Digital Literacy: Enhancing English Reading Comprehension among Foreign Language Students

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Abstract

Digital literacy has become an essential tool for authentic communication, information accessibility, and reading development. To enhance reading comprehension among English as a foreign language (EFL) students, an effective reading instruction that integrated technology into language teaching should incorporate digital literacy. This mixed-method study aimed to examine how digital literacy enhanced EFL students' reading comprehension and what focus areas of the digital literacy they employed within and beyond the classroom. Thirty Thai high school students participated in this digital literacy instruction for ten weeks. Findings from the Wilcoxon signed-rank test on the reading comprehension test revealed that the digital literacy enhanced EFL students' reading comprehension, particularly reading and evaluating information from texts. They reported from the questionnaire and semi-structured interviews that they tended to access and process information through the focus area of communicating and information in digital literacy for better comprehension beyond the classroom.

Keywords: digital literacy, English as a foreign language, reading comprehension, technology

1. Introduction

Reading is considered an essential skill in English language teaching, as it is commonly acknowledged as a crucial focus of language acquisition (Richards, 2015). Furthermore, reading enables people from diverse backgrounds and languages to communicate for various reasons, such as learning new things or sharing ideas (Hudson, 2007). Considering the emphasis on education, students should be capable of reading for specific purposes, such as studying textbooks or applying to universities. For this reason, Thailand is among the countries participating in the Program for International Student Assessment (PISA) aimed at evaluating student comprehension skills in reading. The PISA data from 2012 to 2018 reveals that English as a Foreign Language (EFL) students in Thailand have low reading scores, which indicates poor reading comprehension (The Organization for Economic Co-operation and Development, 2012, 2015, 2018). This may also be true for EFL students at demonstration schools in the Pathum Thani province in Thailand. Consequently, English instructors in Thailand must develop an instructional approach or teaching framework to help students improve their reading comprehension.

In the twenty-first century, technology has become a significant part of human life in Thailand because it facilitates communication, information access, education, and other processes with greater speed and convenience. From an educational perspective, integrating technology into the teaching framework would provide more opportunities for EFL students to customize their learning paths to meet their individual needs. According to Coiro and Hobbs (2016), they did research on implementing digital literacy to develop an intense program especially for people who engage in the educational field. Program results showed that language acquisition was aided by digital technology for both teachers and students. Turner, Hicks, and Zucker's (2019) research on digital technology included more analysis, with a focus on reading and digital literacy. The findings demonstrated the connection between the two: adolescents would utilize technology to read and explore pages on websites. They therefore practice reading skills more the more they read.

Previous studies suggest that by establishing a link between technology and reading comprehension, the digital literacy framework may help EFL students in Thailand enhance their reading comprehension. Accordingly, the digital literacy framework used in this study was derived from two existing frameworks: Hobbs and Coiro (2018) and Pegrum, Hockly, and Dudeney (2022). Within the framework, the two main components were the teaching

processes and the focus areas. The teaching processes were influenced by Hobbs and Coiro's (2018) framework, which concentrated on the procedures associated with integrating technology into education. The digital literacy focal areas, which deliberately specified the scope of language acquisition in the digital age, were also inspired by Pegrum et al. (2022).

The purpose of this study was to examine how digital literacy affects EFL students' reading comprehension and how it can be used to enhance reading comprehension outside the classroom. Therefore, the following research questions and null hypotheses were developed:

Research Questions:

(1) How does digital literacy enhance reading comprehension among EFL students?

(2) To what extent do EFL students use digital literacy to enhance reading outside the classroom?

2. Literature Review

2.1 Digital Literacy (DL)

In this study, the digital literacy framework refers to the five teaching processes adapted from Hobbs and Coiro (2018) within the four focus areas adapted from Pegrum et al. (2022). The first step in the teaching process is accessing or having the means to obtain knowledge through the use of technology. The second process is analyzing and evaluating, which is the capacity to understand information with or without the aid of technology. Thirdly, creating, or the capacity to produce data. The fourth level is reflecting, which emphasizes the capacity to reconsider the implications of knowledge and action. The last term is "acting," which describes the capacity to transmit information both with and without the use of technology. Additionally, the scope of the first focus area, communicating, centers on the means or channels via which language can be used to express or receive meaning. Informing, the second one centers on how to search and filter information using technology. The third area of emphasis is collaborating, which stands for the social or interactional sphere. The final area of concentration is (re)designing, or the capacity to rewrite data. With these processes and areas, the framework places a strong emphasis on using technology to teach reading to EFL students.

