THE ROLE AND IMPACT OF TECHNOLOGY ON STUDENTS' READING

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ABSTRACT

Technology is gaining more and more place in our classrooms today, making its investigation more relevant than ever. Therefore, the author of this paper aimed to explore the role and impact of technology on students reading. To do so, the author has examined several aspects related to the use of technology for teaching and learning, including how technology can promote independent learning, communication, collaboration, assist students with learning needs, and certain limits of technology, before conducting research using interviews and observations with 86 participants (students, teachers, and parents). The research focused particularly on what role technologies such as text-to-speech apps, translators, electronic dictionaries, online reading apps and websites, etc., can play on students' reading, how they can impact students reading, and how they are perceived by students, teachers, and parents. At the end, the author provides some suggestions to consider for an effective use of these technologies.

INTRODUCTION

Practicing research is believed to have lots of benefits for educators. According to Hensen, practicing research encourages educators' reflective teaching and thinking, broadens their pedagogical repertoire, puts them in charge of their craft, reaffirms the connection between practice and students' achievement, fosters an openness to new ideas and learning new things, and gives them ownership of successful practices (as cited in Hine, 2013, p.153). Therefore, the author of this paper intends to conduct research on the use of technology, including audio, video, mobile apps, computer software, phones, computers, online websites, etc., in teaching practice, particularly on students' reading, in order to expand his knowledge and encourage readers to promote effective use of technology.

Purpose of the study

The purpose of this study is to examine the implications of technology on students' reading (English as a second language). Technology is gaining more and more ground in the educational field. Many specialists believe that technology has dramatically altered the way we learn and teach, leading us to question what constitutes "true" teaching and learning (Seifert & Sutton, 2009, p. 10). New technology such as the internet has changed the nature of literacy, leading to a new form of literacy that requires additional skills and strategies (Leu et al., 2014, p. 144). In addition to this, beyond providing a wider choice of materials that can be accessed easily, facilitating communication and collaboration, making teaching and learning more exciting, developing students' critical thinking, and helping them acquire new knowledge and skills, the internet has become a great source of information for both teachers and students, making its mastery more relevant than every learning tool. On the other hand, to complete a wide range of learning tasks, such as reading, writing, doing math, keeping track of attendance, simulating scientific experiments, simulating social situations, and providing access to learning for students with handicaps or learning disabilities, to name a few, knowing how to use tools such as computers, tables, and cellphones and their related apps effectively has become indispensable (Poole, 2009, p. 230). However, despite the potential of technology, we still have little information about how technology can enhance students' reading. Therefore, the author of this paper intends to investigate the role and impact of technology on students' reading and how it is perceived by Chinese School stakeholders.

Context

Registered in China's Hubei Province, the school in question is a Cram School (Yingyu peixun zhongxin in Chinese), a school that is specialized in teaching English to second language learners of all ages. It has over 700 students spread across six areas; nearly 30% of the students are preschoolers, 60% are primary school students, and the remainder are students from other categories. The staff is composed of sixty-seven members: forty-five teachers and twenty-two that are composed of principals, marketing agents, advisors, etc., and most of the classes are delivered during weekends, vacations, and after school. All these categories of members work in a synchronized way with parents in order to reach the objectives of the school, which are to develop students' English and make them good English speakers, and technology is considered a crucial factor for this and is gaining more and more place for the fulfillment of these objectives.

Statement of the Problem

As stated above, it is recognized by many specialists that technology can play a great role in the teaching and learning process. However, in addition to the fact that not all educators and students are well trained for its effectiveness or are aware of its potential, we don't know much about how it can impact second language readers or how its users perceive it at the schooling level.

Rational

At the school studied, before the COVID-19 epidemic, many teachers' use of technology for lesson delivery was limited to making PPTs and cutting audio and video to enhance reading and facilitate understanding. With the COVID-19 pandemic lockdown, many teachers and parents had to embrace technology for other purposes, especially to support their students in reading, making certain digital reading technologies more and more present in the teaching and learning process. However, the evidence to support the effectiveness of these digital reading instructional programs remains limited (Ordetx, 2020), and the increase of this digital reading technology in the teaching and learning process has never been evaluated yet at the studied school. Teachers, parents, and students have never been asked what they think about this increase in technology in their students reading. We don't know whether this increase is impacting students positively or negatively or whether it has an additional value for the students' reading, and we don't know how the present use of technology is employed by the different stakeholders. It is all these uncertainties that motivate this paper.

