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A Study on Literacy Enhancement: Assessing the Impact of Technology-Assisted Reading Instruction on English Language Learners

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Abstract: The purpose of this research is to assess the impact of technology-assisted reading instruction specifically on English language learners. The interview method was employed and the questionnaire served as the major data-gathering instrument. The respondents of the study were composed of learners. It was evident from the results that technology-assisted reading instruction provided significant benefits for improving reading comprehension through individualized and interesting learning experiences. In addition to promoting more engagement, this method enhances literacy, allowing students to engage in more meaningful conversations in English. Overall, technology-assisted reading instruction has been shown to help English language learners become more motivated and engaged by providing them with individualized, interactive learning opportunities that effectively accelerate their language development.

Keywords: Reading comprehension; Vocabulary acquisition; Fluency; Technology-assisted reading instruction; Engagement; Motivation

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1. Introduction

In order to enhance literacy outcomes, technology-assisted reading instruction is a cutting-edge pedagogical approach that is setting the standard for contemporary education. As digital tools continue to revolutionize instructional approaches, technology-assisted reading instruction is an example of a deliberate use of technology to increase reading skills in children of various ages and skill levels.

Traditional reading instruction approaches, which aim to develop essential literacy competencies, have long relied on textbooks, workbooks, and teacher-led exercises as their main components. However, the advent of digital technologies has created new, engaging opportunities for personalized and interactive learning. Technology-assisted reading instruction provides individualized interventions that can successfully address

specific reading challenges by leveraging adaptive algorithms, multimedia tools, and educational software to suit diverse learning preferences.

The study of linguistics is essential to understanding how technology interventions impact language learning and comprehension in technology-assisted reading instruction research. Linguistic theories and frameworks provide valuable insights into the cognitive processes associated with reading, and these shape the development and implementation of technology-assisted reading instruction programs. By employing linguistic concepts, teachers can improve their teaching strategies in online learning environments to help students gain a greater understanding of vocabulary, grammar, and textual meaning.

The acquisition of literacy skills forms the bedrock of academic achievement and lifelong learning. For English language learners (ELLs), who navigate the complexities of acquiring English proficiency alongside content knowledge, literacy development is crucial not only for academic success but also for socio-economic mobility and cultural integration. However, the journey toward literacy proficiency can be fraught with challenges, ranging from linguistic barriers to limited access to resources tailored to diverse learning needs.

Traditionally, educators have employed various strategies to support ELLs in their literacy journey, including explicit instruction, scaffolded reading activities, and vocabulary development exercises. While these methods remain essential, the rapid evolution of technology offers new possibilities to augment and enrich traditional approaches. Technology-assisted reading instruction leverages digital tools such as interactive software, multimedia resources, and adaptive learning platforms to engage learners actively, personalize instruction, and provide immediate feedback—all of which are pivotal in fostering literacy growth among ELLs.

Even though technology-assisted reading instruction is increasingly being used in educational settings, empirical research analyzing its long-term effects on literacy development and educational outcomes is still lacking. Previous research frequently concentrates on the immediate effects on particular groups, necessitating in-depth analyses that examine the long-term advantages and potential drawbacks of technology-assisted reading instruction applications in a range of educational settings.

These days, with everything being digitalized, technology is essential to education, especially when it comes to improving literacy among a wide range of students. Reading proficiency is a unique difficulty for ELLs, which has led to research into creative, technology-integrated teaching strategies.

In educational settings across the globe, English language learners are becoming a more prevalent demographic. They frequently face linguistic and cultural obstacles that hinder their progress in reading. Due to this, it is critical to investigate other alternatives, including technology-assisted reading education, as traditional approaches to literacy training might not cater to their demands.

Understanding the connections between language learning and literacy development, particularly for ELLs, is made easier with the help of linguistics. It provides guidance for instructional tactics that can effectively accommodate linguistic diversity and advance fair educational results.

Despite advancements in educational technology, there remains a gap in understanding the specific impacts of technology-assisted reading instruction on ELLs' literacy skills. Existing literature often focuses on general student populations, underscoring the need for targeted research that evaluates the effectiveness of these interventions within the context of language learning. By methodically evaluating the influence of technology-assisted reading instruction on the literacy results of English language learners, this study seeks to close this gap. Through the analysis of qualitative insights, the study aims to offer factual data and useful suggestions to guide instructional strategies and assist ELLs in developing their literacy.

