

INVESTIGATING TECHNIQUE EFFICACY IN EFL READING INSTRUCTION USING PEAR DECK

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ABSTRACT

The present research examined the efficacy of integrating Pear Deck, a student response system (SRS), into reading instruction with two teaching techniques. A total of 151 university students from four intact classes were given identical learning content and a digitally interactive environment using Pear Deck. Two of the four classes were instructed using the teacher-interaction (TI) technique, while the other two classes were instructed using the peer-interaction (PI) technique. A pre-test, mid-test, and post-test were implemented to investigate the teaching effectiveness of integrating Pear Deck into reading instruction through the two teaching techniques. The results demonstrate that integrating Pear Deck into reading instruction can increase student engagement and boost the learning effect on reading skills and vocabulary acquisition. However, although the performance of the PI group was slightly better than the TI group, the differences did not reach a significant level, which differs from Kent's (2019) study results. The differing results might be due to the difference in the study sample size, the participants' varying English proficiency levels, the students' willingness to engage, the teacher's role, and the challenge of monitoring peer discussion in larger classes. Future research is suggested to explore whether the above factors affect interaction types.

Key words: EFL reading, SRS, teacher-interaction, peer-interaction

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INTRODUCTION

Developing English reading proficiency is fundamental for EFL learners (Li, 2022). Meanwhile, in the EFL context, which continually lacks target language input, English reading instruction in the classroom has become an essential source of learning. However, in college-required English classes for non-English majors, students often lack attention and learning motivation, leading to low learning effects. Love (2012) states that student engagement is crucial for effective teaching and efficient learning. Hence, the present study integrated a student response system (SRS) into EFL reading instruction to enhance student engagement. This can trigger learning motivation, improve self-efficacy, and form a positive learning cycle to obtain learning achievements. SRS has been reported to increase student involvement and improve student achievement (Kalinowski & Jones, 2005) because it provides immediate and real-time feedback. Moreover, through SRS, instructors can ask students questions, immediately gather their responses, and share the students' responses with the entire class (Trees & Jackson, 2007). Research regarding second languages suggests that feedback facilitates second language acquisition (Mackey, 2006). Classroom feedback includes several forms, such as teacher feedback, peer feedback, and corrective feedback, which can be provided via SRS. For instance, Yoon's (2017) study demonstrated that SRS can promote opinion sharing, student participation, and teacher interaction in Korean classrooms. Lee and Oh (2014) also found that applying a question method using SRS into EFL reading instruction allowed students to integrate their prior knowledge with new information to reach their conclusions, significantly increasing comprehension, engagement, and learning outcomes.

The present study adopted Kent's (2019) methods of comparing teacher-interaction (TI) and peer-interaction (PI) techniques in reading instruction using SRS. Kent (2019) found that using TI and PI techniques in EFL reading instruction via a structured questioning process on SRS to elicit L2 production has not been thoroughly examined. As such, more research is needed to narrow this research gap. Unlike Kent's study, which employed Plickers as the SRS model,

the current study used Pear Deck to elicit learner production, provide feedback, and enhance interaction in real time. Hence, four research questions were formulated as follows.

1. Is there a significant improvement in learning outcomes after receiving the SRS integration reading instruction?
2. Is there any significant difference between the TI and PI groups regarding improving students' learning outcomes?
3. Can SRS-integration reading instruction improve students' learning motivation and self-efficacy?
4. How do students perceive the SRS-integration reading instruction using TI or PI techniques?

LITERATURE REVIEW

EFL Reading Skills and Vocabulary Acquisition

Research on language acquisition suggests that EFL learners apply similar reading strategies in English as in their native language (Grabe, 1999; Phakiti, 2003). These strategies include both top-down and bottom-up cognitive skills. Top-down reading strategies involve readers using their background knowledge and contextual clues to predict, infer, and understand the content of a text. Bottom-up reading approaches begin with word decoding and progress until meaning is derived. This involves a range of cognitive subskills, including word recognition and comprehension of textual structures up to the discourse level (Hinkel, 2006). In EFL reading instruction, Hsu (2006) identified several strategies to enhance reading comprehension. For example, skimming, scanning, reading for meaning, contextual guessing, recognizing text structures, and using background knowledge. Jang (2005) also highlighted several reading techniques that improve students' comprehension abilities, such as identifying the primary thoughts of paragraphs, answering specific text-based questions, and making inferences about the content. However, Ediger (2001) indicated that reading skills from one's native language (L1) may not easily transfer to reading in a foreign language. Therefore, according to Birch (2005), while teaching reading skills and strategies

is essential to assist students in understanding a foreign language, establishing a reading foundation, such as vocabulary instruction, should also be emphasized before students can benefit from using reading techniques.

Since English reading comprehension is built upon the extent of learners' vocabulary, vocabulary instruction holds substantial significance in teaching EFL reading. Hu and Nation (2000) indicated that second language learners must understand approximately 98% of the words in a reading passage to comprehend its content. Furthermore, Nation (2005) suggested that vocabulary acquisition, whether learned in a contextualized or decontextualized manner (through deliberate memorization), contributes to word learning in reading, provided certain conditions are met. These conditions include inspiring learners' interest, providing repeated encounters with the words, drawing deliberate attention to them, and encouraging generative use of these words in new contexts. Therefore, the present study used teacher questioning and student responding through an SRS; students can apply newly learned vocabulary from the texts, thus enhancing their opportunities for vocabulary acquisition. Eskey (2005) indicated a reciprocal relationship between reading and vocabulary, i.e., the more one reads, the larger their foundational vocabulary becomes.