2.2 Reading Comprehension

Mikulecky (2011) suggested that reading is a set of processes and strategies used to interpret and piece together the writers' intentions in texts. This is comparable to the definition of reading provided by Grabe and Stoller (2013), who described it as a way of assembling and analyzing certain data. Grabe and Yamashita (2022) offered additional details regarding reading as a comprehension process, emphasizing that to fully comprehend a text, the reader requires language-processing abilities. Readers choose what to read for a specific purpose, and each purpose employs a unique process to understand the meaning of the text. Jang, Seo, and Brutt- Griffler (2022) therefore studied digital reading engagement and reading comprehension. The results showed a connection between the two since students' reading comprehension is enhanced when they engage in digital reading practice, which in turn increases reading motivation. Based on these data, the study used the digital literacy framework to enhance reading comprehension for four different objectives from Grabe and Yamashita (2022): searching, synthesizing, and evaluating texts and reading for general understanding. The capacity to scan text for particular information is the initial goal, known as searching. Second, synthesizing is the process of fusing textual information with the reader's prior knowledge. Third, evaluating is the capacity to understand textual content. Reading a text for general information is the final objective.

2.3 Reading Assessment

Grabe and Yamashita (2022) highlighted that "Reading assessments are meant to provide feedback on the skills, processes, and knowledge resources that represent reading abilities" (p. 461). Reading assessment has the following five purposes: 1) reading proficiency assessment, 2) classroom learning assessment, 3) placement and diagnostic assessment, 4) reading assessment practices and resources, and 5) standardized second language reading assessment. In order to investigate the impact of digital literacy on EFL students' reading comprehension, the assessment for learning method was the primary means of evaluating students' knowledge in this study. Generally, six item types are used in a reading assessment (Richards, 2015); however, in this study, only true or false statements, short answers, and multiple-choice questions were used to assess EFL students' reading comprehension since these are the official sorts of items used in the participants' schools.

3. Methodology

3.1 Participants and Context

A mixed-methods approach was used to examine the effect of digital literacy on the reading comprehension of EFL students in grades 11 and 12. The study was conducted at a demonstration school in Pathum Thani, Thailand. The study utilized the convenience sampling method to recruit a sample of thirty high school students who registered for reading courses in the first semester of 2023. The course's EFL students, whose abilities differed, studied reading for 10 weeks, spending 90 minutes on each lesson, using a digital literacy framework. In this course, the teacher was the only non-native speaker, and the language of instruction was English. The teacher would implement instructional processes in each class, incorporating the four focus areas and working from the framework. Each lesson would conclude with a review or discussion of the material covered.

3.2 Research Instruments

Three main research instruments were used to collect the data: 1) a reading comprehension test, 2) a questionnaire, and 3) interviews. The reading comprehension test was conducted twice, in weeks 1 and 10, to investigate the effect of digital literacy on EFL students' reading comprehension. The test consisted of 30 multiple-choice questions, and the level of the texts was in the range of A2–B1 levels of the Common European Framework of Reference for Languages (CEFR). The validity of the reading comprehension exam was evaluated by three professionals in the field of education using the three-point Item-Objective Congruence (IOC) grading system. Furthermore, the questionnaire and interviews were used to explore EFL students' use of digital literacy to enhance reading comprehension outside the classroom, both of which were assigned to EFL students in week 10. The questionnaire consisted of 26 questions on a Likert scale that were divided into two categories: teaching processes and focus areas. The focus areas and the teaching processes questionnaire were developed using prior research by Hobbs and Coiro (2018) and Pegrum et al. (2022). Furthermore, the interviews were conducted in week 10, and 5 EFL students were selected based on their CEFR levels. To avoid anxiety and confusion among participants, interviews were done in Thai, the native tongue of the teachers and students. The questions used in the interview aimed to 1) further explore how EFL students used specific aspects of digital literacy outside the classroom and 2) investigate the use of digital technology in reading English texts. The questionnaire and interview questions were assessed for validity by a second group of three education specialists who used the three-point Item-Objective Congruence (IOC) grading system.

