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Effects of prompting type and learning achievement on reading literacy of ninth graders

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Abstract

This paper sought to explore the effects of different prompting types of computer-based assessment on reading literacy of ninth graders and to examine interaction effect between different promptings of computer-based assessment and learning achievement on reading literacy. This research developed computer-based assessment called computerized dynamic assessment (C-DA) that integrated promptings with assessment to support reading literacy. A quasi-experimental design was adopted. 541 ninth graders from 11 secondary schools participated in this study and each individual was randomly assigned into instructional-based prompt (n = 148), error-explanation prompt (n = 139), mixed prompt (n = 131), and verification prompt or control group (n = 123). The results revealed that: (1) there was a statistically significant difference in reading literacy gain score among the prompting groups. Control group scored significantly lower when compared with students in experimental groups; and (2) there was no significant interaction between the two factors, prompting conditions and levels of learning achievement, on reading literacy. The analysis of main effects showed that levels of learning achievement had no effect on reading literacy gain score, whereas promptings of computer-based assessment had a significant impact on students' gain score. Prompting-based groups also received the higher scores when compared to the control condition. As a result, this study provides empirical evidence for educators to make use of the assessment as an effective tool for assessing reading literacy of ninth graders with a wide range of learning achievement in classroom.

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Introduction

Reading literacy is the skill measuring how students understand the text, interpret the meaning of the text, evaluate the text and apply their reading ability into real-life situations (The Organization for Economic Co-operation and Development [OECD], 2019a). OECD (2019a) has categorized reading literacy into three dimensions as follows: (1) locate information; (2) understand; and (3) evaluate and reflect. It is the foundation of other subject areas in the educational system. Moreover, the attainment in reading literacy successfully leads to the prerequisite for participation in

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real-life situations. Reading literacy is also mentioned as one of the goals in improving Thai educational system (Office of the Education Council, 2017). The important indicators include the improvement of reading proficiency level and the international assessment results (Office of the Education Council, 2017).

The international assessment from the Programme for International Student Assessment (PISA) provided evidence that Thai students' reading literacy results were unsatisfactory. The average reading literacy scores of Thai students decreased steadily since the first participation in PISA 2000 (The Institute for the Promotion of Teaching Science and Technology, 2020a). For the results of PISA 2018, Thai students' average score was 393 points below the OECD average (487 points) (The Institute for the Promotion of Teaching Science and Technology, 2020a). More than half of the students were rated below Level two, which is the minimum reading literacy level benchmark, interpreted as those who might have difficulties in solving complex reasoning and problems in real life (The Institute for the Promotion of Teaching Science and Technology, 2020a). Moreover, UNESCO's 2017/8 Global Education Monitoring (GEM) report found that only 50 percent of students had achieved a minimum proficiency level in reading at the end of lower secondary education (The United Nations Educational, Scientific and Cultural Organization [UNESCO], 2016). One of the important factors associated with reading performance is teacher support (The Organization for Economic Co-operation and Development [OECD], 2019b). Students who perceived greater assistance from teachers scored higher in reading (OECD, 2019b). In Thailand, most students reported that teachers helped students with their learning, but they hardly received feedback from teachers to tell them in which areas they could still improve and how they could improve their performance (The Institute for the Promotion of Teaching Science and Technology, 2020b). As a result, providing feedback is necessary for students' reading performance. With the use of feedback to promote reading literacy of Thai students, this research aimed to develop a prompting-based program for reading literacy assessment.

The prompting-based program for reading literacy assessment called 'computerized dynamic assessment (C-DA)' was developed for this research. It can be administered to a large numbers of students and provides prompts during the assessment procedure (Poehner & Lantolf, 2013; Zhang & Lu, 2019). The theoretical concept of prompting-based program for reading literacy assessment is dynamic assessment. The term of dynamic assessment has been defined as a procedure integrating teaching and assessment simultaneously to assess and to promote learner's zone of proximal development by offering appropriate forms of mediation to learners during the assessment process (Davin, 2013; Poehner & Lantolf, 2013). Hence, a prompting-based program for reading literacy assessment focuses on providing more effective feedback and assistance for learners (Poehner & Lantolf, 2013; Zhang & Lu, 2019). However, with a broad variety of promptings for guiding students, establishing the most effective prompts is a challenging task. The appropriate prompts are necessary to be implemented in the classroom context. Little research has paid attention to the development of computer-based assessment as a function of different types of promptings to enhance reading literacy performance. The present study addressed this issue by studying the effects of different promptings of computer-based assessment on reading literacy of ninth graders. Reading literacy is needed for ninth graders as the solid foundation of basic knowledge and skills that are necessary for pursuing further education or career in the future. In addition, this study selected schools in Bangkok because school sizes in Bangkok varied considerably, ranging from small schools to extra-large schools. Previous studies have pointed out the impact of school size on learning achievement (Egalite & Kisida, 2016; Giambona & Porcu, 2018). Thus, the number of schools with varying sizes in Bangkok were selected to participate in this study.