The Advantages of Integrating SRS in EFL Classrooms

“Feedback” is an umbrella term comprising two types of information: verification and elaboration. The former refers to the correctness of responses. The latter entails guidance on accurate answers (Hattie & Gan, 2011). For instance, in an educational context, teacher feedback in response to students' answers verifies the answers' accuracy and explains why the answers are correct. In contrast to summative assessments typically conducted at mid-term and end of term, formative assessments are performed during instruction, such as teacher-directed questioning and student group presentations. Formative assessments can assist teachers in collecting information about student performance while evaluating instruction effectiveness through student feedback. On the other hand, teacher feedback can

substantially contribute to students' subsequent performance (Pérez-Segura et al., 2020). With technological advancement and development, the emergence of Online Student Response Systems (SRS) has increased. Current instant response systems include Cloud Classroom, Zuvio, Plickers, Kahoot!, and the Pear Deck system employed in this study. Through SRS, teachers can gain real-time insight into students' learning progress, analyze their responses, and monitor advancements. By providing timely feedback and adjusting the teaching pace via SRS, teachers can help students achieve learning outcomes more efficiently (Bichsel, 2012; Spector, 2016). SRS also enables teachers to implement formative assessment practices, offering immediate feedback to students and guiding them throughout the learning process (Kent, 2019).

SRS is used in higher education classrooms for diverse purposes, from attendance tracking to practice quizzes. Moreover, these platforms allow instructors to lead class discussions and allocate group discussions to enhance student classroom engagement (Espey & Brindle, 2010). Using Kahoot! and Zuvio in a university electronics course, Xie 謝 (2021) demonstrated that SRS can effectively increase students' learning interest. Literature is abundant regarding SRS applications across various learning stages. However, studies focusing on the effect of SRS in English classrooms remain limited, particularly in the context of reading instruction using SRS technology, such as Pear Deck. Among the limited studies that applied SRS technology to English language instruction, researchers have discovered that its use in English classrooms can significantly enhance student satisfaction (Hung, 2017), vocabulary acquisition and development (Yu, 2014), classroom participation (Cordoso, 2011), motivation (Yu & Yu, 2016), and quantifiable improvements in English communication skills (Agbatogun, 2014). Yoon (2017) confirmed that using SRS increases opinion sharing, participation, and interaction with instructors in English classrooms at Korean universities. Additionally, Lee and Oh (2014) found that the question methods provided by SRS enable students to identify new information, access their prior knowledge, and ultimately generate conclusions; this allowed Korean English learners to apply reading skills to increase comprehension, strengthen engagement, and improve

learning outcomes.

Classroom Interaction Technique

Nowadays, students interact actively on social media. Yet, such social engagement is typically not as frequent in classroom settings. In most cases, classroom interactions remain one-way, with teachers asking questions and students responding (Hurst et al., 2013). This teacher-centered approach contradicts Dewey's (1963) theory that learning is a social activity. Similarly, Hurst (1998) asserts that true learners take on leading roles in their learning process. Teachers invest much effort in preparing teaching materials, reading various versions of texts, organizing information, and selecting critical points for students. However well-organized, information is often delivered to students with issues concentrating in class. Ultimately, the students, not the teachers, should be actively engaged in the learning process (Hurst et al., 2013). Hence, Vacca and Vacca (2002) emphasize the need to shift the burden of learning from teachers to students. As such, students are obliged to share partial responsibility for their learning. One way to empower students to take responsibility for their learning is to engage them as readers, writers, speakers, listeners, and thinkers and actively interact socially with others during class (Alvermann & Phelps, 2005).

As a result, cooperative learning is considered an effective method to facilitate language learning through social interaction in classrooms (Ghaith, 2003). Cooperative learning enables students to develop positive attitudes, intrinsic motivation, and satisfaction through peer interactions (Clement et al., 1994). Moreover, it fosters the active pursuit of group goals (Nichols & Miller, 1994) and helps students complete expected tasks (Douglas, 1983). Furthermore, it increases students' confidence while reducing anxiety (Deci & Ryan, 1985). Studies have also shown that peer-interactive learning improves students' reading performance (Ghaith, 2003). Cooperative learning among peers enhances learners' vocabulary skills, critical thinking abilities, and problem-solving capabilities (Hurst et al., 2013).

Cooperative learning can be classified into various types, including teacher-interactive (TI) and peer-interactive (PI) techniques.

The efficacy of language learning varies with the focus on student interaction. Studies have examined and discussed these two interactive teaching modes. Peer interaction originated from constructivist approaches, such as those of Lev Vygotsky and Jean Piaget. Both theories emphasize peer interaction (Tudge & Rogoff, 1999). Piaget and his followers argue that peer interaction is efficient because children share their understanding and learn through sociocognitive conflicts. Vygotsky asserts that social interaction significantly influences children's knowledge sharing and comprehension with peers. However, a crucial difference exists between Piaget's and Vygotsky's theories: the role of adults in interactions.

From Vygotsky's viewpoint, children learn more effectively through their interactions with adults. Conversely, Piaget holds the opposite view, believing that adult-child interaction doesn't help children learn more effectively. According to the Piagetian approach, the intellectual difference between children and adults forms an obstacle to sufficient learning for children. Similarly, the debate over whether peer interaction is better than teacher interaction in promoting effective student learning continues to invite more research and study (Tenenbaum, Winstone, Avery, & Leman, 2020).

