their reading comprehension and point to the need to better understand how effective reading strategy instruction is taught to and is engaged by Filipino students in their reading classes.

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Introduction

In 2018, Filipino students participated in the OECD's Programme for International Student Assessment (PISA) for the first time, and the results revealed that Filipino students ranked last among 79 countries/economies in the domain of reading (Organisation for Economic Co-operation and Development 2019b). Around 80% of the Filipino students who participated in the assessment failed to meet the minimum reading proficiency level. A few studies (e.g., Bernardo 2023; Bernardo et al. 2021; Haw et al. 2021) have attempted to explore the factors that may be related to variations in Filipino students reading proficiency in PISA, and in this study, we focus on one factor, metacognitive awareness of reading strategies, which has been associated with reading proficiency of readers in different parts of the world (Alkhateeb et al. 2021; Pinninti 2016; Sheikh et al. 2019). We inquire into metacognitive strategies considering that the Filipino students were tested on their reading proficiency in English, the official medium of instruction for most high school subjects in Philippine schools, but a language that was not used at the homes of 94% of the students. Researchers have noted how reading strategies play a very important role in learning to read in a second language or foreign language (Chen and Chen 2015; Friesen and Haigh 2018); in particular, metacognitive strategies help students attain better reading proficiency even as they have low language proficiency (Kolić-Vehovec and Bajšanski 2007). In this study, we use data from the PISA 2018 database drawn from a nationally representative sample of 15-year-old Filipino students to explore how awareness of 11 different reading strategies relate to Filipino students' reading proficiency in English.

Reading strategies of second language learners. Among the variables that affect the process of reading in the second language, reading strategy use is one of the most studied (Chen and Chen 2015; Friesen and Haigh 2018). Second language and foreign language readers need to be proficient in the use of reading strategies to be able to understand a text (Hong-Nam and Page 2014; Schiff and Calif 2004; Sheorey and Mokhtari 2001; Zhang et al. 2014). Reading strategies are actions undertaken by readers to support their comprehension and attempts to draw meaning from texts (Garner 1987; Yoshikawa and Leung 2020). Reading strategies also involve readers' perceptions of the reading tasks and how they respond to difficulties encountered while reading (Singhal 2001), as the students' reading strategies indicate how they are attempting to overcome their comprehension difficulties (Tercanlioglu 2004). Without the use of the appropriate reading strategies, comprehension difficulties are likely to arise among second or foreign language readers, and the difficulties might result in detachment from reading activities (Kasemsap and Lee 2015). On the other hand, the use of appropriate reading strategies can compensate for second language readers' lack of language proficiency while engaged in reading tasks (Carell 1989; Kolić-Vehovec and Bajšanski 2007).

Reading strategies have been classified by experts as low-level and high-level strategies, and both types need to be activated and coordinated by a reader throughout the reading process (Grabe Stoller 2013). Low-level strategies refer to the basic strategies for literal interpretation of texts that include skimming, underlining, and rereading. On the other hand, high-level strategies are those essential to be able to regulate and monitor one's understanding of a text like interpreting, summarizing, and evaluating the text. In the case of second and foreign language readers who are not yet skilled in the target language, many are forced to use low-level reading strategies which reduces their employment of the higher-level strategies (Zhang 2001).

The importance of reading strategies does not simply depend on the quantity (range and frequency) of strategies. While studies show that learners with higher reading proficiency tend to use more strategies (Sheorey and Mokhtari 2001), some non-proficient readers also use many strategies (Hong-Nam and Page 2014). Instead, awareness and appropriate use of reading strategies seems more important in predicting reading proficiency (Hong-Nam and Page 2014), which has shifted the focus on learners' metacognitive reading strategies (Fitrisia et al. 2015; Hong-Nam and Page 2014). Metacognitive reading strategies refers to learners' knowledge of their reading processes, and in particular, the self-controlled techniques they use while monitoring their reading comprehension (Ahmadi et al. 2013; Mokhtari and Reichard 2002). Research has consistently shown that metacognitive reading strategies differentiates highly proficient readers from less skilled ones (Mohseni et al. 2020; Pinninti 2016; Sheikh et al. 2019) particularly among second language readers (Meniado 2016; Sheorey and Mokhtari 2001; Singhal 2001; Tavakoli 2014). Second language learners who know and understand their strengths and weaknesses and who know which controlled learning strategies work for them are better able to overcome the difficulties they encounter in second language reading tasks.