3.3 Data Collection and Analysis

The first research instrument, the reading comprehension test, served as both the pre-test and the post-test. The impact of the digital literacy framework was examined by collecting the median scores. The Wilcoxon signed-rank test was used to examine the quantitative data. This non-parametric test works well with small samples (Riina, Stambaugh, Stambaugh, and Huber, 2023), making it appropriate for this study. It was used to assess reading comprehension among EFL students. The second and third research instruments were used to investigate the use of digital literacy outside the classroom. Both quantitative and qualitative data were included in the questionnaire whereas only qualitative data were represented in the interview. The questionnaire's mean score indicated the areas of digital literacy that were most frequently utilized outside the classroom and provided additional details. The interviews primarily served to clarify how EFL students used digital literacy to improve their reading comprehension skills.

4. Findings

4.1 Reading Comprehension Test

A reading comprehension test was used to answer the first research question, focusing on four reading objectives adopted from Grabe and Yamashita's (2022) work: 1) searching for information, 2) synthesizing information; 3) evaluating information, and 4) reading for general comprehension. As discussed earlier, the impact of digital literacy on reading comprehension in EFL students was demonstrated using the median score analyzed using the Wilcoxon signed-rank test, as shown in Table 1.

Table 1. The result of the Wilcoxon signed-rank test of the pre- and post-tests

Reading Comprehension Test	Group	N	Mean Rank	Sum of the Ranks	z	p
Post-test–Pre-test	Negative Rank	6	8.00	48.00	-2.936	.003
	Positive Rank	18	14.00	252.00		
	Ties	6				
	Total	30				

Based on the statistically significant difference (z = -2.935, p = .003) between the pre- and post-test, Table 1 indicates that the digital literacy framework in this study has the potential to enhance reading comprehension among EFL students. Moreover, the pre-test's score of 18.00 had been exceeded by the post-test's median score of 19.50. The results of the post-test for each reading objective are presented in Table 2.

Table 2. The result of the Wilcoxon signed-rank test of the pre- and post-tests (focusing on each reading objective)

Reading Objective	Group	N	Mean Rank	Sum of Rank	z	p
Searching for Information	Negative Rank	4	9.00	36.00	-1.966	.049
	Positive Rank	13	9.00	117.00		
	Ties	13				
	Total	30				
Synthesizing Information	Negative Rank	5	9.90	49.50	-1.947	.052
	Positive Rank	14	10.04	140.50		
	Ties	11				
	Total	30				
Evaluating Information	Negative Rank	4	9.13	36.50	-2.001	.045
	Positive Rank	13	8.96	116.50		
	Ties	13				
	Total	30				
General Comprehension	Negative Rank	6	14.08	84.50	-1.991	.046
	Positive Rank	18	11.97	215.50		
	Ties	6				
	Total	30				

Most EFL students improved their reading comprehension after using the digital literacy framework, as shown in Table 2. According to the statistically significant differences, students' greatest progress in reading purpose was aimed at evaluating information from the texts (z = -2.001 and p = .045). Following closely behind (z = -1.991, p = .046) were reading for general comprehension and reading to search for specific information from texts (z = -1.996, p = .049). Nonetheless, there was no discernible improvement in the EFL students' ability to synthesize information from text or other sources (z = -1.947, p = .05). As previously indicated, students had the opportunity to read for four objectives throughout each lesson, and they generally did well in each one. Students could participate rather well in reading to search, evaluate, and general knowledge because they enjoyed using technology to enhance their learning, such as by looking up reliable sources online or summarizing content there. However, as it required them to apply both the material from the books and their prior knowledge, reading to synthesize was the only goal that the students appreciated less. When students lacked prior knowledge on a particular topic, they tended to avoid using technology to find out more information and instead wait for the teacher to explain it to them.