Building on this debate, a study comparing teacher-involved and peer-interactive online learning by Chen (2019) found that Chinese EFL students in the teacher-involved group were better prompted and performed more consistently. Chen indicates that while peer interaction offers a more interesting and challenging learning process, certain factors hinder its efficiency. Not all EFL students are willing to engage in peer interaction; some remain silent during activities, and others struggle with foreign language anxiety, preventing active participation. Conversely, students in the teacher-involved group benefit from regular prompting, leading to more stable learning progress. Thus, stability accounts for the differing performance outcomes between teacher-interactive and peer-interactive students (Chen, 2019).

SRS is inspired by the concept of TI techniques. Teachers use student feedback to adjust their teaching methods to meet students' needs. This interaction technique allows teachers to assess students'

prior knowledge and prepare materials to suit their needs (Novak et al., 1999). However, this teaching technique reflects a traditional, teacher-centered approach in classrooms, where teachers initiate discussions and students merely respond. With the rise of Communicative Language Teaching and Constructivism, this teacher-centered technique has been challenged, as scholars find it may limit students' opportunities to participate in interactions (Kent, 2019). Mazur (1997) indicates that the PI technique allows students to engage in peer discussions before responding to teachers' questions. This increases opportunities for students to discuss with each other and enhances their participation. By engaging in peer discussions, students can alleviate the stress of not knowing the correct answers before responding. As a result, this PI technique is considered more effective in creating interactive classrooms, improving students' learning, and providing more interaction opportunities (Kent, 2019).

Empirical Study of Integrating SRS in EFL Teaching

Hung (2017) incorporated the SRS Kahoot! to engage students and promote active learning in a flipped classroom. Its SRS-integrated instruction was supported by the just-in-time teaching (JiTT) technique or the PI technique to enhance the students' speaking skills, willingness to communicate (WTC), and satisfaction with their learning experiences. The findings indicate that SRS-integrated flipped classrooms can provide interactive learning opportunities that promote WTC, enhance speaking skills, and increase students' satisfaction (Hung, 2017). The findings further suggest that the SRS-integrated were particularly effective in motivating learners with low WTC when facilitated by the PI technique. Ebadi et al. (2021) also integrated Kahoot! into an EFL grammar course, which yielded different results. They investigated 80 English-major college students' perspectives on distractive and facilitative aspects of using SRS to facilitate their understanding of English grammar. The results showed that most students were unwilling to participate in this game-based application on Kahoot! despite its positive features (Ebadi et al., 2021). The participants perceived elements that made them demotivated and distracted, including fast-paced games, Internet connectivity issues,

the competitive nature, and the lack of detailed explanation regarding grammar points after the game.

Liu et al. (2019) investigated the effectiveness of using an SRS, Pear Deck, to learn grammar in a flipped class with a quasi-experimental design. The experimental group used this SRS to perform in-class activities, whereas the control group followed the traditional method. The results showed that compared to the control group, using an SRS in the experimental group increased the students' learning motivation and self-efficacy in learning English grammar and promoted their participation and engagement in learning grammar during the flipped learning process. Furthermore, the students perceived the SRS as an acceptable instructional method in the in-class activities of an EFL flipped class (Liu et al., 2019). However, they found that integrating Pear Deck was ineffective in improving students' grammar learning achievement. Liu et al. (2019) mentioned that an SRS that offers an interactive learning environment possesses the potential to improve knowledge retention. With an SRS, class content becomes more dynamic and varied. Kent (2019) employed an SRS, Plickers, in EFL reading instruction as a formative assessment supported by TI and PI teaching techniques. The results of Kent's (2019) quasi-experimental study showed that the Plickers SRS-integrated reading instruction coupled with a PI technique classroom significantly promoted reading skills. Additionally, the students perceived that Plickers-integrated reading instruction combined with either a TI or PI technique could facilitate active learning, increase attention, and stimulate engagement, which can be an alternative to conventional methods (Kent, 2019).

METHODS

Participants

The participants were from four intact classes of first-year English courses studying at a technical university in southern Taiwan. Two classes were randomly assigned to the TI group, and the other two were assigned to the PI group. The TI group comprised 72 students, and the PI group comprised 79. The total 151 participants with a

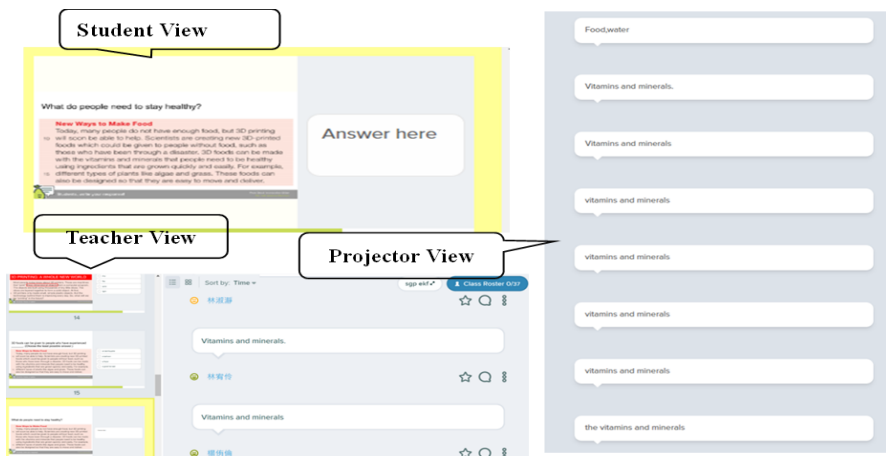
homogenous background were all non-English majors. Their English proficiency was primarily around A2 in CEFR, with a few lower to A1, while some were higher to B1. Before the reading instruction, none of the students had ever used the Pear Deck SRS.