2. Research questions

This study aims to systematically assess the impact of technology-assisted reading instruction on the literacy outcomes of English language learners.

Specifically, this study seeks to answer the following questions:

(1) How does technology-assisted reading instruction impact the (a) reading comprehension, (b) vocabulary acquisition, and (c) fluency of English language learners?

(2) How do English language learners perceive the effectiveness of technology-assisted reading instruction in enhancing their literacy skills?

(3) How do English language learners experience technology-assisted reading instruction in terms of engagement and motivation?

3. Study significance

This study is significant to the following people in the field of education:

(1) School administrators: This study may serve as a revelation and encouragement to design programs to improve the use of technology-assisted reading instruction for English language learners.

(2) Teachers: They may benefit the most from this study. This will be vital because it could give them a chance to improve their technological skills.

(3) Future researchers: This study may provide them with significant information about the topic and will serve as a reference and guide in conducting future studies.

(4) Learners: This study may be vital because it could give them a chance to improve their reading skills. Thus, they may uplift their individual skills and abilities, particularly in English Language.

(5) Curriculum planner: The result of this study may inform them about the topic. In connection, they would be able to guide the teachers in designing programs that may improve their skills and may also help the learners.

4. Scope and limitation

This study aimed to determine the impact of technology-assisted reading instruction on English language learners. The interview method was employed and the questionnaire served as the major data-gathering instrument. The respondents of the study were composed of learners. This study was limited to the assessment of the impact of technology-assisted reading instruction on English language learners.

5. Literature review

5.1. Impact of technology-assisted reading instruction on reading comprehension, vocabulary acquisition, and fluency

Reading skills development in ELLs is a multifaceted process that involves the acquisition of various competencies, including phonemic awareness, vocabulary, fluency, and comprehension. ELLs face unique challenges in developing reading skills due to the need to simultaneously learn a new language and master literacy skills [1]. Vocabulary acquisition is particularly crucial for ELLs, as it directly impacts their ability to understand texts and express themselves effectively [2]. Additionally, cultural and linguistic differences can

influence ELLs' reading strategies and comprehension [3]. Technology has played an increasingly significant role in language learning, offering diverse tools and resources to support the development of reading skills. Digital platforms provide access to authentic materials, interactive exercises, and multimedia content, which can enhance learners' exposure to the target language and facilitate a more engaging learning experience [4]. Technology also allows for personalized learning, enabling ELLs to progress at their own pace and receive immediate feedback [5]. Previous studies have demonstrated the potential of technology-assisted reading instruction in improving reading skills among ELLs. For example, research has shown that computer-assisted language learning (CALL) programs can effectively enhance vocabulary acquisition and reading comprehension [6]. E-books and multimedia annotations have been found to support vocabulary learning and comprehension by providing visual and auditory cues [7]. Interactive reading programs that incorporate games and quizzes have been reported to increase motivation and engagement in reading activities [8]. CALL programs are designed to provide language learners with interactive and multimedia-rich environments for practicing reading skills. These programs often include features such as adaptive learning algorithms, which adjust the difficulty level based on the learner's performance, and integrated dictionaries or glossaries to support vocabulary development. E-books and multimedia annotations offer a digital alternative to traditional print materials, with the added advantage of interactive features. Multimedia annotations, such as pop-up definitions, audio pronunciations, and visual illustrations, can aid in the comprehension of new vocabulary and concepts, making reading more accessible for ELLs [9]. Interactive reading programs and games engage learners in a more dynamic and enjoyable reading experience. These tools often incorporate elements of gamification, such as points, badges, and leaderboards, to motivate learners and encourage regular reading practice [8]. Technology-assisted reading instruction (TARI) significantly enhances reading comprehension by providing interactive tools that scaffold understanding through multimedia elements and adaptive text difficulty. It facilitates vocabulary acquisition by offering definitions, synonyms, and contextual examples, making learning dynamic and accessible. TARI also improves fluency by providing models of fluent reading, opportunities for repeated practice, and real-time feedback on pronunciation and intonation. These integrated features empower ELLs to develop comprehensive literacy skills in a supportive and engaging digital environment, ultimately fostering confidence and proficiency in reading and language use.

In terms of reading comprehension, Mikulecky [10] 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 [2] who described it as a way of assembling and analyzing certain data. Grabe and Yamashita [11] offered additional details regarding reading as a comprehension process, emphasizing that to fully comprehend a text, the reader requires language-processing skills. Readers choose what to read for a specific purpose and each purpose employs a unique process to understand the meaning of the text. Jang *et al.* [12] 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 objectives from Grabe and Yamashita [11]: searching, synthesizing, and evaluating texts and reading for general understanding.