PISA cognitive framework for reading. The PISA 2018 assessment framework also underscored the importance of metacognitive research strategies in the overall assessment of reading proficiency (Organisation for Economic Co-operation and Development 2019a). The PISA 2018 framework for reading proficiency features a "typology of cognitive processes involved in purposeful reading activities as they unfold in single or multiple text environments" (Organisation for Economic Co-operation and Development 2019a, p. 36). Three categories of cognitive processes are defined with specific subprocesses specified in each category: (a) locate information (access and retrieve information within a text, search for and select relevant text), (b) understand (represent literal meaning, integrate and generate inferences), and (c) evaluate and reflect (assess quality and credibility, reflect on content and form, detect and handle conflict). But in addition to the cognitive processes associated with text processing, the PISA reading framework also emphasizes the goal-driven and intertextual nature of reading proficiency (McCrudden and Schraw 2007; White et al. 2010). As such, the framework also highlights the role of the learners' strategies and motivations that drive the management processes of the reading task (Vidal-Abarca et al. 2010). In this regard, PISA 2018 also assessed a range of non-cognitive variables associate with the learners' beliefs, motivations, engagement, practices, and experiences in the reading classroom; one of the variables they assessed was metacognitive awareness of reading strategies related to two important cognitive processes: (a) understanding and memorizing the text, and (b) summarizing the text.

Various measures have been developed to measure metacognitive reading strategies including the Metacognitive Awareness of Reading Strategies Inventory (MARSI, Mokhtari and Reichard 2002), and the Survey of Reading Strategies (SORS, Sheorey and Mokhtari 2001) which was developed for second language learners. In the PISA reading assessment, the measure of metacognitive reading strategies was measured using two reading scenarios (Organisation for Economic Co-operation and Development 2019a). The first reading scenario involved understanding and remembering a text, and the second scenario involved summarizing information in a text. For each scenario, the students were asked to evaluate a list of reading strategies and

to indicate how effective each was to fulfill the goal of the scenario. Two indexes of metacognitive awareness of reading strategies were computed from responses to a list of strategies for each scenario.

The current study. The main objective of the current study is to explore how Filipino students' metacognitive reading strategies is related to their reading proficiency in English as a second language. There have not been many previous studies that inquired into Filipino students' reading strategies. Mante-Estacio (2016) surveyed students from one Philippine university using the SORS (Sheorey and Mokhtari 2001) and found overall high use of reading strategies, with problem-solution strategies used more than support and global strategies. Cirocki et al. (2019) surveyed high school students from a school in a rural region of the Philippines, and also found them preferring to use more problem-solving strategies than the global and support types. But Filipino students' responses to these quantitative scales do not always converge with qualitative inquiries into the reading strategies. For example, Mante (2009) administered the MARSI (Mokhtari and Reichard 2002) among university students and found that the top reported reading strategies were reading the sentence again, relating an unknown word to something you already know, using context clues, and reading the text until it is clarified. But when given a reading task and then asked to respond to an open-ended question on what strategies they used in the task, the students reported a different set of strategies: making previews, identifying relevant and useful learning strategies, relating one's prior knowledge, and double-checking on comprehension. The study also showed that the students reported using some ineffective reading strategies and not using some effective strategies (e.g., doing close reading as an initial strategy and throughout the reading process despite difficulties encountered, and paraphrasing and checking comprehension during reading) (Mante 2009).

The above studies merely describe what strategies tended to be used by Filipino students, but two studies inquired into how the students' strategies related to their reading comprehension performance. Ilustre (2011) used the SORS and a researcher-made reading comprehension test with university students. Only problem-solving strategies subscale was positively associated with text comprehension; text comprehension was negatively correlated with support reading strategies. Mante (2013) administered the MARSI among Filipino high school students and two comprehension tests after reading four reading materials. Similar to previous studies, the students reported frequent use of all three types of metacognitive reading strategies, problem solving, global reading strategies, and support reading strategies, and that the last two were strongly correlated with each other. But only support reading strategies predicted the reading scores of the students' unaided written recall.