Prior Interventions

Many researches and studies show that technology can have a great impact in addressing reading comprehension and vocabulary skills. Five (Ertem, 2010; Fry & Grosky, 2007; Glenberg et al., 2011; Higgins & Raskind, 2005; Pearman, 2008) of the 10 papers examined by Streans provide evidence that technologically based approaches provide greater results than non-technologically based approaches, and four (Korat & Shamir, 2007; Twyman & Tindal, 2006; De Jong and Bus, 2004; Mostow et al., 2003) show that technology-based approaches are just as successful as non-technology-based approaches (Stearns, 2012, p. 23). On the other hand, exposing students to technology earlier is believed to help them gain the skills needed to thrive in a digital society and meet the requirements of the 21st century (Ortetx, 2020). Thus, conscious of the role and impact of technology in the teaching and learning process and in the future of the students, after the first lockdown and after realizing

that many teachers and parents lacked the competence and tools to help their students read, the school bought a text-to-speech APP, provided training on its use to both teachers and parents, and encouraged them to do the same with their students. Teachers were trained on how to upload content, assign homework, and track students, whereas parents and students were trained on how to access the contents and fulfill reading tasks. And in addition to the text-to-speech app, the school has suggested other reading tools and provided training on them.

Research Questions

Thus, to conduct such as a research, the author will focus on the following questions:

1. What is the possible role of technology in students' reading processes?
2. What is the impact of technology on students' reading?
3. How do stakeholders of the school perceive the role of technology in reading in general and during the COVID-19 lockdown?

Significance of the Study

The purpose of this research is not to teach educators how to implement technology in their schools; instead, it is to investigate how technology can facilitate the teaching and learning process, increase students' learning outcomes, help educators meet the needs of all learners despite their barriers or handicaps, and why it is necessary to promote its use. The author believes that testing the effectiveness of technology on student reading and investigating how it is used by the selected school teachers and parents to support their students' reading during and after the COVID-19 pandemic and how teachers, parents, and students perceive it in the teaching and learning process will illuminate its role and impact on students' reading and encourage readers (educators) to promote effective use of technology at their schools. Also, the author believes that conducting such research will be a kind of self-reflection on the use of technology that will expand his own knowledge in this field.

LITERATURE REVIEW

Technology has always been considered an integral part of the educational field. Technology such as printers, magnifying glasses, magic lanterns, etc. has been used to increase students' learning outcomes before the radio, overhead projectors, tapes (video and audio), photocopiers, calculators, etc. (Purdue Online University, n.d.). Nowadays, we live in the era of the internet and digital technology, which are dramatically changing our lives, gaining ground in our educational sector, and changing the way we learn and teach, prompting us to question what constitutes "true" teaching and learning (Seifert & Sutton, 2009, p. 10). New technology such as the internet has changed the nature of literacy, leading to a new form of literacy that requires additional skills and strategies (Leu et al., 2014, p. 144). In addition to the internet, computers, tables, cellphones, smartboards, etc., and their related applications have brought opportunities for both students and teachers and have become indispensable for effective teaching and learning as defined by educational theorists. However, despite the numerous advantages of technology, it also has some limitations related to training, health, implementation, etc. Therefore, in this literature review, the author will explore some of the roles and impacts of technology in the teaching and learning process, as well as some of its limitations.

The role of technology in the teaching and learning process

Earlier educational theorists viewed technology as an effective means to increase students' learning outcomes. In 1965, when technology was not as famous and advanced as it is today, the American psychologist Jerome Bruner already imagined the use of technology such as documentaries for modeling and film loops for use with technicolor cartridge projectors to increase students' understanding (Bruner, 1965). However, technology has evolved a lot and is widely used for various tasks today, including promoting independent learning, assisting students with learning needs, promoting communication and collaboration, etc., to name a few.

Technology to promote independent learning or self-directed learning

We can define independent learning as the ability for an individual to take control of his own learning. In other words, it is "the process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing learning strategies, and evaluating learning outcomes" (Knowles, 1970, as cited in Dawson et al., 2012, p. 1). Thus, many educators may agree that providing students with means that permit them to become autonomous in their learning is a good start to engaging them in independent learning, and technology is believed by many specialists to support all kinds of learning and teaching, including independent and lifelong learning.