Additionally, there have been numerous studies on vocabulary and the use of technology with vocabulary; "research on good vocabulary learning suggests that to develop vocabulary knowledge, it takes a word rich environment; active, motivated engagement on the part of the learner; multiple exposures to and ways to access words both contextual and definitional information about words; and the development of independent

words learning strategies" [13]. Using technology with vocabulary lends itself to multiple exposures as well as independent learning strategies. Students will be able to recognize these words not only in technology but also in the books they are reading, the tests they are taking, etc. Using technology to teach vocabulary fulfills the requirements of successfully teaching vocabulary in an enjoyable way for the students.

On the other hand, in terms of fluency, the Repeated Reading model chosen for this work involves three-to-one-minute reads on the same text. Yet, the practice differs in that, the reads are audio-taped through a web-based pedagogical tool known as VoiceThread. Between each read, a teacher or proficient peer reviews the VoiceThread and provides corrective feedback in an effort to clarify any errors and increase the likelihood of accuracy upon subsequent reads. This corrective feedback has proven to be a highly effective exercise when implementing repeated readings [14]. As a result, the research widely supports repeated readings as a pedagogical strategy best suited for improving reading fluency and seamless technology integration. Repeated Readings reinforce the critical roles of visual memory, phonological memory, episodic memory, and semantic memory in the fluency process.

5.2. Effectiveness of technology-assisted reading instruction in enhancing literacy skill

In 2014, the British Council reported that there were about 1.5 billion English language learners in the world [15]. Of these ELLs, 750 million were learning English as a foreign language (EFL) and 375 million were learning English as a second language (ESL) [16]. One of the greatest challenges for ELLs is to master higher-order literacy skills such as meaning inferencing, reading comprehension, and writing [17]. With the advancement of computer technologies and the prevalence of internet access, educational technology applications have been recognized as powerful tools to bolster ELLs' literacy development [6].

Currently, second language acquisition (SLA) theories suggest that the optimal learning environment for ELLs' literacy development is characterized by meaningful interactions in a social context [18]. Informed by the SLA theories, different types of technology tools and techniques have been adopted to create such learning environments and facilitate ELLs' reading, writing, and vocabulary development.

For instance, Lan *et al.* [19] implemented a cooperative reading environment using a mobile device-supported system for ten weeks. By offering balanced reading instruction, immediate and specific feedback, and reciprocal learning scenarios, this system significantly improved fourth graders' oral reading fluency and retelling fluency. Plus, Hwang *et al.* [20] employed a situational learning system supported by an online digital platform to provide authentic contextual writing environments and interactive peer feedback to improve elementary school students' English writing skills in just one semester. The results from students' writing scores, questionnaires, and interviews showed that this learning system significantly helped students create better sentences and achieve greater basic writing skills. For vocabulary instruction, Mirzei *et al.* [21] used LexisBOARD software to offer engaging instructional activities and feedback for junior high school students based on their interests and learning needs. This student-centered computer-assisted language learning environment significantly improved students' vocabulary test scores. In another study, with a two-hour intervention [22], an interactive, multimedia, web-based abstract word learning system that facilitated individual self-learning in a CALL environment was also found to significantly help sixth graders learn more abstract words than those learning in a regular language-learning class.

The use of educational technology in the classroom has been encouraged by recognizing that today's students are considered digital natives [23]. The students are said to be technologically confident [24] as well as "born digital" [25]. Today's school children are completely immersed in the digital environment and culture. Therefore, some argue that teachers' instruction needs to meet the students' changing learning styles

and preferences [26]. On the other hand, some researchers [27] suggested that the generational preference for technology does not always determine the success of the use of educational technology. It may, they argue, be more dependent upon factors regarding how, when, and for whom the technology applications are used. In this respect, studies [28] have examined how teachers' instruction incorporates educational technology with different pedagogical considerations.