While these few studies seem to suggest the use of metacognitive strategies (particularly, problem solving strategies) based on the quantitative scales, at least one study (Mante 2009) showed that the responses to the scale did not correspond to the students' self-reports of actual strategies use after completing a reading task, and there is inconsistency in results showing which of these strategies relate to better reading performance. We note that these studies all involved small sample sizes of students drawn from one school or university.

As the Filipino students' performance in the reading domain of PISA 2018 was disappointing, the PISA assessment provides data on reading proficiency and on metacognitive awareness of reading strategies from a nationally representative sample. The PISA 2018 database provides a good dataset to inquire into Filipino students' reading strategies and proficiency in ways that previous Philippine research studies were unable to. More importantly, the inquiry allows for an investigation of a potentially important factor that explains reading proficiency, when that proficiency is very low. We note that there are previous studies that attempt to identify factors to explain the low reading proficiency (e.g., Bernardo 2023; Bernardo et al. 2021; Haw et al. 2021), those studies did focus on reading strategies. In the current study, we explored two related questions: (1) What strategies are perceived to be more useful by Filipino high school students? (2) What strategies are associated with Filipino high school students' total reading proficiency and with each of the three cognitive subscales of reading proficiency?

We will seek answers to these questions using data from the PISA 2018 survey, and the PISA definition and framework for assessing reading proficiency is adopted. In particular, the PISA 2018 framework for reading proficiency features a "typology of cognitive processes involved in purposeful reading activities as they unfold in single or multiple text environments" (Organisation for Economic Co-operation and Development 2019a, p. 36). Thus, aside from the overall reading proficiency, we also explore how the perceived usefulness of the strategies related to the three broad categories of cognitive processes described earlier: locate information, understand, and evaluate and reflect. As regards metacognitive reading strategies, we explore each of the 11 strategies measured in PISA 2018 instead of using the two indexes of metacognitive strategies computed in the database. We believe that using the 11 strategies will provide more detailed analysis and answers to the main research questions.

Previous preliminary analysis of the Philippines PISA 2018 data (Besa 2019) indicated significant sex differences (i.e., girls outperform the boys), and across different socioeconomic statuses (socioeconomically advantaged students outperformed socio-economically disadvantaged ones). In this regard, we decided to include sex and socioeconomic status of the student as control variables. We included one other home background variable from the PISA survey as another control variable in the analysis; students were asked the number of books in their home, and this factor has been consistently identified as an important home variable that predicts reading proficiency in many different countries (Chiu and McBride-Chang 2006; Park 2008).

Method

Data and participants. We use data from the Philippine sample in the OECD PISA 2018 database. The complete nationally representative sample comprised 7233 15-year-old Filipino students, who were randomly selected using a two-stage stratified random selection system. First, stratified sampling was used to select 187 schools from the country's 17 regions, and then students were randomly sampled from each school to participate in the PISA assessment (Besa 2019). Because English is the official medium of instruction in most subjects in high school, reading proficiency was assessed in English, although only 408 (or 5.64%) reported that the main language they used at home was English.

Measures

Reading proficiency. To assess reading proficiency, we referred to the plausible values provided in the PISA 2018 dataset. To clarify, the PISA 2018 assessment does not provide actual achievement scores for each student; instead, it assesses cognitive learning in the reading domain using ten plausible values that represent ten random values drawn from the posterior distribution of the student's scores for reading (Organisation for Economic Co-operation and Development 2019b). In addition to the plausible value for the overall reading proficiency, PISA 2018 also provided plausible values for three cognitive process subscales of reading:

(a) locate information, (b) understand, and (c) evaluate and reflect. For the current study, we used the first plausible for the overall reading proficiency and for the three cognitive subscales. Previous studies on PISA data have used only one plausible value (e.g., Bernardo et al. 2023; Gomez and Suarez 2020; Spiezia 2010; Trinidad 2020) based on the assumption that one plausible value is said to provide unbiased estimates of population parameters. Prior to deciding to use only one plausible value, we examined the distribution and correlations among the ten plausible values for overall reading proficiency and for the three cognitive subscales and we found the means and standard deviations of the ten distributions are almost identical and are highly correlated with each other. Thus, it is unlikely that an analysis with only one of ten plausible values would lead to loss of information.