Indeed, technology such as the internet and computers have provided learners at all levels with access to more information and sources that allow them to improve their independence and lifelong learning both in and out of the classroom (Jaleel & Anuroofa, 2017, p. 1849). Beyond offering a wider choice of materials that can be easily accessed and helping improve learners' communication skills and performance in school and workplace settings, technology can also encourage students to be more active, creative, innovative, and independent (Rufaidah et al., 2021, p. 2). When students know how to use it effectively, they will be more creative and innovative, whereas when they develop an enthusiasm for using technology, they will tend to seek information beyond the teacher that allows them to be more active and motivated and thus more independent and stay up-to-date with new technological advancements (Rufaidah et al., 2021, p.2). Technology can thus play a great role in students' learning outcomes. The results of the Rufaidah et al. (2021) study and the analysis of five (Ertem, 2010; Fry & Grosky, 2007; Glenberg et al., 2011; Higgins & Raskind, 2005; Pearman, 2008) studies realized by Stearns (2012) show that in a technology-based learning environment, students become more independent and score better than in a non-technology-based learning environment.

Technology to assisting students with learning needs

Education is a fundamental human right and a critical pillar in an individual's development. Ensuring that everyone has access to education and that all students have access to learning materials has then become a duty as well as a challenge for states and educators. Thus, to improve students' access to learning materials and learning outcomes, regardless of their learning barriers or handicaps, as technology advances, various methods and instruments, including the use of "assistive technology," are used by concerned parties.

Defined by Adebisi et al. (2015) as "any device that helps a learner with a disability complete an everyday task" (p. 15), assistive technologies help not only to reduce gaps, handicaps, or barriers to learning for an individual learner but also facilitate the learners'

access to the content with considerable ease and efficiency, which otherwise might not have been possible (Fouzia, 2015, p. 64). The assistive technologies can help to enhance the independence of students with learning or physical handicaps who used to rely on others to complete their tasks, and they are integral components of certain inclusive teaching and learning strategies, such as differentiated instruction (DI), universal design for learning (UDL), etc., and both parents and teachers can use them to assist learners who need support.

Assistive technologies do not assist only students with learning disabilities. Devices such as text-to-speech or speech-to-text apps, word processors, digital dictionaries or translators, audio and digital text formats of instructional materials, programs that differentiate instruction, adaptive testing, etc., computers, and network systems all enable students of all categories, including language learners, students with diverse learning styles, students in rural communities, or students from economically disadvantaged families, to access the learning material, accommodate their needs, or increase their learning opportunities (Reimaging the role of technology in education: 2017 National Education Technology Plan Update, 2017, p. 5).

Technology to promote communication and collaboration

Communication in education can be defined as the exchange of information between students and teachers, between teachers and students, or between teachers or students and another person or organization, whereas collaboration is an interpersonal negotiation process of many individuals focusing on addressing a specific learning problem (Ballantyne & Olm-Madden, 2013; Dillenbourg, 1999, as cited in Mattews & Johnson, 2017, p. 436). Earlier social constructivists saw learning as an active, collaborative assimilation and accommodation of new information via interactions with a knowledge community (GSI teaching and resource center, 2016, p. 2). However, as ICTs advance, collaborations and interactions are shifting from the physical space (the classroom) to the virtual space (the internet).

Indeed, nowadays, many schools are using social media, online collaborative platforms, virtual classrooms, or their own apps to facilitate the communication and collaboration of their students and teachers. Thus, instruments including Google Docs, Evernote, Microsoft Team, Slack, Trello, Canva, Wechat, etc. are widely used to facilitate the collaboration between school stakeholders. These instruments allow them to work alone at different times, work together simultaneously on their projects according to their pace, and allow teachers to assist their students from a distance. Other instruments, such as social media, e-mail, SMS, MMS, etc., are not left behind; they have played their role in the teaching and learning process too by facilitating communication between school members.

The limits of technology in the teaching and learning process

There is no doubt that technology can play a great role in the teaching and learning process. It can increase students' learning outcomes, help teachers meet the needs of all their learners regardless of the barriers to learning, make teaching and learning fun, allow students to improve themselves, and stay up to date with new technological advancements. However, despite all these advantages, some research has shown that technology can also present some drawbacks related to health and its effective implementation.

Health problems related to the over use of technology

Indeed, some research has shown that inappropriate or excessive use of technology can

lead to health issues. According to the OECD (2020), excessive screen time "negatively affects children's physical health, influencing hours of sleep, engagement with physical activity, and obesity". Studies related to the use of technology have been conducted through research and have identified other additional issues due to its overuse, including spinal damage, vision problems, attention problems, violent behavior, a decrease in academic performance, anti-social behaviors, deterioration of social relations, dehumanization of the educational environment, and isolation of the individuals from physical experience (Yücelyiit & Aral, 2020; Alhumaid, 2019). In addition to this, due to pressure to incorporate the technologies into their everyday teaching practices or a dearth of teacher training and education in educational technology, it is believed that the usage of educational technologies increases some teachers' anxiety, stress, and symptoms of weariness or depression (Fernández-Batanero et al., 2021).