As Egbert and Petrie [29] suggested, learners' achievement in technology-integrated instruction is dependent on various factors such as learners, language, context, tools, tasks, and learning community. This means in the field of literacy research; it is important to (1) examine how different technology tools are used in classroom context and (2) how unique features of literacy instruction interact with different functions and interfaces provided by educational technology. Technology-assisted reading instruction has proven highly effective in enhancing literacy skills by offering personalized, interactive learning experiences. By adapting to individual learning needs and providing immediate feedback, TARI supports significant gains in reading comprehension, vocabulary acquisition, and fluency among learners. Multimedia tools and adaptive learning features engage students actively, making complex texts more accessible and promoting deeper understanding. TARI's integration of audio models and interactive exercises further reinforces language development, empowering learners to navigate and excel in literacy tasks with increased confidence and proficiency.

With the increasing use of technology in educational settings, the ELL instruction field is in critical need of a comprehensive review of (1) the effectiveness of various technology-integrated instruction methods for developing ELLs' literacy skills and (2) the features that influence instructional technology implementation in the classroom context, encompassing technology-related and instruction-related factors. To date, while a few comprehensive reviews have investigated these areas, no reviews have examined a wide range of technology tools for ELLs' literacy development. The present study aims to fill this gap by investigating the overall characteristics of technology tools and evaluating their effects on ELLs' literacy outcomes such as reading, writing, and vocabulary with different moderator variables. Technology-integrated classroom instruction in the confines of this study does not identify any specific entity, such as a hardware or software program. Instead, the term is used broadly to refer to the instructional use of a variety of programs or applications, including but not limited to computers, mobile devices, digital games, and intelligent tutoring systems.

5.3. Instruction in terms of engagement and motivation

Technology is always transforming education. According to the latest surveys, 76% of students say that technology makes learning more engaging (EdWeek, 2023) and 90% of teachers say that technology helps them to assess student learning more effectively (2023 State of Technology in Education Report, 2023). Future educators need to be prepared to use technology successfully within the classroom, as it is a powerful device for engaging students and enhancing the learning effect. By informing the way to use technology effectively, teachers may create lesson plans that are more relevant, thrilling, and impactful for students, imparting each individual the assistance they want to succeed, no matter their skills or learning styles.

Additionally, numerous address what might constitute effective teaching strategies and methods to motivate young learners in the ESL/EFL classrooms. For example, Maynard [30] claimed that schools in the United Kingdom have a significant role in encouraging children to read more, even in their free time. Children and students ages between seven and twelve years old who read more, enjoy it and become proficient. Teachers who incorporate reading into the ESL classroom encourage students to develop good reading habits both in the classroom and at home, and this improves their literacy skills. Students are more comfortable sitting in front of a screen surfing the

web rather than reading a book. They no longer have enough concentration to fully read through the conclusion. Therefore, it has become more popular to read electronic books, since digital technology has become more appealing to students who do not respond well to printed materials. New technology becomes more popular amongst readers and even changes the way students read. Students choose electronic books instead of printed books. Students who read on the screen, such as the Kindle and iPad, satisfy users as much as printed books.

Furthermore, the study by Ghalebandi and Noorhidawati [31] indicated that students gain more motivation to read electronic books. They came to this conclusion by investigating the motivation and pleasure regarding digital books among Malaysian bilingual children in the EFL classroom of the first and second graders, ages seven and eight. Students were observed as well as interviewed. Have and Pederson [32] added that e-books offer multimedia such as sounds, pictures, and videos, and because of this, they grab children's attention, which then increases their motivation to read. TARI enhances engagement and motivation through interactive and personalized learning experiences. By integrating multimedia elements, adaptive features, and gamified activities, TARI captivates learners' interest and encourages active participation. Real-time feedback and progress tracking provide continuous motivation by highlighting achievements and areas for improvement, fostering a sense of accomplishment and accountability. TARI's ability to cater to diverse learning styles and preferences ensures that learners remain motivated as they navigate challenging texts and develop essential literacy skills in an engaging digital environment.

Active learning approaches, such as problem-based learning, collaborative projects, and inquiry-based tasks, promote engagement by encouraging students to actively participate in their learning process [33]. Incorporating technology into instruction can enhance engagement and motivation by offering interactive simulations, multimedia resources, and adaptive learning platforms that cater to diverse learning styles [34]. Providing personalized learning pathways and adaptive assessments allows educators to tailor instruction to individual student needs, thereby increasing motivation and fostering deeper engagement [35]. Gamification elements, such as points, badges, and leaderboards, can motivate students by transforming learning into a rewarding and enjoyable experience [36].