Metacognitive reading strategies. The student questionnaire of PISA included 11 items that referred to different strategies that students use in their reading and writing tasks (see Table 1 for the items); 6 items referred to strategies to help them understand and memorize the text that they read, and five items referred to strategies to help them write summaries of the text that they read. The students were asked whether they perceived each strategy as being useful for the different reading tasks indicated, and they answered using a scale from 1 (*not useful at all*) to 6 (*very useful*).

Economic, social, and cultural status. Several indexes of the students' SES were computed in the PISA 2018, and for this study the index of economic, social, and cultural status (henceforth, ESCS) was used. The ESCS was derived from the students' report on the availability of 16 household items (e.g., a room of one's own, air-conditioning unit, and three country-specific items), other possessions in the students' homes (e.g., cell phones with internet access, computers), education and work status of the students' parents.

Number of books at home. The students were also asked to estimate how many books there were in their home. They were instructed to exclude magazines, newspapers, and their schoolbooks, and they responded by ticking one of six options: 0–10 books, 11–25, 26–100, 101–200, 201–500, and more than 500 books.

Data analysis. There were numerous missing data across the different variables, and we conducted analysis only on participants with complete data on all the main variables and control variables. The final sample for the analysis comprised 6591 students (53.86% were girls). To answer the first research question, mean scores of the 11 metacognitive reading strategies were computed and then analyzed using a completely repeated analysis of variance. The analysis of the main effect of type of learning strategy was followed by a post hoc multiple comparison of means using Bonferroni test. To answer the second set of questions, four hierarchical regression analyses were conducted. In each analysis, the reading proficiency score or subscale score was first regressed to three control variables (sex, ESCS, and number of books at home). In the second step of each hierarchical regression, the 11 learning strategies were added to the model. At each step, the overall model and change in R^2 of the model was assessed.

Results

The first research question of the study investigates which learning strategies for reading are perceived to be most useful by Filipino 15-year-old learners. The results are summarized in Table 1, which lists the different learning strategies according to their perceived usefulness. As the standard deviations indicate, the students varied in their perceptions of the different strategies, and the students' responses spanned the full range of options for each strategy. The repeated measures ANOVA (with learning strategy as within group factor) indicated a statistically significant difference across the means, $F(10,\ 6649) = 56463.08$, $p < 0.001$, partial $\eta^2 = 0.90$. The Bonferroni test used in the post hoc multiple comparison of means indicated that the first three strategies were perceived most useful by the Filipino students compared to the other eight strategies, although the means of the three were not statistically different from each other. The top two strategies are similar as both include underlining, with the first involving the additional strategy of writing the underlined texts in their own words. The two strategies rated least useful are low-level reading strategies commonly chosen by readers whose repertoire of strategies is limited. Underlining involves separating content based on importance, which is not always enough promote learning (Dunlosky et al. 2013) and is typically effective in

Table 1 Descriptive Statistics for Key Variables (Using Sampling Weights).

	M	*SD*
Reading proficiency*		
Overall reading proficiency	339.47	79.54
Locate information subscale	342.94	92.55
Understanding and summarizing subscale	334.42	82.16
Reflection and evaluation subscale	333.57	88.19
Metacognitive reading strategies		
(1) Read through, underline important sentences, write in own words	4.09[a]	1.71
(1) Underline important parts of text	4.08[a]	1.74
(2) Check that important facts are reflected in summary	4.06[a]	1.67
(3) Summarize text in own words	3.94[b]	1.72
(4) Read text as many times as possible	3.87[c]	1.66
(5) Concentrate on parts of text that are easy to understand	3.73[d]	1.73
(6) Quickly read through text twice	3.60[e]	1.63
(7) Write summary then check that each paragraph is in summary	3.57[e]	1.72
(8) After reading, discuss content with other people	3.40[f]	1.66
(9) Copy accurately as many sentences as possible	3.32[g]	1.57
(10) Read text aloud to another person	3.15[h]	1.67

*Plausible Value 1 for each proficiency score.
Means with the same superscripts are not statistically different from each other based on Bonferroni test for post hoc multiple comparisons; means with different superscripts are statistically different from each other.

Table 2 Summary of Results of Hierarchical Regression Analysis for Overall Reading Proficiency.