Research Question

1. Are there any significant differences among different prompting types of computer-based assessment on reading literacy?
2. Is there any significant interaction effect between different prompting types of computer-based assessment and learning achievement on reading literacy?

Literature Review

Computer-Based Assessment for Reading Literacy

Computer-based assessment for reading literacy is developed with the theoretical concept of dynamic assessment. It is grounded by Vygotsky's notion on the zone of proximal development which believed that using appropriate forms of mediation can help a learner to attain his/her learning potential (Poehner & Lantolf, 2013).

Several studies have developed computer-based assessment, called computerized dynamic assessment (Ku, Shih, & Hung, 2014; Lin, 2016; Poehner & Lantolf, 2013; Teo, 2012; Ting & Kuo, 2016; Wang & Chen, 2016; Wu, Kuo, & Wang, 2017; Zhang, Lai, Cheng, & Chen, 2017). The system of computer-based assessment relies upon cake format, in which mediation is provided during the test administration. Students will receive the prompt while having some difficulty during the assessment (Poehner & Lantolf, 2013; Wang & Chen, 2016). Computer-based assessment has been popular because of its advantages in administering a large number of students as well as generating the diagnostic results for the classroom settings (Poehner & Lantolf, 2013). This system is used as an assessment to better capture learner's independent performance and mediated performance as well as to predict learning potential hidden in each learner (Poehner & Lantolf, 2013; Zhang & Lu, 2019).

Different Promptings of Computer-Based Assessment

Prompts are questions or hints to guide and support students' solving problems indirectly. They are used to enhance knowledge and performance provided during the assessment when students have difficulty in solving problems (Poehner & Lantolf, 2013; Sternberg & Grigorenko, 2002). According to Davin (2013) and Zhang and Lu (2019), prompts help to keep track of learners' progress more easily by pointing out the number and types of prompts learners require. For computer-based assessment, promptings are influenced by content that often ranges from implicit to explicit (Golke, Dorfler, & Artelt, 2015). There were four prompting methods operated in this study as follows:

1. Instructional prompting. The prompt relied on the instruction to guide students to answer the question correctly. The first prompt was the most general. If a student answered incorrectly, the second prompt was provided. If a student answered incorrectly again, the third more explicit prompt was shown. This process continued until either a student answered correctly or a student obtained all four mediating prompts (Poehner & Lantolf, 2013; Teo, 2012; Wang & Chen, 2016; Zhang et al., 2017). For the multiple-choice questions with five answers, there were a total of four mediating prompts in each item (Poehner & Lantolf, 2013). Prompts guided in graduated way can assist students to discover or apply some principles to independently solve problems (Wang, 2010). Students can transfer the prompt to other questions by detecting similarities between questions (Golke et al., 2015).

2. Error-explanation prompting. The prompt was provided in accordance with the choice of incorrect answer students chose, ranging from implicit to explicit. Each distractor provides different prompts to emphasize the error pattern that corresponded to selected response (Golke et al., 2015; Ting & Kuo, 2016). Golke et al. (2015) mentioned that this prompt aims to repair false links or gaps that a student maintains. This type of prompt is preferred for tasks requiring higher-order cognitive processes (Golke et al., 2015; Petrović, Pale, & Jeren, 2017).

3. Mixed prompting. The prompt combined the instructional and error-explanation promptings. Prompting was based on the instruction to guide a student to answer the question correctly and the reason why the option the student chose was incorrect. Similar to Ting and Kuo (2016)'s study, prompts also ranged from implicit to explicit and each prompt differed in selected options.