Positive teacher-student interactions and supportive classroom environments contribute significantly to student engagement and motivation [37]. Considering cultural diversity and contextual factors is crucial in designing instructional strategies that resonate with students' backgrounds and experiences [38]. Despite the benefits of engaging instructional strategies, challenges such as time constraints, resource limitations, and varying student needs can impact implementation and effectiveness [39]. Addressing these challenges requires thoughtful planning, professional development for educators, and ongoing evaluation of instructional practices.

6. Research design

The study used the case study method for research. The case study is used to examine a person, group, or institution where researchers may draw upon multiple sources of data, such as observation, interviews, and documents. After collecting the data, they were analyzed to identify common or prominent themes.

6.1. Data collection

Data collection in this research involved an interview method. Semi-structured interviews were conducted with participants to gather in-depth information about their experiences with technology-assisted reading interventions. Interview questions will focus on the impact of TARI on the reading comprehension, vocabulary acquisition, and fluency of English language learners; their perceptions of the effectiveness of the interventions,

and how often they experience technology-assisted reading instruction in terms of engagement and motivation.

6.2. Data analysis

This research used a thematic analysis method. Thematic analysis was used to identify, analyze, and report patterns within the qualitative data [29]. This method for analyzing qualitative data involves reading through a set of data and looking for patterns in the meaning of the data to find themes. The analysis involves coding the data, generating themes, and interpreting the significance of the themes in relation to the research question.

7. Discussion

7.1. The impact of TARI on the (a) reading comprehension, (b) vocabulary acquisition, and (c) fluency of English language learners

The responses of the participants are shown in **Table 1**.

Table 1. The impact of TARI on reading comprehension, vocabulary acquisition, and fluency of English language learners

	Reading comprehension	Vocabulary acquisition	Fluency
Participant 1	"Technology-assisted reading instructions (TARI) can provide significant benefits to reading comprehension by making learning more personalized, engaging, and supportive."	"Some digital reading platforms highlight new or difficult words within the context of the reading material. Students can click on these words to get definitions, synonyms, and usage examples, helping them learn vocabulary in context."	"Many language learning apps and programs provide audio examples and speech recognition technology that helps English language learners practice and improve their pronunciation, leading to more fluent speech."
Participant 2	"Technology-assisted reading instruction (TARI) improves reading comprehension by providing tools that offer comprehensive input to learn quickly and personal learning based on the student's reading ability. With these and more features, its impact on improving English language learners' reading comprehension is certainly remarkable."	"Technology-assisted reading instruction (TARI) helps learners grasp and retain new words by showing them in context, resulting in improvement in vocabulary acquisition. Learners can more easily comprehend and remember new vocabulary with the help of these tools, which are capable of offering definitions, pronunciations, and use examples."	"Technology-assisted reading instruction's (TARI) impact on improving reading fluency cannot be denied, especially for people who are not proficient in English. Take text-to-speech features as an example, which allow learners to improve and replicate correct pronunciation and pace."
Participant 3	"The instruction of technology and reading helps us to easily understand especially the thoughts that we would like to explore in terms of reading."	"For vocabulary acquisition, the involvement between the technology and vocabulary helps us to broaden our knowledge about the different words that we need to understand."	"Technology also helps us to improve or develop our fluency in every different language that we need to know for us to speak properly."
Participant 4	"Technology-assisted reading instruction (TARI) has a big impact on the reading comprehension, vocabulary acquisition, and fluency of English language learners. Through the support of its learning program, it helps everyone, including those who struggle with reading. With this, struggling readers can improve their reading skills, develop their abilities to read better, and expand their knowledge about reading and pronouncing the language of English."	"Interactive elements foster a comprehensive learning experience that goes beyond static definitions. They encourage active participation, self-paced learning, and personalized feedback, ultimately supporting robust vocabulary acquisition in diverse educational settings."	"By listening to native speakers and engaging in repeated reading exercises, ELLs benefit from immersive language exposure and modeling."

Table 1 (Continued)

	Reading comprehension	Vocabulary acquisition	Fluency
Participant 5	"Technology-assisted reading instruction (TARI) improves comprehension with interactive content, e-books, and adaptive programs that provide instant feedback."	"Digital flashcards, pronunciation guides, and contextual examples in these interventions enhance vocabulary learning through interactive and repetitive exposure."	"Programs with repeated reading practice, audio support, and real-time feedback help English language learners improve fluency by listening to native speakers and practicing pronunciation."

TARI has emerged as a transformative approach in education, particularly beneficial for enhancing reading comprehension among ELLs. This essay explores various perspectives on how TARI facilitates personalized, engaging, and supportive learning environments, ultimately improving comprehension, vocabulary acquisition, and fluency.