	Model 1	Model 2	
	β	*β*	95% CI
Sex (1 = female, 2 = male)	−0.18***	−0.09***	[−17.29; −11.21]
Socioeconomic status (ESCS)	0.37***	0.27***	[17.98; 21.00]
Number of books at home	0.12***	0.08***	[4.44; 7.65]
Perceived useful reading strategies			
(1) Read through, underline important sentences, write using own words		0.05**	[0.77; 3.79]
(2) Underline important parts of text		0.04**	[0.42; 2.97]
(3) Check that important facts are reflected in summary		0.11***	[7.60; 10.80]
(4) Summarize text in own words		0.11***	[6.16; 8.83]
(5) Read text as many times as possible		0.01	[−0.89; 2.01]
(6) Concentrate on parts of text that are easy to understand		0.08***	[2.65; 4.98]
(7) Quickly read through text twice		0.08***	[2.79; 5.32]
(8) Write summary then check that each paragraph is in summary		0.03	[−0.18; 2.50]
(9) After reading, discuss content with other people		0.08***	[2.73; 5.22]
(10) Copy accurately as many sentences as possible		−0.17***	[−9.85; −7.30]
(11) Read text aloud to another person		−0.19***	[−9.79; −7.64]
R^2	0.22	0.40	
F	614.42***	313.73***	
df	3, 6587	14, 6576	
ΔR^2		0.18	
ΔF		181.28***	
df		11, 6576	

**$p < 0.01$, ***$p < 0.001$.

reading comprehension when used in combination with other strategies (Pugalee 2007).

For the second question, we first investigated the learning strategies that predicted overall reading proficiency. The results of the hierarchical regression analysis are summarized in Table 2. First, we note that adding the perceived usefulness of the 11 strategies in the regression model explained an additional 18% of the variations in overall reading proficiency, relative to the variation explained by sex, socioeconomic status, and number of books at home. Therefore, we can infer that the Filipino students' metacognitive reading strategies are relevant factors in understanding their reading achievement. Second, we note (as the learning strategies are listed according to their perceived usefulness following Table 1) that the strategies perceived most useful are not always the ones most strongly associated with the students' overall reading proficiency. As shown in Table 2, perceiving the first two strategies as useful was positively associated with reading proficiency, but perceiving some lower ranked strategies as useful (i.e., ranked 3, 4, and also 6, 7, and 9) was more strongly associated with reading proficiency. In contrast, the perceived usefulness of the last two strategies was strongly negatively associated with the students' overall reading proficiency. That is, the students who perceived these two strategies as useful were more likely to have lower reading proficiency. Finally, the perceived usefulness of two strategies (see, ranked 5 and 8) was not significantly associated with the students' reading proficiency.

We then ask, was the pattern of results similar when we examined the three cognitive subscales of reading? Generally, the results in Table 3 suggest yes, except for a few interesting differences. Again, we note that adding the 11 metacognitive reading strategies in the regression model explained an additional portion of the variations in overall reading proficiency, relative to the variation explained by the three control variables. For locate information, adding the 11 strategies in the model resulted in $\Delta R^2 = 0.16$, $F(11, 6576) = 149.77$, $p < 0.001$; for understand, $\Delta R^2 = 0.18$, $F(11, 6576) = 170.06$, $p < 0.001$; and for evaluate and reflect, $\Delta R^2 = 0.14$, $F(11, 6576) = 123.75$, $p < 0.001$. Across these three cognitive subscales, there are two notable differences. In both cases, the perceived usefulness of strategy is associated with the more basic cognitive processing but not for the higher-level processes. As shown in Table 3, perceiving "underlining important parts of the texts" [see (2)] as useful is positively associated with scores for locating information and for understanding, but not for evaluate and reflect. Similarly, perceiving "reading the text as many times as possible" [see (5)] as useful is positively associated with scores for locate information, but not for understand nor for evaluate and reflect.

Discussion

This study was conducted to explore whether Filipino students' metacognitive reading strategies is associated with their reading proficiency. As the data analyzed were from the Philippines' PISA 2018, where the Filipino students performed rather poorly, ranking last among all the participating countries/economies, the inquiry investigated whether the reading strategies used (or not used) by the Filipino students could explain the poor reading performance. The results indicate that metacognitive reading strategies explains a significant portion of the variation in Filipino students' overall reading proficiency and also in each of the three cognitive subscales. The specific results point to some useful observations about the Filipino students' metacognitive strategies, which we briefly discuss below.