Target Technology

Pear Deck is an SRS online platform that allows teachers to engage students in learning activities. Through its Google Slides added-on function, teachers can easily use it to conduct formative assessments by creating interactive questions while obtaining students' responses immediately. For instance, to check students' comprehension, a teacher can pose a question about a reading paragraph on Pear Deck; students can view it and type in their responses using their smartphones, as demonstrated in Figure 1. The teacher can project the students' responses anonymously, as shown in the projector view, while monitoring each student's answering progress from the teacher's perspective.

Figure 1

Three Different Viewing Interfaces: Using the Pear Deck SRS

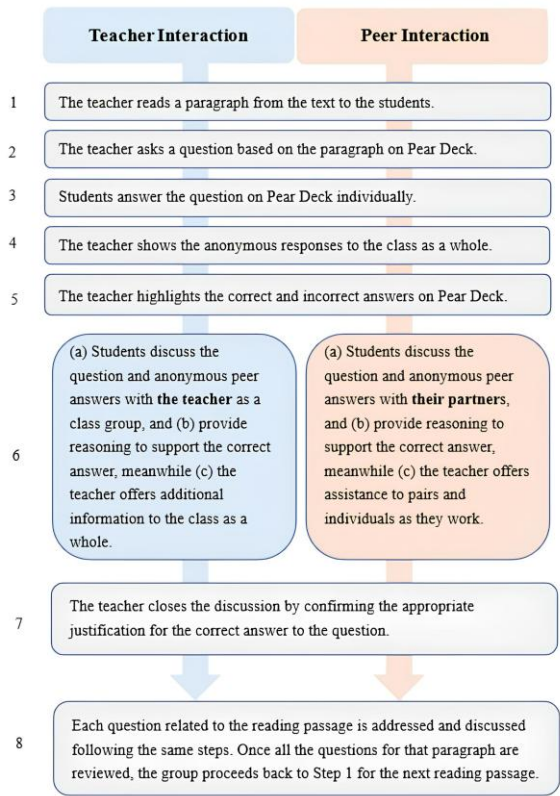


Reading Instruction

The SRS-integrated reading instruction using the target technology Pear Deck lasted eight hours throughout a semester, four hours before the midterm exam and four after for both the TI and PI groups. Four articles taken from the class textbook were used as reading materials. The instructional steps for both groups, adapted from Kent (2019), are illustrated in Figure 2. The teacher first reads a paragraph from the assigned text aloud to the students and then raises questions based on the paragraph on Pear Deck. After students had individually responded to the questions on Pear Deck, the teacher showed all the anonymous responses to the class. Students were then asked to discuss the questions and anonymous peer answers with the teacher for the TI group, while with their partners for the PI group. After the discussion, students were asked to cite evidence from the text to justify their answer, and the teacher confirmed the appropriate justification for the correct answer to the question. The same cycle will apply to all questions in the same reading passage. The main instructional difference between TI and PI groups lies in the discussion process, which was initiated, managed, and controlled by the teacher for the TI groups and by the students themselves for the PI groups. The teacher in the TI groups dominated the flow of the interaction and actively participated in the whole class discussion, whereas in PI groups, the teacher adopted the role of a facilitator who monitored group discussion and provided scaffolding when needed.

Figure 2

The Instruction Steps of TI and Pi Groups



Instruments

Reading Test

The three reading tests (pre-test, mid-test, and post-test) were developed by the researchers of this study with the same formatting and similar difficulty levels. Each reading test contained four reading passages with 10 multiple-choice questions for each, 40 questions in total. Twenty questions were designed to test the students' reading skills, and the other 20 focused on testing the students' vocabulary knowledge. For the mid-test and post-test, two of the four reading

passages were taken from the reading materials in the SRS-integrated reading instruction. The questions differed from those used in the reading instruction.

RESULTS AND DISCUSSION

This section presents findings from the reading tests, questionnaires, and interviews based on the four research questions. The findings are as follows:

Learning Outcomes After Receiving the SRS Integration Reading Instruction (RQ1)

The study revealed a significant improvement in learning outcomes for both the TI (teacher interaction) and PI (peer interaction) groups. Analyzing the reading test scores, Table 1 shows the descriptive statistics for total scores, reading skills, and vocabulary scores from the pre-test, mid-test, and post-test. The results indicate that both groups demonstrated substantial progress over time.

Table 1

Descriptive Statistics of the Pre-Test, Mid-Test, and Post-Test Scores

Scores	TI Group (N=72)		PI Group (N=79)	
	Mean	SD	Mean	SD
Total pre-test scores	41.25	12.88	39.90	14.56
Total mid-test scores	45.60	17.12	44.56	17.38
Total post-test scores	46.24	15.27	47.78	14.69
Reading skills for the pre-test	21.88	7.14	22.06	8.93
Reading skills scores for the mid-test	23.72	9.29	22.63	10.08
Reading skills scores for the post-test	23.37	8.59	24.37	8.09
Vocabulary scores for the pre-test	19.38	7.15	17.84	7.60
Vocabulary scores for the mid-test	21.74	9.20	21.93	9.22
Vocabulary scores for the post-test	22.74	8.22	23.41	8.05

Specifically, a one-way repeated measures ANOVA (Table 2) revealed significant differences in total scores among the pre-test, mid-test, and post-test for both groups. The TI group showed an F -value of $F(2, 142) = 6.26, p = .002 < .01$, while the PI group showed $F(1.72, 133.93) = 14.75, p = .000 < .01$. In the post hoc analysis, both the TI and PI groups showed significant improvements in average scores from pre-test to mid-test and post-test (TI: $p = 0.013$ and $p = 0.001$; PI: $p = 0.004$ and $p = 0.000$, respectively). However, there were no statistically significant differences between mid-test and post-test scores for either group (TI: $p = 0.648$; PI: $p = 0.051$).