4. Verification prompting. The prompt was given only to tell a student that the response was either correct or incorrect. If a student answered incorrectly, the prompt would be provided showing that the answer choice was incorrect. In contrast, if a student answered correctly, the prompt would show that the answer choice was correct (Golke et al., 2015).

Computer-Based Assessment on Student Performance

Several studies have utilized the prompting method compared with control group and found that the group with the prompting method outperformed the other group (Ebadi, Weisi, Monkaresi, & Bahramlou, 2018; Teo, 2012; Wang & Chen, 2016; Wang, 2010; Yang & Qian, 2020). Regarding reading performance, Wang and Chen (2016) said that online dynamic assessment had significant effects on changes in reading ability of Grade 5 and Grade 6 students. Moreover, Teo (2012) said that the computer-based assessment helped EFL college students to monitor and regulate their reading process effectively. With respect to other constructs, Wang (2010) also said that web-based dynamic system enhanced student learning effectiveness in Biology. Moreover, Ebadi et al. (2018) mentioned the improvement of EFL students in vocabulary acquisition.

Learning Achievement and Computer-Based Assessment on Student Performance

Several studies have compared students with different levels of knowledge in computer-based assessment with

those in control group (Ku et al., 2014; Wang, 2010; Wu, Yeh, & Chang, 2010).Wu et al. (2010) revealed that Grade 10 students with different levels of prior knowledge (i.e., high, mid, and low) in computer-based assessment had higher performance in earth science than those in the traditional tests. Ku et al. (2014) said that after using the computerized dynamic assessment, vocational students in all three groups (i.e., high, medium, and low scores) had better understandings on the concepts and improved their learning outcomes. Wang (2010) found that learning effectiveness of students with low-level prior knowledge was not significantly different from those of students with high-level and middle-level prior knowledge.

Moreover, previous studies have found that computer-based assessment was associated with learning achievement, especially low-level knowledge students (Wang & Chen, 2016; Wu et al., 2010). Wang and Chen (2016) said that even though both high and middle-initial reading ability outperformed students with low reading ability, low readers had stable and higher gains when compared with other groups. According to Wu et al. (2010), the computer-based assessment served as a scaffold for students with low prior knowledge to reduce cognitive load in making the questions easier to understand and raising students' interest.

As a result, this experiment hypothesized that: (1) the instructional prompting, the error-explanation prompting and the mixed prompting would yield higher performance on reading literacy compared to the control condition (verification prompting); and (2) the different promptings of computer-based assessment would not differ in accordance with the levels of learning achievement.

Methodology

Participants

The participants in this study included 541 ninth graders in eleven secondary schools in Bangkok. The two-stage random sampling was used to select the participants. For the first stage of sampling, the researchers used stratified random sampling to select schools in accordance with school sizes (i.e., extra-large, large, medium, and small schools). For the second stage of sampling, ninth-grade classrooms were randomly selected to take part in this study.Of these students, 57 percent were female and 43 percent were male. They were studying at medium schools (40%), followed by extra-large schools (27%) and large schools (21%). Most of them were very high achievers (39%), followed by high achievers (30%), mid achievers (17%), and low achievers (14%), respectively.

In terms of levels of learning achievement, the participants were classified into groups by using their grade point averages (GPAs) on last semester as; (1) very high achievers (those who received 3.51–4.00 of their GPAs), (2) high achievers (those who received 3.01–3.50 of their GPAs), (3) mid achievers (those who obtained 2.51–3.00 of their GPAs), and (4) low achievers (those who obtained 0.00–2.50 of their GPAs).

Instruments

Reading literacy pretest and posttest

The pretest and posttest instruments were constructed in alignment with the PISA 2018 guideline from The Organization for Economic Co-operation and Development [OECD] (2019a). The test items comprised 20 multiple-choice questions with five response options written in Thai. Each test consisted of four reading passages. The tests were examined by five experts for content validity. All items had IOC index range from 0.6–1.0, except three items that needed revision. After revision, the tests were piloted with 277 students. The KR20 reliability coefficient of the reading literacy pretest and posttest were 0.71 and 0.76, respectively. The degree of equivalence between pretest and posttest items were checked in terms of content and statistical equivalence. A group of five experts were also asked to depict their agreement on each item pair. The results suggested that all item pairs had IOC index higher than 0.5, except one pair that needed to be revised. In addition, the statistical equivalence was analyzed by using a root mean square deviation (RMSD) statistic to quantify the closeness of the test information functions (TIF) between the pretest and posttest and the item information functions (IF) of item pairs (Debeer, Ali, & Van Rijn, 2017). For the acceptable value, RMSD should be smaller than .50 (Debeer et al., 2017). The results depicted that RMSDTIF was .44 and RMSDIF ranged from .00 -.13, resulting in the conformity of the two test forms and individual items.