First, the two reading strategies that Filipino students perceived as very useful were not the strongest predictors of reading proficiency. These two strategies were "I underline important parts of the text" and "I read through the text, underlining the most important sentences, [t]hen I write them in my own words as a summary," which were rated "very useful" by 32.3% and 30.7% of the Filipino students, respectively. Both strategies involve underlining parts that are considered important. This selective highlighting allows readers to focus on important parts of a given text, thereby enabling them to organize the material being read.

Table 3 Summary of Results of Final Model of Hierarchical Regression Analysis for Cognitive Subscales for Reading Proficiency.

	Locate information		Understand		Evaluate and reflect	
	β	95% CI	*β*	95% CI	*β*	95% CI
Sex (1 = female, 2 = male)	−0.09***	[−20.35; −13.12]	−0.09***	[−17.40; −11.02]	−0.06***	[−13.74; −6.59]
Socioeconomic status (ESCS)	0.26***	[20.09; 23.68]	0.27***	[19.01; 21.18]	0.26***	[18.68; 10.58]
Number of books at home	0.09***	[6.48; 10.31]	0.08***	[4.55; 7.93]	0.10***	[6.80; 10.58]
Perceived useful reading strategies						
(1) Read through, underline important sentences, write own words	0.05**	[0.76; 4.35]	0.05**	[0.63; 3.79]	0.05**	[0.89; 4.43]
(2) Underline important parts of text	0.04**	[0.46; 3.49]	0.03**	[0.24; 2.92]	0.02	[−0.44; 2.56]
(3) Check that important facts are reflected in summary	0.15***	[5.35; 10.16]	0.19***	[7.66; 11.12]	0.17***	[6.85; 10.61]
(4) Summarize text in own words	0.14***	[6.02; 9.20]	0.17***	[6.39; 9.19]	0.14***	[5.58; 8.72]
(5) Read text as many times as possible	0.04*	[0.37; 3.82]	0.02	[−0.35; 2.46]	0.00	[−1.61; 1.80]
(6) Concentrate on parts of text that are easy to understand	0.09***	[3.33; 6.10]	0.09***	[2.97; 5.41]	0.07***	[2.34; 5.07]
(7) Quickly read through text twice	0.08***	[3.08; 6.09]	0.08***	[2.60; 5.26]	0.07***	[2.42; 5.40]
(8) Write summary, check that each paragraph is in summary	0.02	[−0.59; 2.60]	0.02	[−0.35; 2.46]	0.02	[−0.80; 2.34]
(9) After reading, discuss content with other people	0.08***	[2.81; 5.78]	0.08***	[2.45; 5.07]	0.10***	[3.93; 6.86]
(10) Copy accurately as many sentences as possible	−0.15***	[−9.99; −6.95]	−0.18***	[−10.67; −7.99]	−0.16***	[−10.50; −7.50]
(11) Read text aloud to another person	−0.16***	[−10.10; −7.54]	−0.17***	[−9.56; −7.31]	−0.16***	[−9.60; −7.07]
R^2	0.37		0.38		0.33	
$F(14, 6576)$	275.10***		292.50***		232.87***	

β reported are standardized coefficients in the final model in the hierarchical regression analysis. Scores for each cognitive subscale were the first plausible value for each subscale.
*$p < 0.05$,**$p < 0.01$, ***$p < 0.001$.

Effective highlighting allows readers to discriminate between minor and major details of a text. These highlighting strategies may lead to an "isolation effect" (Hunt 1995) wherein the highlighted sections of a text are better remembered and the text, in general, is better processed (Cashen and Leicht 1970). The use of both strategies was positively associated with reading proficiency, but the relationships were weak (*β* coefficients ≤0.05) and the first of these strategies was not associated with the scores in the higher cognitive subscale of evaluate and reflect. This result might indicate some overestimation of the usefulness of the two strategies in aiding reading comprehension; the overestimation may be in reference to their appreciation of the usefulness of the other strategies.