These findings suggest that the initial improvements observed in mid-test scores may be attributed to increased motivation and effective reading techniques. However, achieving further enhancement in vocabulary required extended engagement and learning. Compared to pre-test scores in both groups, the increase in mid-test scores likely stemmed from heightened motivation and the use of reading techniques. Despite significant initial improvements, further progress was constrained, possibly due to waning student interest after weeks of implementation and the need for prolonged engagement in reading to acquire new vocabulary. Consequently, post-test scores did not significantly surpass mid-test scores. These results are consistent with student interviews, where participants noted greater improvement in reading techniques rather than vocabulary.

Table 2

Comparing the Total Scores of the Reading Pre-Test, Mid-Test, and Post-Test for Both Groups

Source	TI Group (N=72)					PI Group (N=79)				
	SS	Df	MS	F	P	SS	df	MS	F	P
Between Conditions	1060.03	2	530.01	6.26	.002**	2479.75	1.72	1444.15	14.75	.000**
Within Subjects	37135.67	71	523.04			43807.31	78	561.63		
Residual	12027.14	142	84.70			13117.75	133.93	97.94		
Total	50222.83	215				59404.81	213.65			

Participating in discussions facilitated by the Pear Deck SRS enhanced reading skills in both TI and PI groups. Notably, the post-test scores of the PI group approached statistical significance compared to the mid-test scores, suggesting slightly greater improvement than the TI group. This underscores the role of PI in boosting learning motivation and fostering classroom discussions, which deepened students' comprehension of reading content through peer interactions and teacher explanations.

Table 3 summarizes the results of the one-way repeated measures ANOVA conducted to compare reading skill scores across the pre-test, mid-test, and post-test for both the TI and PI groups. In the PI group, significant differences were observed among the mean reading skill scores of the pre-test, mid-test, and post-test, with $F(1.78, 128.70) = 3.25$, $p = .047 < .05$. Conversely, in the TI group, no significant differences were found among these scores, with $F(2, 142) = 2.35$, $p = .099$. This suggests that only the PI group significantly varied reading skill scores across the three tests. Post hoc comparisons within the TI group revealed no significant differences between pairs.

However, in the PI group, while post-test scores for reading skills did not significantly increase compared to mid-test scores, the mid-test scores approached statistical significance ($p = .053$) when compared to pre-test scores. Moreover, significant improvements were observed in post-test scores compared to pre-test scores (p

= .007). These findings suggest that the instructional approach involving PI techniques had a more pronounced impact on students' acquisition of reading skills than the TI group. This conclusion is supported by student interviews, where many students expressed feeling more comfortable and confident in answering after discussing with peers rather than responding immediately to the teacher. This effect was particularly noted among students with lower proficiency levels, who preferred seeking peer assistance through discussions.

Table 3
Comparing the Reading Skill Scores of the Pre-Test, Mid-Test, and Post-Test for Both Groups

TI Group (N=72)						PI Group (N=79)				
Source	SS	Df	MS	F	P	SS	df	MS	F	P
Between Conditions	137.67	2	68.84	2.35	.099	228.85	1.78	128.70	3.25	.047*
Within Subjects	10832.29	71	152.57			13758.93	78	176.40		
Residual	4153.99	142	29.25			5485.65	138.70	39.55		
Total	15123.96	215				19473.43	218.48			

Table 4 presents the results of the one-way repeated measures ANOVA conducted on vocabulary scores across the pre-test, mid-test, and post-test for both the TI and PI groups. Significant differences were found in the means of vocabulary scores among the three tests for both groups, with $F(2, 142) = 6.25, p = .002 < .01$ for the TI group and $F(1.73, 1314.84) = 18.59, p = .000 < .01$ for the PI group. This indicates that both groups showed significant improvements in vocabulary scores over time. Post hoc comparisons did not reveal significant differences between mid-test and post-test scores in either group. However, both groups observed significant differences between pre-test vs. mid-test and pre-test vs. post-test scores. These findings indicate that integrating the Pear Deck SRS into reading instruction may help students enhance their ability to infer word meanings from context by fostering effective reading techniques. This

improvement was reflected in notable increases in mid-test vocabulary scores compared to pre-test scores. However, mastering vocabulary that cannot be inferred contextually requires extended reading engagement. This explains why students did not significantly improve their post-test scores compared to mid-test scores.