Considering all the data above, we can say that TARI had a great impact on learners' language skills. From the data gathered, it was clearly stated that technology-assisted reading instruction offered substantial advantages for enhancing reading comprehension through personalized and engaging learning experiences. TARI utilized tools that provide comprehensive input and adapt to the student's reading skills, facilitating quicker learning. Particularly beneficial for English language learners, TARI significantly improved comprehension through interactive content, e-books, and adaptive programs that offer instant feedback. This is supported by the result of the study by Jang *et al.* [12], where students' comprehension is enhanced when they engage in digital reading practice, which in turn increases reading motivation. TARI enhances understanding and supports the exploration of complex ideas within reading contexts of English language learners in terms of reading comprehension. In addition to improving comprehension, TARI significantly impacts vocabulary acquisition and fluency among ELLs. Its structured learning programs provide essential support that benefits all learners, including those who struggle with reading. Through interactive content, e-books, and adaptive programs that offer instant feedback, TARI helps learners not only expand their vocabulary but also enhance their pronunciation and fluency in the English language. This holistic approach ensures that students receive comprehensive support across multiple facets of language acquisition, fostering a well-rounded development of reading skills.

In terms of the vocabulary acquisition of ELLs, technology-assisted reading instruction enhanced vocabulary acquisition by highlighting new or difficult words within the context of reading materials. Students clicked on these words to access definitions, synonyms, and usage examples, facilitating understanding and retention of vocabulary in context. These tools significantly improved learners' ability to comprehend and remember new words through features like digital flashcards, pronunciation guides, and repeated exposure to contextual examples. It is also supported by the study of Blachowicz *et al.* [13], who suggested that to develop vocabulary knowledge it takes a word-rich environment; active motivated engagement on the part of the learner; multiple exposures to and ways to access words both contextual and definitional information about words, and the development of independent words learning strategies. Overall, technology plays a crucial role in broadening knowledge and aiding in the acquisition of vocabulary skills by integrating interactive and supportive elements into reading interventions.

Technology-assisted reading interventions significantly enhanced reading fluency for English language learners by integrating audio examples and speech recognition technology. These features enabled learners to practice and improve their pronunciation, leading to more fluent speech. For instance, text-to-speech functionalities allowed them to hear correct pronunciation and pacing, aiding in their language proficiency

development. Moreover, technology supported fluency development across various languages by providing programs with repeated reading exercises, audio assistance, and immediate feedback. This integrated approach helped learners listen to native speakers, emulate correct pronunciation, and steadily improve their overall fluency skills. This was related to the result of the study by Chard *et al.* [14], according to them, the research widely supports repeated reading as a pedagogical strategy best suited for improving reading and fluency and seamless technology integration. Repeated reading reinforces the critical roles of visual memory, phonological memory, episodic memory, and semantic memory in the fluency process.

TARI stands as a powerful tool for enhancing reading comprehension, vocabulary acquisition, and fluency among English language learners. By creating personalized, engaging, and supportive learning environments through adaptive technology and interactive content, TARI empowers learners to navigate complex texts, improve language skills, and achieve academic success. As educational technologies continue to evolve, the integration of TARI promises to play a pivotal role in advancing literacy and language proficiency for ELLs, ensuring they are well-equipped for future academic and professional endeavors.

7.2. English language learners' perception of the effectiveness of technology-assisted reading instruction in enhancing their literacy skills

ELLs' perception of the effectiveness of technology-assisted reading instruction in enhancing their literacy skills is presented in **Table 2**.

Table 2. ELLs' perception of the effectiveness of technology-assisted reading instruction in enhancing their literacy skills