Computer-based Assessment for Reading Literacy

Computer-based assessment for reading literacy was designed and developed by using the theoretical basis of graduated prompting approach (Campione & Brown, 1985; Grigorenko & Sternberg, 1998), which intended to provide guidance for students to solve problems and learn more (Wang, 2010; Zhang & Lu, 2019). These features provided more specific feedback when students answered an item incorrectly. Twenty experts were

required to review the tests for content validity. Results suggested that all items of the three reading literacy test sets had IOC index ranging from 0.6–1.0, except for seven items out of sixty items that needed to be revised. The test items were piloted with a large groups of students (n = 525) to examine the validity of the test items. The alpha reliability coefficients of the three test sets were 0.81, 0.84, 0.83, respectively. Each participant randomly received different promptings of computer-based assessment. They were administered C-DA across three time points. Each time point consisted of 20 multiple-choice questions for reading literacy items. The test scored dichotomously, one point for a correct answer and zero for an incorrect answer.

Data Collection

This study adopted a quasi-experimental design to account for internal threats to validity such as the threat of history, maturation, instrumentation, and testing (Campbell & Stanley, 1963). Moreover, this study was employed in educational settings where classes were already formed in real-world setting. Because the study was conducted in diverse settings where learning achievement variation was observed, results could be generalized to relevant settings, representing external validity (Gopalan, Rosinger, & Ahn, 2020).

The researchers used purposive sampling for selecting one or two ninth-grade classrooms in each school. In each individual classroom, students were randomly assigned into one of the four conditions; (1) instructional-based prompt (Group A), (2) error-explanation prompt (Group B), (3) mixed prompt (Group C), and (4) verification prompt or control condition (Group D). As a result, there were a total of four groups, including Group A (n = 148), Group B (n = 139), Group C (n = 131), and Group D (n=123). Before training sessions, students in instructional-based prompt, error-explanation prompt, mixed prompt, and verification prompt groups were not significantly different in their learning conditions (F (3, 537) = .804, p = .492).

The pretest was administered to Grade 9 students prior to training sessions. Then, the participants were briefly introduced the computer-based assessment and were allowed to practice computer-based assessment in order to make them acquainted with the system. During the training sessions, they were administered computer-based assessment in classroom context for three testing periods. Each session comprised of 20 multiple-choice reading literacy items with five options. They were allowed to work at their own pace, depending on the difficulties encountered and number of prompts used. When they responded incorrectly, they received the prompts in accordance to their group conditions, ranging from implicit to explicit. The training sessions lasted eight weeks, and each session was a four-week interval. The posttest was administered in the final week after finishing the training sessions.

Data Analysis

All statistical analyses were analyzed using R software version 4.0.4. One way ANCOVA was used to investigate the effects of different promptings on posttest gain score. Two-way ANCOVA was used to analyze the effects of different promptings and levels of learning achievement on posttest gain score. Gain score was used as dependent variable. Pretest score was treated as covariance to avoid the influence of the prior knowledge on students' reading literacy performance. The statistical significance level was set at .05.

Results

ANCOVA Result of Different Prompting Conditions on Students' Reading Literacy Ability

All prompting conditions had higher posttest score than the pretest score. The highest posttest score was Group A (M = 14.99, SD = 3.33), followed by Group C (M = 14.82, SD = 3.09). However, Group C received the highest posttest gain score (M = 7.34, SD = 4.12) and the lowest posttest gain score was Group D (M = 3.30, SD = 4.71) as seen in Table 1.