Table 4

Comparing the Vocabulary Scores of the Pre-Test, Mid-Test, and Post-Test for Both Groups

Source	TI Group (N=72)					PI Group (N=79)				
	<i>SS</i>	<i>Df</i>	<i>MS</i>	<i>F</i>	<i>P</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P</i>
Between Conditions	430.38	2	215.19	6.25	.002**	1314.84	1.73	760.59	18.59	.000**
Within Subjects	9558.07	71	134.62			10676.03	78	136.87		
Residual	4886.29	142	34.41			5515.99	134.84	40.91		
Total	14874.74	215								

Differences Between TI and PI Groups in Learning Outcome Improvement (RQ2)

Table 5 compares the participants' performance on the three reading tests across both groups. Independent samples *t*-tests revealed no significant differences between the TI and PI groups on the pre-test ($t = 0.69$, $p = .494$), mid-test ($t = 0.31$, $p = .757$), and post-test ($t = -0.88$, $p = .380$). This suggests that engaging EFL learners through either TI or PI techniques had statistically similar effects on their reading skill development. This contrasts with previous studies (e.g., Hung, 2017; Kent, 2019), where PI techniques and SRS technology enhanced learning outcomes more effectively. However, as indicated earlier in comparing reading skill scores using one-way ANOVA, the PI group demonstrated better performance than the TI group. The lack of significant difference between the two interaction techniques in this study may be influenced by various confounding variables such as participants' proficiency levels, sample sizes, grouping strategies, and

learners’ willingness to communicate.

Table 5

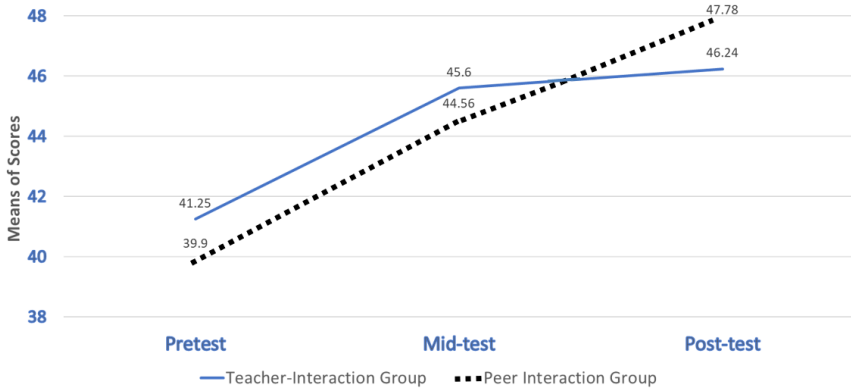
Independent Samples T-Test Results Comparing Three Test Scores Between the TI and PI Groups

Total Scores for Reading Tests	Teacher Interaction(n=72)		Peer Interaction (n=79)		<i>t</i>	<i>p</i>
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>		
Pre-test	41.44	12.84	39.91	14.50	0.69	0.494
Mid-test	45.60	17.12	44.73	17.35	0.31	0.757
Post-test	46.24	15.27	48.38	14.65	-0.88	0.380

In terms of sample size, the present study included larger groups, with 72 and 79 students in the TI and PI groups, respectively, compared to Kent’s (2019) study, with only 12 students per group. This larger sample size enhances the generalizability of our findings to real-world educational settings. Nonetheless, greater improvements were observed in the scores of the PI group compared to the TI group, as illustrated in Figure 3, which profiles the total scores of both groups across the three tests. Additionally, the one-way ANOVA results in Table 4 highlight that the scores of the PI group were significantly higher than those of the TI group regarding reading skills. This finding is supported by feedback from student interviews, where some students noted that discussing with peers before responding improved their memory and comprehension of reading materials. However, these influences were insufficient to significantly improve reading scores, especially with a larger sample size.

Figure 3

The Total Scores of the Two Groups Across Three Tests



Regarding participants' proficiency levels, Kent's (2019) study involved participants with TOEIC scores ranging from 605 to 780, approximately corresponding to CEFR levels B1 to B2. In contrast, participants in our study had lower English proficiency levels, ranging from A1 to A2. This difference in proficiency levels may impact the effectiveness of interaction techniques and subsequently influence learning outcomes, necessitating further investigation. Concerning grouping within the PI group, challenges were noted due to larger class sizes, with one teacher and one teaching assistant overseeing group discussions. Some students also initially hesitated to engage in discussions due to unfamiliarity with group members at the beginning of the course. As Chen and Goh (2011) noted, Asian EFL students are easily affected by language anxiety, a lack of confidence, and a fear of negative evaluation, which may prevent them from actively engaging in interactive learning. Additionally, the traditional role of the teacher in a Chinese context may perpetuate this problem, as students expect the teacher to hold a dominant position while they remain in a passive comfort zone during teacher-led learning activities (Xu & Liu, 2009). These confounding variables underscore the complexity of interactions in educational settings, potentially affecting the visibility of outcomes.

Improvement in Learning Motivation and Self -Efficacy (RQ3)

A paired-sample *t*-test was conducted before and after the SRS-integrated reading instruction to compare the difference in students’ learning motivation and self-efficacy. Table 6 presents the *t*-test results, which indicate significant differences between the pre- and post-surveys across all six questions related to learning motivation. These findings suggest that the SRS-integrated reading instruction effectively enhanced students’ learning motivation. This result aligns with the findings of Liu et al. (2019), where students’ learning motivation significantly improved after participating in interactive flipped classes using SRS.