	Learners' perception
Participant 1	"Interactive and multimedia elements of technology-assisted reading make learning more enjoyable and engaging. The use of games, videos, and interactive stories helps maintain my interest and motivation to practice reading. And the ability to track their progress through technology. Seeing my improvements over time can be motivating and provide a sense of achievement. Some may still prefer traditional methods or face challenges such as access to technology or digital literacy skills."
Participant 2	"Like me, English language learners find technology-assisted reading instruction to be very beneficial. It enhances engagement and allows learners to progress at their own pace. These tools also offer valuable feedback to help me correct errors and expand my vocabulary. Additionally, the audio and visual aids that I am fond of provided by these tools allow for different learning preferences and help me better understand the material, contributing to the growth of my literacy skill."
Participant 3	"Technology is an instrument that helps an English language learner for the fast improvement of their literacy skills, with this it affects the technology becomes a big influence to every language learner to practice with."
Participant 4	"The effectiveness of technology-assisted reading instruction in enhancing the literacy skills of English language learners like me is greatly improved through the use of English movies and some English learning websites that can be used on devices such as computers, TVs, and gadgets. Some of these effectively have a big impact on someone, especially on learning websites."
Participant 5	"We appreciate the interactive and engaging nature of the tools, which provide instant feedback and personalized learning experiences. I often find that these technologies make learning more enjoyable and accessible, leading to improvements in reading comprehension, vocabulary acquisition, and overall confidence in their reading abilities."

Based on the data, it was revealed that technology-assisted reading interventions incorporated interactive and multimedia elements that enhanced learning engagement and enjoyment. Features like games, videos, and interactive stories maintain learners' interest and motivation to practice reading. Technology enables learners to

track their progress, which can be motivating and fosters a sense of achievement as improvements are visible over time. However, some learners may face challenges such as access to technology or digital literacy skills, despite the benefits. Challenges persist for some learners, such as access to technology or digital literacy skills. Despite these obstacles, the benefits of technology-assisted reading instruction remain clear. These tools offer valuable feedback that helps correct errors and expand vocabulary, catering to diverse learning preferences through audio and visual aids. This versatility not only supports comprehension but also contributes to the overall growth of literacy skills among ELLs.

For ELLs, technology-assisted reading instruction proved highly beneficial, enhancing engagement and allowing learners to advance at their own pace. TARI provided valuable feedback to correct errors and expand vocabulary, catering to different learning preferences through audio and visual aids. This contributed significantly to literacy skill development. Technology extends learning opportunities beyond traditional methods. Platforms like English learning websites and interactive English movies accessible on various devices broaden exposure to language in authentic contexts. These resources facilitate immersive learning experiences that reinforce language skills and cultural understanding, crucial for effective communication.

The effectiveness of technology in improving literacy skills for ELLs is evident in the accessibility of learning resources like English movies and language learning websites, which can be accessed on various devices such as computers, televisions, and gadgets. These interactive tools offered instant feedback and personalized learning experiences, making learning enjoyable and accessible for ELLs. Technology serves as a powerful catalyst in the educational journey of ELLs, enhancing literacy skills through interactive, multimedia-rich learning environments. By providing personalized feedback, tracking progress, and accommodating diverse learning styles, technology-assisted reading instruction empowers learners to achieve greater proficiency and confidence in English. Despite challenges, the positive impact of these tools on engagement, motivation, and language acquisition underscores their significance in modern education, ensuring equitable access to quality language learning experiences.

Overall, technology-assisted reading instruction contributed to improvements in reading comprehension, vocabulary acquisition, and overall confidence in reading skills among English language learners. The result of this study was related to the report by Hwang *et al.* [20], who employed a situational learning system supported by an online digital platform to provide authentic contextual writing environments and interactive peer feedback to improve students' English writing skills.

7.3. English language learners' experience with technology-assisted reading instruction in terms of engagement and motivation

ELLs' experience with technology-assisted reading instruction in terms of engagement and motivation is shown in **Table 3**.

Table 3. ELLs' experience with technology-assisted reading instruction in terms of engagement and motivation

	Learners' experience
Participant 1	"English language learners often experience technology-assisted reading instruction with high levels of engagement and motivation when technology-assisted reading instruction is well-designed and implemented, it can significantly enhance engagement and motivation for English language learners."
Participant 2	"Considering its benefits, research suggests that utilizing technology for reading instruction can keep English language learners both engaged and motivated whilst enhancing their language growth. As a student who also uses this approach, I believe that one major factor contributing to this is engagement due to features like audio and multimedia models, this also helps increase motivation because it makes reading easier and enjoyable, which motivates learners like me to practice on my own and interact with the material better."
Participant 3	"It is used quite often. It is important so studying will not be boring and it will motivate the students so they will study more while having fun. It is often used thrice a week so while the teacher is teaching, the students will listen and participate actively."
Participant 4	"English language learners can benefit greatly from technology-assisted reading instruction, which can improve engagement and motivation. This is especially helpful in schools where formal communication is necessary, including oral recitation and formal English responses. I have used this approach with my cousin and nephew, who are fluent in English, and it has enabled me to have more meaningful conversations with them."
Participant 5	"We frequently experience high levels of engagement and motivation with technology-assisted reading instruction. The interactive elements, instant feedback, and personalized learning paths keep them interested and motivated to improve their literacy skills."