Table 1 Descriptive statistics of students' pretest, posttest, and posttest gain scores on reading literacy

Group	Pretest score		Posttest score		Posttest gain score	
	M	*SD*	*M*	*SD*	*M*	*SD*
A	7.93	3.31	14.99	3.33	7.06	4.45
B	8.06	3.51	14.51	3.57	6.45	4.71
C	7.47	3.13	14.82	3.09	7.34	4.12
D	7.86	2.98	11.16	3.80	3.30	4.71

The reading literacy score measured pre- and post-training of different promptings of computer-based assessment. One-way ANCOVA was conducted to investigate the differences among prompting-based groups with respect to the posttest gain scores. The preliminary analyses investigating the homogeneity of slope, linearity, homogeneity of variances assumptions were satisfactory.The results revealed that when the pretest score was considered as the covariate, there was a statistically significant difference in posttest gain score among the groups ($F(3, 536) = 35.63$, $p < .05$). The summary of ANCOVA result is shown in Table 2 and Figure 1.

As presented in Table 3, the results of follow-up pairwise comparison using Bonferroni revealed that Group D scored significantly lower when compared with students in any other groups.

Two-Way ANCOVA Results of Different Prompting Conditions and Levels of Learning Achievement on Students' Reading Literacy

As presented in Table 4, all groups obtained higher posttest scores than the pretest score. The highest posttest score of very high achievers was Group C ($M = 15.10$, $SD = 2.93$), whereas Group A had the highest mean posttest scores for both high ($M = 14.93$, $SD = 3.76$) and mid achievers ($M = 15.17$, $SD = 3.43$). For the group of low achievers, Group B had the highest score ($M = 15.82$, $SD = 3.24$). With respect to the posttest gain score, Group C had the highest posttest gain scores for very high achievers ($M = 7.12$, $SD = 4.31$), high achievers ($M = 6.51$, $SD = 3.89$), and mid achievers ($M = 8.19$, $SD = 3.50$), whereas the highest posttest gain score was obtained by Group A ($M = 10.18$, $SD = 3.84$).

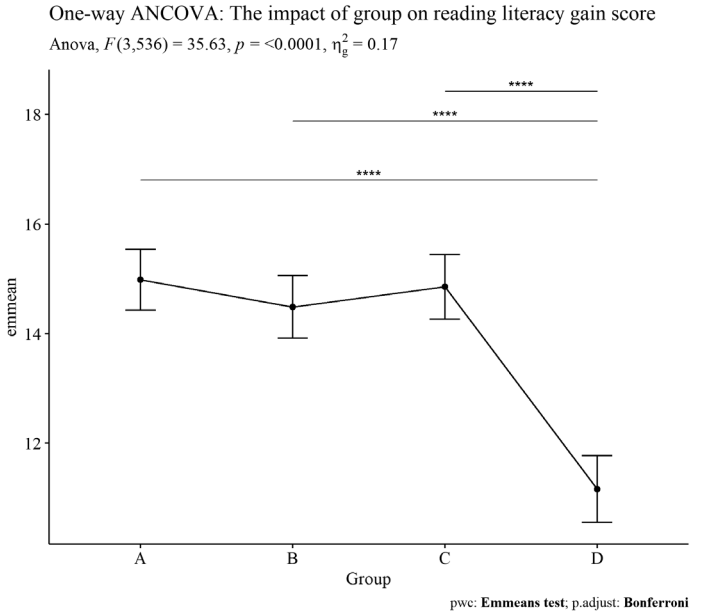

Figure 1 Line plot of the analysis of covariance for prompting conditions on reading literacy posttest gain score with pretest score as covariance

Table 2 Analysis of covariance for prompting conditions on student's reading literacy posttest gain score with pretest score as covariate

Source	Univariate ANCOVA				
	SS	df	MS	*F*	*p*
Pretest (Covariate)	4575.67	1	4575.67	387.28	.025*
Group	1262.70	3	420.90	35.63	.001*
Residuals	6332.62	536	11.81		

Note: *$p < .05$.

Table 3 Results of pairwise comparison of prompting conditions

Pair comparison		Mean Difference (G1-G2)	*SE*	*p*
Group1	Group2			
A	B	0.49	0.40	1.00
A	C	0.12	0.41	1.00
A	D	3.82*	0.41	.000
B	C	-0.36	0.41	1.00
B	D	3.33*	0.42	.000
C	D	3.69*	0.43	.000

Note: *$p < .05$.