Issues related to technology effective implementation

Most of the issues of technology implementation are generally related to access, training, and support (Johnson et al., 2016, p. 4). Access refers to the availability of the technology in question. Most technologies used in education are not free, and their price has increased over time. According to a report completed by Keltner and Ross in 1996, a student could spend $142-490 per year on term technology in the United States, and this price is not expected to decrease because a 2020 market analysis estimated the global education technology market at $78.6 billion and predicted the cost to rise to $195.7 billion in 2026 (Nagel, 2021). This increase in cost can be problematic for states or schools with low financial resources, hampering their ability to provide their students with adequate technology. On the other hand, most of the today's learning applications demand a charge for updating or full access, which is another additional cost and another roadblock for technology implementation.

Training refers to the capacity of the individuals (teachers, students, and/or parents) to use the technology effectively, and since technology is in a constant state of mutation, it has become more crucial than ever for its users to stay updated. Thus, technology users need continued training to be able to use it fully, requiring more time and financial resources that not everyone possesses. On the other hand, the complexity of new literacies has also exposed students to a new kind of learning, one that necessitates a profound comprehension as well as the ability to handle ambiguity, weigh multiple points of view, and comprehend the material (Leu et al., 2014, p. 346). This, combined with the fact that the new literacies of the Internet today are becoming increasingly reliant on the ability to critically analyze information, as opposed to the past, when teachers could instruct children to look up material in an encyclopedia and rely on that information as accurate and true (OECD, 2021, p. 3), necessitates special training for both teachers and students in order for them to be considered literate and ready for the new demands of the twenty-first century.

The support refers to the accessibility of adequate technical and administrative (or peer) support (Johnson et al., 2016, p. 9). In a study conducted by Lee and Vega in 2005 on 154 special education teachers, 87.7% of the participants agreed that they needed additional support with assistive technology (Woodbury, 2015, p. 8). Thus, for an effective technology implementation, both educators, parents, and students need support. They require additional training from subject matter experts as well as access to high-quality materials, which certainly will require additional financial resources that not every school, state, or parent can

provide.

Summary

To summarize, technology has the potential to strengthen and improve relationships between teachers and students, reimagine how we collaborate and learn, close long-standing equity and accessibility gaps, and adapt learning experiences to accommodate the needs of all students. However, in order to use technology effectively, it is preferable for one to be aware of its limits. It is only by knowing its limits that we will be able to implement it effectively and serve our interests and goals.

METHODOLOGY

Purpose of the study

The purpose of this research is to investigate the role and impact of technology in students' reading and how it is perceived by the studied school stakeholders in order to determine whether it is worth encouraging its implementation and which aspects should be emphasized.

Applied Research Questions

The question that the author intend to use for the investigation are the following:

1. What is the possible role of technology in students' reading processes?
2. What is the impact of technology on students' reading?
3. How do stakeholders of the school perceive the role of technology in reading in general and during the COVID-19 lockdown?

Study Population

The study took place in two of the branches of the of the school and focused on three groups, including teachers, students, and parents. The two branches total twenty-six English teachers (twenty-two Chinese and four foreigners), fifteen management and marketing agents, and nearly two hundred Chinese students from kindergarten to grade six. The data was collected from (n = 86) students, teachers, and parents through interviews and observations. Among the 86 participants, thirty-eight were students in grades 5 and 6, aged between ten and twelve, among whom there are twenty-one boys and seventeen girls. All the students were not at the same level of reading. Almost 35 percent of the grade 5 students and 52 percent of the grade 6 students were considered to be at the right level of reading, meaning they could read complex texts with a minimum of assistance, whereas the others were at the low level, meaning they needed more assistance with complex texts. Seventeen teachers (including four foreigners and thirteen Chinese) and 31 parents of different grades have participated in the research.

Population Justification

The reason for these groups is that the author believes that to understand the role and impact of technology in students' reading, it is crucial to understand how each of these groups interacts with and perceives it. Thus, investigating how technology is present in the school teachers' practices and how it is used to support their students' reading would help to understand its usefulness. Understanding how students interact with technology and what the advantages and disadvantages of their use of it are would help to evaluate its effectiveness.

On the other hand, parents are an integral part of the teaching and learning process. They participate actively in their children's learning. Therefore, understanding their experience and perception of technology in their children's learning might certainly help to understand the scope of technology in education and its effectiveness as well. The number of participants was not intentional; only these people were interested in participating in the research.