Technology-assisted reading instruction has emerged as a powerful tool for enhancing engagement and motivation among ELLs. When well-designed and effectively implemented, this approach not only facilitates learning but also nurtures a positive attitude toward reading and language acquisition. Research supports the notion that integrating technology into reading instruction can significantly benefit ELLs by keeping them engaged and motivated while promoting language growth. Key features such as audio support and multimedia models play a crucial role in this process. A student who has experienced these benefits firsthand can attest to the impact of such tools. The interactive nature of these resources makes reading more accessible and enjoyable, thereby motivating learners to practice independently and interact more deeply with the material, this study is supported by Means *et al.* [34].

It can be gleaned from the data collected that technology-assisted reading instruction significantly enhanced engagement and motivation among ELLs when effectively designed and implemented. Features such as audio and multimedia models contributed to increased engagement by making reading more enjoyable and accessible. This engagement, in turn, boosted motivation among learners, encouraging independent practice and interaction with the material. Research underscored the benefits of technology in reading instruction for ELLs, emphasizing its role in maintaining engagement and motivation while enhancing language development. Regular use of technology, incorporating interactive elements, instant feedback, and personalized learning paths, helped sustain high levels of interest and motivation among learners, as supported by Pane *et al.* [35].

Technology-enabled learning supports formal communication skills necessary for oral recitation and formal English responses, crucial in academic and real-world contexts. Personal experiences highlight how such methods facilitate meaningful interactions with English-fluent individuals, thereby enhancing practical language skills and communication skills. The effectiveness of technology-assisted reading instruction is further underscored by its ability to provide interactive elements, instant feedback, and personalized learning paths. These features cater to individual learning styles and preferences, keeping learners interested and motivated to improve their literacy skills continually. By offering immediate feedback and adapting to individual progress, technology not only enhances engagement but also accelerates learning outcomes.

In educational settings, technology-assisted reading instruction supports formal communication skills, including oral recitation and formal English responses, which are crucial for language learners. This approach not only facilitates better engagement but also improves literacy skills, enabling learners to have more meaningful interactions in English. TARI stands as a cornerstone for fostering engagement, motivation, and language development among ELLs. Through its thoughtful design and implementation, educators can cultivate an environment where learning becomes dynamic, enjoyable, and effective. Overall, TARI proved instrumental in fostering engagement and motivation among English language learners, offering interactive and personalized learning experiences that effectively enhance their language growth and proficiency. These empirical studies have been supported by Have and Pederson [32], who added that e-books offer multimedia such as sounds, pictures, and videos, and thus grab children's attention and increase their motivation to read.

8. Conclusion

Based on the discussion above, the following conclusions were drawn:

(1) Technology-assisted reading instructions have significantly enhanced language skills, especially for ELLs. TARI offers personalized and engaging learning experiences that improve reading comprehension by adapting to individual abilities and providing instant feedback. They also enhance vocabulary acquisition by integrating new words with definitions, synonyms, and usage examples. Additionally, technology aids in improving reading fluency through audio examples and speech recognition, allowing learners to practice pronunciation and develop a more fluent speaking style with repeated exercises and real-time feedback.

(2) Technology-assisted reading instruction significantly enhanced learning engagement through interactive multimedia elements and enabled learners to track their progress, fostering motivation and a sense of achievement. Despite challenges like access to technology or digital literacy skills, TARI is highly beneficial for ELLs. They provide valuable feedback, expand vocabulary, and cater to diverse learning preferences with audio and visual aids, promoting overall literacy skill development. Accessible resources such as English movies and language learning websites on multiple devices further enhance personalized learning experiences, ultimately boosting reading comprehension and confidence in ELLs' abilities.

(3) Technology-assisted reading instruction significantly enhanced engagement and motivation among ELLs through audio and multimedia features, making reading more enjoyable and accessible. This engagement encourages independent practice and interaction with learning materials, supported by interactive elements, instant feedback, and personalized learning paths. Research confirms technology's benefits in maintaining engagement and enhancing language development for ELLs. In educational settings, this approach improves formal communication skills and overall literacy, facilitating meaningful interactions in English. Overall, technology-assisted reading instruction plays a crucial role in fostering engagement, motivation, and language proficiency among ELLs.

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