Table 6

Pre- and Post-Survey on Learning Motivation in the Paired-Sample T-Test (Pre-Post)

Survey Items	Pre-Survey		Post-Survey		<i>t</i>	<i>p</i>
	M	STD	M	STD		
1. I think reading English is interesting and fun.	3.22	0.82	3.84	0.79	-6.67	.000**
2. I want to learn more and explore more in English reading.	3.37	0.83	3.90	0.81	-5.64	.000**
3. It is meaningful and worthwhile to learn English reading skills.	3.83	0.77	4.15	0.75	-3.58	.000**
4. For me, it is essential to acquire English reading skills well.	3.85	0.79	4.25	0.74	-4.31	.000**
5. In daily life, learning English to read for communication is essential.	3.94	0.74	4.26	0.75	-3.48	.001**
6. I will take the initiative to search and look up to pick up the unknown words encountered in English reading.	3.46	0.83	4.06	0.84	-6.61	.000**

Table 7 shows the *t*-test results for self-efficacy, revealing significant differences after the SRS-integrated reading instruction on all items (Items 7-12). This indicates that the SRS-integrated learning activity significantly boosted students' self-efficacy. Similarly, these findings are consistent with Liu et al.'s (2019) study, where students' self-efficacy significantly improved following interactive flipped classes with SRS.

Table 7

Pre- and Post-Survey on Self-Efficacy in the Paired-Sample T-tests (Pre-Post)

Survey Items	Pre-Survey		Post-Survey		<i>t</i>	<i>p</i>
	M	STD	M	STD		
7. If I try hard enough, I can always manage to solve complex problems in English reading.	3.37	0.81	3.90	0.84	-6.16	.000**
8. I am confident that I am proficient in the reading skills required for reading English.	2.90	0.88	3.74	0.91	-9.09	.000**
9. I believe I can understand the teaching content of English reading.	3.21	0.84	3.88	0.85	-7.20	.000**
10. I believe I can solve most of my English reading problems if I put in the necessary effort.	3.50	0.75	4.02	0.81	-6.00	.000**
11. I believe I can learn and try to remember the words in English reading.	3.48	0.77	3.91	0.86	-4.89	.000**
12. I believe I can get a high score on the English reading test.	2.79	0.93	3.46	1.00	-6.30	.000**

Table 8 presents the descriptive statistics of the survey results on students' perceptions of the interactive reading instruction with SRS. The responses reflect an intermediate to upper-intermediate level of perception regarding its usefulness and helpfulness. This suggests that most participants viewed the interactive reading instruction using the

Pear Deck SRS positively. Item 1 ranked highest ($M = 4.00$), followed by Item 7 ($M = 3.99$) and Item 8 ($M = 3.96$). This indicates that the students felt the interactive reading instruction with Pear Deck enriched the class content and helped them become more immersed in the reading materials. Moreover, they suggested that tools like Pear Deck should be used in the classroom to facilitate learning.

Table 8

The Students' Perceptions of the Interactive Reading Instruction Using the Pear Deck SRS

Survey Items	M	STD
1. Pear Deck enriched learning activities in the classroom.	4.00	0.85
2. Pear Deck was very helpful for me in acquiring new knowledge.	3.92	0.80
3. The learning feedback platform provided by Pear Deck made the learning process smooth.	3.91	0.90
4. Pear Deck helped me get helpful information when I needed it.	3.87	0.80
5. Pear Deck helped me learn to read English better.	3.83	0.84
6. Pear Deck helped me to be more focused in class.	3.95	0.85
7. Pear Deck made me feel more integrated into the reading material in the classroom.	3.99	0.86
8. An SRS (like Pear Deck) should aid learning in the classroom.	3.96	0.92

Table 9 details students' responses regarding their technological acceptance of Pear Deck. The mean scores for all four items were above four points on a five-point Likert scale, indicating that students generally found Pear Deck easy to learn and use, and it did not add to their cognitive load. These findings are consistent with the study of Liu et al. (2019), where participants also perceived Pear Deck as easy to use.

Table 9

The Students' Perceptions Toward Technological Acceptance of Using Pear Deck

Survey Items	M	STD
1. Learning to use the Pear Deck learning platform was not difficult for me.	4.00	0.88
2. It only took me a short time to understand how to use Pear Deck fully.	4.04	0.86
3. The learning activities on Pear Deck are easy to understand and follow.	4.04	0.78
4. I find Pear Deck's interface very easy to use.	4.07	0.80

Students' Perceptions of SRS-Integrated Reading Instruction (RQ4)

Semi-structured interviews were conducted with six students from the TI and PI groups to evaluate students' perceptions of the interactive reading instruction using SRS. From their responses and open-ended survey questions, several themes emerged, highlighting the impact of SRS on teaching methods, learning motivation, classroom interaction, and perceptions of Pear Deck.

Immediacy

Participants appreciated the Pear Deck SRS for its immediate feedback capabilities and the ability to compare responses with peers anonymously. This feature encouraged active participation and alleviated the fear of making mistakes in front of classmates, fostering a more inclusive learning environment.

Usefulness and Enjoyment

Students found Pear Deck instrumental in breaking down complex reading materials into digestible sections. They particularly enjoyed multimedia elements and interactive questioning, which enhanced comprehension and engagement. Despite some differences from previous studies (Liu et al., 2019), students valued how Pear Deck

enriched lesson content and made learning more interactive and enjoyable.

Promotion of Learning Outcomes

Participants noted significant improvements in learning outcomes through interactive reading instruction using SRS. During the interview, most students highlighted enhanced reading comprehension, attributing their progress to discussions with peers and teachers that helped them grasp main points and details more effectively. Their experiences echoed findings from Pérez-Segura et al. (2020), where personalized feedback led to remarkable gains in global reading comprehension scores. This method also facilitated vocabulary learning; two students reported substantial gains by answering vocabulary questions and matching synonyms on Pear Deck. Overall, participants expressed increased learning attention and a deeper understanding of lesson content presented via interactive PowerPoint slides on their smartphones.