In contrast, the two strategies that were perceived least useful on the average were both strongly negatively associated with reading proficiency and its cognitive subscales. These two strategies were, "I try to copy out accurately as many sentences as possible" and "I read the text aloud to another person," which both involve repeating the encoding of the text. Copying sentences exactly does not engage readers to think and might be a waste of their time as it does not involve higher level processing like what is used in selective note taking. On the other hand, reading aloud may develop reading fluency but is not likely to help in reading comprehension tasks like understanding and summarizing. Yet, these two strategies were rated as "very useful" by 12.4% and 13.3% of the Filipino students, respectively; around 25% of the Filipino students actually rated these two strategies using the two highest points in the 6-point scale of usefulness. This set of results indicate a sizable proportion of the students' lacking awareness of the efficacy of two strategies, which are strongly and negatively associated with reading proficiency according to the data. In this case, the students might be underestimating the usefulness of the two strategies relative to their actual relationship with reading proficiency.

The results point to another concern regarding two strategies that were not significantly associated with reading proficiency. These two strategies are "Before writing the summary, I read the text as many times as possible" and "I write a summary [t]hen I check that each paragraph is covered in the summary, because the content of each paragraph should be included." Around 40% of the Filipino students rated the first strategy as very useful in 6-point scale of usefulness, and it was only weakly positively associated with the most basic cognitive subscale (locate information). Around a third of the students rated the second strategy as useful, suggesting the students' lack of awareness regarding the usefulness of the two strategies which were not predictive of reading proficiency according to the results.

In contrast, consider the two strategies that were most strongly associated with higher achievement. The strategy "I summarize the text in my own words" was rated as "very useful" by 27.1% of the students, yet another 27.3% rated the same strategy as not useful. A student who uses this strategy is engaging in many different processes such as differentiating minor from major details, getting the main idea, identifying the author's purpose, integrating several ideas into one message or theme among others. The strategy "I carefully check whether the most important facts in the text are represented in the summary" was rated as very useful by 27.8% of the students, but 31.19% indicated that they perceived this strategy as not useful. This strategy entails examining the accuracy of their output against the given reading material, and students must evaluate if the ideas presented in the summary are complete and are all crucial in restating the original text. Therefore, it includes judging and critiquing their own work based on how they understood the reading material. These two strategies help not only to understand the text but also to analyze, evaluate, and critique the text; yet a significant proportion of Filipino students consider them not useful.

These results taken together suggest possible gaps in Filipino students' awareness of and appreciation of metacognitive reading strategies. For both sets of strategies for understanding and for writing, their awareness of the usefulness of the strategies varied across students; and some strategies that are associated with reading proficiency were not rated as useful on the average, while other strategies not associated with reading proficiency were rated

as useful on the average. The data cannot provide for explanations for these patterns, and we should use caution in attributing these patterns to students' lack of understanding of such strategies. Indeed, students' responses regarding the usefulness of the strategies might reflect what they were told by their teachers, or what their classmates shared to them, or they might indicate a limited exposure to the possible reading strategies available to them. The students' perceived usefulness of the strategies might also reference their own understanding of what reading proficiency means, which might not align with the PISA reading assessment definitions. We should also consider that the students' understanding of reading proficiency might also reflect their experiences in their reading class instruction and assessment.

Indeed, one possible important implication relates to the question of whether the Filipino students are being taught these reading strategies in their reading education, and what competencies of reading proficiency they are assessed in their reading classes. An analysis of the Philippine high school reading curriculum in comparison to the PISA 2018 reading framework (Romero and Papango 2020) found that the task management skills (which include reading strategies) are found in the Philippine reading curriculum for Grades 7 to 10. But their analysis suggests that these task management skills are taught as discreet topics independent of the teaching of the text processing skills. More importantly, Romero and Papango (2020) noted that the task management skills found in the Philippine curriculum did not fully align with those indicated in the PISA 2018 reading framework (Organisation for Economic Co-operation and Development 2019a).