Table 4 Descriptive statistics of different prompting conditions and levels of learning achievement on reading literacy pretest, posttest, and posttest gain score

Group	Learning achievement	Pretest score		Posttest score		Posttest gain score	
		M	*SD*	*M*	*SD*	*M*	*SD*
Group A	Very high	8.77	3.52	14.85	2.99	6.08	4.03
	High	8.45	3.01	14.93	3.76	6.48	4.40
	Mid	7.43	3.04	15.17	3.43	7.74	4.97
	Low	5.14	1.75	15.32	3.41	10.18	3.84
Group B	Very high	9.27	3.80	14.86	3.35	5.59	4.15
	High	7.95	3.16	13.41	3.84	5.46	4.90
	Mid	6.48	2.15	14.56	3.57	8.07	4.39
	Low	6.82	3.80	15.82	3.24	9.00	5.26
Group C	Very high	7.98	3.56	15.10	2.93	7.12	4.31
	High	8.02	2.71	14.54	2.88	6.51	3.89
	Mid	6.81	3.43	15.00	2.53	8.19	3.50
	Low	5.90	1.79	14.52	4.31	8.62	4.50
Group D	Very high	9.09	2.68	12.40	4.15	3.31	4.98
	High	8.57	3.09	10.14	3.46	1.57	4.48
	Mid	6.35	2.01	10.83	3.30	4.48	3.88
	Low	5.28	2.16	10.61	3.60	5.33	4.58

The two-way ANCOVA was conducted examining the effect of prompting conditions and levels of learning achievement on students' reading literacy posttest gain score. The posttest gain score was the dependent measure and the pretest score was a covariate. The preliminary analyses investigating the homogeneity of slope, linearity, and homogeneity of variances assumptions were satisfactory. From the results, an interaction between group and learning achievement could not be demonstrated, $F(9, 524) = 1.08$, $p = .373$. The effects of the two factors were considered separately using main effects analysis. There were no significant differences in the impact of levels of learning achievement on posttest gain score, $F(3, 524) = 0.37$, $p = .773$. The results of posttest gain score of low achievers were not significantly different from those of very high, high, and mid achievers. However, there was significant difference in prompting-based groups on posttest gain score, $F(3, 524) = 35.11$, $p < .05$. The results of follow-up pairwise comparison was only examined for prompting conditions. It showed that the control group (Group D) received significantly lower gain scores when compared with other prompting groups. Thus, control condition differed significantly on posttest gain score when compared with other prompting conditions, but levels of learning achievement had no influence on posttest gain score. The two-way ANCOVA results are summarized in Table 5 as well as Figure 2.

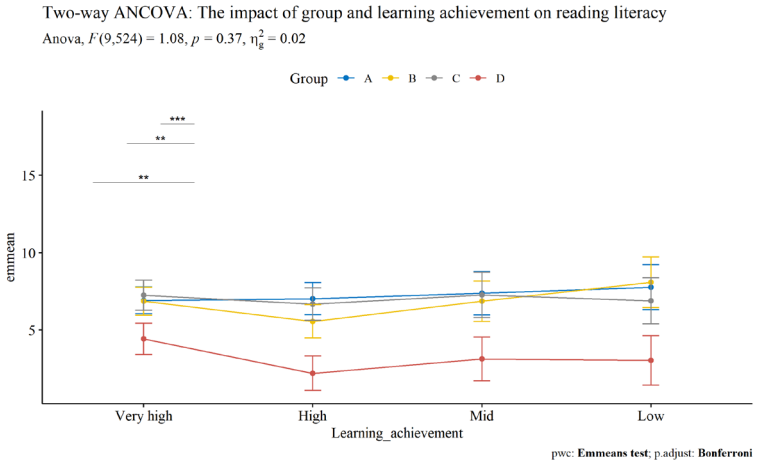

Figure 2 Line plot of two-way ANCOVA for impacts of prompting conditions and levels of learning achievement on posttest gain score with pretest score as covariate

Table 5 Two-way ANCOVA for impacts of prompting conditions and levels of learning achievement on student's reading literacy posttest gain score with pretest score as covariate