Interaction with Teachers and Peers

The interactive nature of Pear Deck facilitated lively discussions and increased interaction among students and teachers. Participants expressed a preference for this approach over traditional methods, noting heightened engagement and reduced anxiety, especially among students with lower proficiency levels. This finding echoes Kent's (2019) observations on the positive impact of peer interaction on learning involvement.

Drawbacks of Pear Deck

Despite its benefits, students noted occasional technical issues, including automatic logouts, internet connectivity problems, and device malfunctions. These challenges, however, did not overshadow their overall positive perception of Pear Deck as a valuable tool for enhancing reading instruction.

Pedagogical Implications

The advancement of technology has significantly transformed tertiary-level teaching and learning. University students now frequently bring smartphones to class, making it increasingly difficult for educators to maintain their focus on reading materials or foster active classroom interaction. However, technology also presents opportunities, as this study demonstrates. It explores how integrating cutting-edge tools like Pear Deck can enhance student engagement, reading comprehension, and vocabulary acquisition. Pear Deck, as an integrated SRS, facilitates classroom interaction by enabling seamless information exchanges between teachers and students. It is particularly useful in large classes, where students tend to remain silent, and teachers may struggle to find time to gather individual responses. It allows all students to participate simultaneously, ensuring their voices are heard, and their understanding is assessed in real time.

The study recommends combining Pear Deck with peer interaction techniques to maximize effectiveness in EFL reading instruction. Although the PI group in this study did not significantly outperform the TI group, it showed greater improvement. Interview findings further emphasized the role of peer interaction in fostering engagement. For vocabulary practice, Pear Deck enables interactive activities like inferring word meanings from context or completing multiple-choice exercises, followed by peer discussions to deepen understanding. For reading comprehension, it integrates questions directly into materials, encouraging engagement and providing immediate feedback. To elevate the quality of peer feedback, students should be trained in discussion skills, and teachers can model questioning and scaffolding techniques used before in peer discussions. Additionally, teachers should actively monitor student interactions to provide support when needed and to incorporate ice-breaking activities to ease students into collaborative learning and enhance the overall experience.

CONCLUSION

This paper explored the integration of the SRS Pear Deck into EFL reading instruction with the aim of enhancing student engagement and promoting reading comprehension and vocabulary acquisition. The results suggest that Pear Deck-integrated reading instruction may positively influence learning motivation, improve self-efficacy, and contribute to the development of reading skills and vocabulary. In addition, students perceived integrating the Pear Deck SRS as effective in enhancing learning experiences through immediate feedback, active engagement with course materials, and fostering collaborative learning environments. This study contributes empirical evidence to existing literature, demonstrating the efficacy of integrating the Pear Deck SRS in improving reading skills and vocabulary acquisition in EFL contexts. While the PI group's scores showed slight improvement over the TI group, the differences were not statistically significant, contrary to findings from previous studies (Kent, 2019). Possible factors influencing these results include sample size differences, varying English proficiency levels among participants, the students' willingness to engage, the teacher's role, and challenges in monitoring peer discussions in larger classes. Future research should explore how these factors impact interaction effectiveness in similar contexts.

Different from traditional reading classes that rely on a lecture-based approach, which might often demotivate students, SRS-integrated reading instruction provides ESL/EFL instructors with a more innovative and engaging method. First, it encourages active learning through formative assessment, using tools like Pear Deck for interactive questioning. This technique activates students' prior knowledge, connects it to new information, and prepares them for contextualized learning. Pear Deck also allows instructors to gather immediate feedback from all students, not just a select few. Students can ask questions without interrupting the lesson, and anonymous responses help shy students participate. Additionally, instructors can adjust the pace based on student feedback. Pear Deck keeps students alert and engaged, helping them stay on track even if they momentarily lose focus. Positive reinforcement and praise for correct

answers further enhance student engagement by fostering a sense of healthy competition. Given its effectiveness in promoting active learning, Pear Deck is a valuable tool for EFL instructors to incorporate into their reading instruction.

Despite a larger sample size, the study had several limitations that may affect the effectiveness of peer interactions. Firstly, the frequency and quality of these interactions were not consistently monitored due to the large class size. Secondly, the grouping method had several drawbacks: allowing students to choose their own partners led to uneven group dynamics and limited diversity in thought. Additionally, students were not grouped based on language proficiency, leading to imbalanced engagement in some groups during peer discussions. Some students tended to opt for passive participation, relying on the teacher's final class summaries, which impacted overall productivity. Furthermore, the lack of effective questioning and discussion techniques among students resulted in unproductive discussions. The absence of designated roles, such as reporters, facilitators, and notetakers, contributed to disorganized and ineffective conversations. Finally, due to the lack of a control group, the effectiveness of SRS in reading instruction and its impact on learning motivation on motivation needs further validation by future studies. Nonetheless, the current study can still serve as a reference for EFL reading instruction.

Several targeted enhancements can be made to address these issues and improve future implementations. First, balanced groups should be created by mixing students based on their skill levels to enhance collaboration and ensure more equitable participation. Second, a pre-training session should be introduced to equip students with effective questioning and discussion techniques needed for more productive group discussions. Additionally, specific roles within each group should be assigned: facilitators to guide and keep the discussion focused, notetakers to record key points, and reporters to summarize and present findings. These changes could be made in future studies to ensure effective group discussion. Moreover, it is suggested that future investigations could explore different grouping strategies, comparisons between trained and untrained peers using SRS, and optimal grouping approaches incorporating questioning techniques and accommodating varying language proficiency levels before

employing the PI technique.

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