The results and preceding discussions point to the need for an efficient and integrated reading strategy instruction that will focus on knowledge, skills, and experience development across the grade levels in the Philippine reading curriculum. Strategy instruction should also present a wide range of strategies from the simple strategies to the more complex, which Filipino learners can explore and use in various types of texts in both print and online modes of reading. For instance, visualizing and connecting-to-oneself strategies are likely to be developed when the texts are culturally relevant to the reader. Culturally relevant texts in turn are found to positively affect one's reading comprehension (Tan and Mante-Estacio, 2021). Related to this point, further research could inquire into how reading teachers in the Philippines actually teach reading strategies and how students engage such instructional activities intended to develop metacognition in reading.

It is also important to acknowledge that there is a threshold of reading proficiency which needs to be met before metacognitive strategies can become a significant factor in one's reading performance (Schoonen et al. 1998). Thus, it is possible that the 15-year-old Filipino participants in PISA may not have reached the threshold level of reading proficiency in English for metacognitive reading strategy to make a difference in their reading performance. While it is the case that the positive statistical relationship between some of the reading strategies and reading proficiency suggests that metacognitive reading strategies statistically predicts the Filipino students' reading proficiency, this notion of a threshold level of reading proficiency might be relevant to consider in deciding how early metacognitive reading strategies is introduced in the task management components of the reading curriculum in English as a second language. Consider the rather low overall levels of reading proficiency assess in the PISA 2018, it is possible that Filipino reading teachers might need to focus on other more basic components of reading competencies before focusing on metacognitive strategies for reading.

In this regard, it is also important to underscore that the reading proficiency analyzed in this study refers to reading in a second language. Second language research has underscored how reading in a second language is essentially a cross-linguistic process, which means that the students' reading in their first language has an important role in developing skills in reading in their second language and vice versa (Koda 2005). The reading processes in the two languages can mutually facilitate and accelerate learners' overall reading abilities. It is quite likely that the Filipino students' proficiency, strategies, and other cognitive and noncognitive factors related to reading in their first language also affect their reading proficiency in English. Thus, it is probable that various other factors contribute to the differences in the reading performance of Filipino students in PISA reading assessment, and future research needs to inquire into these, as well.

The preceding arguments point to some important limitations in the study. As our analysis solely focussed on metacognitive strategies as main predictors of reading proficiency, we included only a few control variables to those known to be very strongly associated with the PISA reading outcomes. This limitation in the scope of the analysis did not allow us to explore the relative importance of metacognitive reading strategies together with other cognitive and non-cognitive student-level variables, family background, classroom and school experiences, among others. The analysis was also limited to those strategies included in the PISA 2018 measure, and as such did not allow for the investigation of other reading strategies that may have been important and/or useful for Filipino readers in English. Future research that analyze a wider range of relevant factors and reading strategies would be very useful in deepening the findings of the current study.

Conclusion

Even with the limitations of the study, we believe that this exploration of how metacognitive reading strategies among 15-year-old Filipino readers in English extends the very limited empirical research on reading strategies of Filipino readers in English. As most previous research on Filipino readers' reading strategies typically relied on small sample sizes of students in selected schools, the nationally representative sample analyzed in the study allow for greater confidence in the conclusions regarding the role of reading strategies in second language reading of Filipinos. The results also contribute further evidence to the growing research on strategies in second language reading in general and to the continuing need for discussions on effective reading strategy instruction among second language learners. In particular, as the results show that Filipino students' perceptions on the usefulness of the strategies might not always align with the strategies' usefulness as indicated by their associations with reading proficiency, we could reflect further on what reading competencies in the second language are actually understood and experienced by Filipino students in their classrooms. Understanding the students' notions of reading proficiency might help us to better understand why they perceive some strategies as more useful than others. The results also point to the need to inquire into how metacognitive reading strategies are taught and modeled by teachers and how students engage these strategies in reading classrooms, because such experiences are likely to also shape how the students perceive the effectiveness of the strategies.

Data availability

The data analyzed in this study are available in the PISA 2018 Database page on the website of the Organisation for Economic Co-operation and Development[1].

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1 https://www.oecd.org/pisa/data/2018database/, accessed on 17 February 2020

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Competing interests
The authors declare no competing of interest.

Ethics approval
The study involved secondary analyses of the officially published PISA 2018 dataset; as such ethics review and approval and informed consent does not apply. This dataset was downloaded as a public use file from the OECD website[1].

Informed consent
The study involved secondary analyses of the officially published PISA 2018 dataset; as such ethics review and approval and informed consent does not apply.

Additional information
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