4.2 Questionnaire

A questionnaire was used to answer the second research question, which was divided into two aspects.

4.2.1 Teaching Processes

Hobbs (2011) pointed out that "This five-part process is fundamental to how we learn and communicate today"; therefore, each step would highlight the use of technology in the classroom. The first step is "access," which offers EFL students the opportunity to explore and obtain information. The second step, "analyze and evaluate," requires learners to apply critical thinking to information interpretation. The third step is called "create," and students are expected to complete certain projects or activities during this step. The fourth process is called "reflect," during which learners reevaluate the impact of their work before sharing it with others. The final step is "act," which enables students to create and share knowledge with one another.

4.2.2 Focus Areas

Pegrum et al. (2022) defined digital literacy as a set of skills required to interact with technology in the modern world. Thus, a map of language learning and digital literacy skills was developed with four focus areas. In this study, the first focus was on "communicating," with an emphasis on using digital technologies to assist students in learning to read. The second focus area was "informing," highlighting the necessity for students to evaluate information. The third focus was on "collaborating," which stressed a platform for communicating with others and expressing one's identity. The final focus area was "(re)designing," which emphasized a period for students to reconfigure and deliver their content. EFL students' use of digital literacy outside the classroom is indicated by the qualitative results of the questionnaire in Table 3.

Table 3. Descriptive statistics of the responses to the digital literacy questionnaire

Aspects of Digital Literacy	N	Min	Max	M	SD
Access	30	2.67	4	3.6778	.42420
Analyze and Evaluate	30	2.00	4	3.4667	.52958
Create	30	1.00	4	2.9333	.72397
Reflect	30	2.33	4	3.4667	.46814
Act	30	2.33	4	3.3111	.47893
Communicating	30	2.67	4	3.7000	.38507
Informing	30	1.67	4	3.0556	.64969
Collaborating	30	2.67	4	3.5222	.36811
(Re)designing	30	2.50	4	3.4000	.46238

The mean score for each item indicates how EFL students used digital literacy outside the classroom to improve their reading comprehension. Considering the teaching process, EFL learners primarily used the "access" process outside the classroom (M = 3.6778, SD = .42420). Students frequently used this process to study fascinating topics on digital platforms. In addition, "communicating" was the main focus area for most learners (M = 3.7000, SD = .38507), using digital devices, such as smartphones for learning or activities. In conclusion, all teaching processes and focus areas were utilized by the students, but they were modified to fit their unique learning and practice styles. Since the accessing process scoped ways to use technology as instruments for reading skill practice, it interacted with the communicating area and reflected the use of technology to accomplish activities.

4.3 Interview

Throughout the interviews, five EFL students selected by purposive sampling were asked to elaborate on how they applied digital literacy outside the classroom, therefore, it was divided into two aspects provided below.

4.3.1 Teaching Processes

Based on their CEFR level A2–B1, these students were randomly chosen. The five students rated "access" and "act" as the most used aspects for the teaching process to improve reading comprehension. These two processes were applied in different ways depending on the circumstances.

(1) Access

The EFL students frequently searched for intriguing topics on social media to improve their independent reading comprehension skills. Digital tools, such as smartphones and tablets, facilitated quick and easy access to information. The majority of the time, English-language news and status updates were selected for reading by students because they were humorous or related to current events. However, some students actively looked for reading materials that piqued their interest.

Student 1: I primarily used technology—like my phone—for activities and searches. Anything that I found interesting or funny, I would share with my pals. Typically, I would share memes or posts in the English language from other people's status updates on social media.

Student 3: I like watching movies and reading postings in English on social media, sometimes from different websites. I would share things with my group when I came across amusing or intriguing stuff, especially news that was relevant to our group.

(2) Act

Following their online exploration of fascinating subjects, students typically shared them with friends or family members. In most cases, students would write a comment on the topic before sharing it with others; however, occasionally, they would share it to clarify something they were not sure about. On an online platform, students would exchange information or interests but occasionally have in-person discussions in greater detail. Therefore, to ensure that everyone had access to the same information, students exchanged specific resources online. Students were asked to provide additional information regarding the areas of focus in digital literacy. The different English language proficiency levels among EFL students have been applied to these areas in diverse ways.