Source	Univariate ANCOVA				
	SS	df	MS	F	*p*
Pretest	3929.67	1	3929.67	336.33	.000*
Group	1230.70	3	410.23	35.11	.001*
Learning achievement	13.10	3	4.36	0.37	.773
Group*Learning achievement	113.97	9	12.66	1.08	.373
Residuals	6122.35	524	11.68		

Discussion

The posttest gain scores presented evidence supporting the notion that the prompting treatments significantly contributed to increased scores when compared with the control group on reading literacy. This result is consistent with previous studies working on different promptings of computer-based assessment in cognitive skills (Teo, 2012; Wang, 2010; Wang & Chen, 2016; Wu et al., 2017; Zhang et al., 2017). Those studies reported that different promptings of computer-based assessment generally produced positive outcomes on the student performance. This supported our first hypothesis that the students in the experimental groups performed better than the control group in reading literacy. It can be explained that promptings may provide students with more strategies and contextual clues, whereas the control condition provided verification prompts that only indicated whether the answer was correct or incorrect (Golke et al., 2015). Also, mediation was integrated with the unique characteristics of the computerized dynamic assessment that may combine interactive design and feedback strategies that facilitate learning (Poehner & Lantolf, 2013). In addition, the results showed that prompting methods were not significantly different in terms of their posttest gain scores. This suggests that a wide range of prompts on computer-based assessment could be used for enhancing reading literacy. When considering the mean posttest gain score for group comparison, mixed prompting demonstrated higher mean of gain score followed by instructional prompting and error-explanation prompting. This might be because mixed prompting generated prompts that help guidance and provided the error pattern that corresponded to the selected response. This method may encourage students to learn from their mistakes, the same as the error-explanation prompt (Golke et al., 2015). Moreover, they could benefit from the necessary reading strategies they were missing in the reading process that is similar to instructional prompt and probably enhance their reading literacy skills (Teo, 2012; Wang & Chen, 2016; Zhang et al., 2017).

The results revealed that there was no significant interaction between the two factors, prompting conditions and levels of learning achievement. This result was not consistent with the study by Wang (2010). Wang (2010) found the significant impacts of different types of web-based assessment and levels of prior knowledge on posttest score. There were significant differences in students with different levels of prior knowledge in control groups; however, student level of prior knowledge was not significantly different in the web-based assessment. The reason for such contradicting result might be because of different measured variables. This study emphasized learning achievement obtained from student's grade point averages, which might not be directly comparable with student's prior knowledge in reading ability. However, it was interesting to find no statistically significant differences in the posttest gain scores of learning achievement levels among prompting groups, but significant difference was found in prompting conditions. As a result, this supports evidence that prompting conditions of computer-based assessment had influence on posttest gain score. Moreover, computer-based assessment was applicable for most students with different levels of learning achievement. Thus, computer-based assessment might be the effective way to enhance reading literacy of students with a wide range of achievement ability. The interesting findings also found that although the mean differences were not statistically significant, low achievers had higher posttest score than high achievers. This indicates that the different promptings of computer-based assessment might provide low achievers with scaffold guidance and assistance in the supportive environment that would reduce cognitive load and increase the level of reading ability (Wu et al., 2010). Low achievers might have more opportunity to learn and have more solutions to find the correct answer. Wang (2010) found that the web-based dynamic assessment could enable learners with low-level prior knowledge to experience more effective learning.

Wang and Chen (2016) also pointed out that the low-initial reading ability had higher gain than other groups. Therefore, the different promptings of computer-based assessment may help low achievers to improve their performance in reading literacy.

Conclusion

The present study has contributed to education by providing the empirical evidence of the potential of the different promptings of computer-based assessment to support students' reading literacy and to serve as the basis for future development of reading literacy field. Future studies are needed to investigate the effectiveness of different promptings of computer-based assessment of other grouping factors such as other grades or other subjects. Another issue that needs further study concerns students' attitudes toward computer-based assessment. For educators, computer-based assessment could be developed and widely used in the classroom to support teachers in classroom assessment. Moreover, the finding of different promptings of computer-based assessment can encourage teachers to make use of the assessment results to promote students' reading literacy in the classroom. Moreover, computer-based assessment can be performed in a remedial classroom in order to improve low-achiever learners with the help of prompting approach.

Conflict of Interest

There is no conflict of interest.

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