Student 2: When I found intriguing subjects, I might save or forward such URLs for later, but I would only discuss them with close friends to make sure we were on the same page.

Student 4: Using internet resources, I liked to read books written in English. I would forward the link to my English-speaking friends and ask them to interpret it if the language or words were too difficult for me to understand.

4.3.2 Focus Areas

Students employed the main elements of digital literacy to enhance their comprehension of the content they consume, whereas they each had a unique method of utilizing technology for reading. The following illustrates in detail how students used digital literacy to enhance their reading comprehension.

(1) Communicating

A2 EFL students utilized digital resources to improve their reading comprehension skills. Some practiced reading on interest-only topics while others learned from specialized websites, such as the British Council. By contrast, students at the B1 level would use digital technology for more targeted goals to advance their reading comprehension. Prior to reading, these students had clear reading goals in mind, such as improving their vocabulary in business-related resources or preparing for the Scholastic Assessment Test (SAT).

(2) Informing

Despite having access to information, EFL students occasionally struggled with unfamiliar vocabulary or unclear grammar. Consequently, they searched online for resources that could assist them in finding answers. To help students understand the content, each student had access to their preferred digital resources. However, they generally ignored the information if it remained unclear.

(3) Collaborating

Every EFL student in this interview session shared information, materials, and expertise with their friends and family for various reasons, such as entertainment and comprehension. Although they were aware that they may not always understand or retain the correct information, they had a tendency to share it. Nevertheless, the main reason was to ensure that their friends and family members had access to the same material for discussion or conversation. Students preferred sharing online information over printed materials.

(4) (Re)designing

Although they did not post it publicly on social media, A2 students occasionally reworked the content, which allowed them to share their amusement with their friends. By contrast, B1 students shared what they had learned with others after restructuring the content they had read, mostly regarding exams. Furthermore, every EFL student would utilize technology to help them review the subject matter. While most students use tablets to condense their thoughts or knowledge, a single A2 student decided to use technology in conjunction with a notebook and highlighters reasoning that writing down some crucial information would improve memorization.

5. Discussion and Conclusion

This study aimed to explore the effect of digital literacy on EFL students' reading comprehension and its use outside the classroom. Findings indicated that digital literacy enhances EFL students' reading comprehension. The reading comprehension test results revealed that EFL students' reading comprehension for three reading objectives—evaluating, discovering specific details, and assessing general information—improved by using the digital literacy frameworks developed by Hobbs and Coiro (2018) and Pegrum et al. (2022). The focus areas would typically combine digital technology to improve reading comprehension, but the processes can be applied to both teachers and students as procedures to progress language and social skills. More precisely, by employing digital literacy, EFL students were able to enhance their reading comprehension both within and outside the classroom. Also reading comprehension can be improved by taking part in social settings such as author reviews, book discussions, and social interactions (Alghonaim, 2020). According to Pegrum (2014), students can use technology, including mobile devices, to simultaneously communicate with one another and obtain information. Furthermore, the results of the questionnaire and interviews demonstrate that students used digital literacy in their daily lives using the "access" process to find interesting material. They then used the "act" process to make connections between the information and other people. The more students applied media and reading together, the more they improved their critical reading strategies (Hobbs and Moore, 2013). Students mainly utilized all focus areas to enhance their reading comprehension; nonetheless, they used the "informing" aspect less frequently. This may due to their lack of desire to acquire an answer when they struggled with something such as lacking of background knowledge and could be connected to the reason why EFL students' reading comprehension to synthesize was not enhanced. To comprehend and synthesize information, students need to initially combine the subject matter of the text with their prior knowledge before organizing it the way they think it should fit. Consequently, they would miss opportunities to improve their reading comprehension when they stop to explore more information and wait for the answer from the teacher only. Further research on digital literacy should be conducted to help teachers guide students in continuing to assess materials based on their prior knowledge and new information.

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