Intervention

To conduct the research effectively, teachers, students, and parents were all briefed on the purpose and process of the study. An informed consent letter (Appendix A) was written to introduce the project and explain in detail to teachers and parents what the research was about and what they needed to do. The author had defined the type of technology that was going to be studied, and in this case, the author refers to "technology" as any tool that can assist students in reading, including audio, video, mobile apps, computer software, phones, computers, online websites, etc. Among the seventeen teachers, four teachers called "testing teachers" were selected to conduct non-technology and technology-based reading approach experiments in the two fifth grade classes (called 5A and 5B) and the two sixth grade classes (called 6A and 6B) and provide them with the same teaching strategies, tools, and plan (Appendices B and C). The students were informed that they are going through two reading experiments (non-technology and technology-based reading approaches), and the expectations of each experiment were provided according to the experiment and timetable.

Intervention Plan

With the help of a Chinese colleague, the research was conducted in three weeks according to the following plan:

- During week one, we identified the parents and teachers that we intend to interview, as well as the four "testing teachers." We have written the text that introduces the project, explains in detail to teachers and parents what the research will be about and what they need to do, and defines the type of technology we intend to study. We have identified the four texts that we will use for the reading experiments. We have briefed the "testing teachers" about the strategies, tools, and time they need to employ during experiments.
- During week two, we conducted interviews with some teachers and parents and, at the same time, conducted the non-technology-based reading observation experiences. We introduced the four texts (one for each grade level) for the non-technology-based reading approach to the "testing teachers" and discussed the strategies they will employ. In terms of texts, we have designed "The Boy Who Cried "Wolf!" and "The Cap Seller and the Monkeys" from EnglishLinx for grade 5 and "Amazing Adventurers (Level 1)" and "Mystery Train (Level 1)" from LearnEnglish Teens British Council for grade 6; and for the reading strategy, we have suggested the "Concept Definition Map"—a graphic organizer that can aid students in comprehending the fundamental features, characteristics, and aspects of an idea or word's meaning (Urquhuart & Frazee, 2012, p.93). In terms of text implementation, we assigned to each class a different text for each observation experiment. During all the non-technology-based reading observation experiments, the students were not allowed to use technology and could only rely on their teachers if they needed help. During the experiment, the researcher(s) joined the experiments to observe and take notes. All the experiments did not take place at the same time. The first one took place on Monday evening, the second on Thursday evening, the

third on Saturday morning, and the fourth on Saturday afternoon.

- During week three, we continued the interviews with teachers and parents, and the "testing teachers" conducted the technology-based reading observation experiences with the same process, reading strategy (the Concept Definition Map), and texts as the previous week. However, each text had changed its audience. The one used by the 5A class was used by the 5B class, and the one used by the 5B class was used by the 5A class, and similarly with the two 6th grade classes. The students were provided with tables with internet connections or were allowed to use their phone watches, and the texts were accessible in both print and from the school APP text-to-speech section. In this experience, the students could use the text-to-speech and translator apps on their devices to assist themselves, and the teachers were observers and allowed to only bring technical assistance to those in need.

Sources of Data

We have collected the data from two sources: teacher, parent, and student interviews and student observations. We had considered that these two approaches would help us gather the necessary information we needed for the research. As it is said, an interview is a qualitative research approach that offers the researcher the possibility to gather data through questions, and those questions can be structured when they are predetermined and answered in predetermined ways; unstructured when the questions and answers are free-flowing; or semi-structured when the interview falls somewhere in the middle (Tegan, 2022a). While an observational research method is an approach that consists of observing a phenomenon or participants in their settings (natural or simulated) and recording what has been observed, it can be naturalistic when it takes place directly in the environment where the phenomenon occurs, participatory when the observer (researcher) participates in the activity, structured when it is conducted in a specially built environment, and so on (Tegan, 2022b). That is why, in the present research, we have used the semi-structured interview approach and the participant observation approach.

Instrumentation

As mentioned above, the interviews were conducted under a semi-structured approach, meaning some of the questions were predetermined (for more information on the types of questions asked to the participants, see Appendix D). We have considered that this approach would help us to conduct our research effectively and understand the role, impact, and how teachers and parents perceive technology in their students' reading since with it we can focus our question on the content specified by the research objectives of systematic description, prediction, or explanation (Cannell and Kahn, 1968, as cited in Guerrero, 2012, p. 20). In addition to this, the semi-structured interview allowed us to reformulate the questions to help the interviewee understand, which was crucial for enhancing our understanding. On the other hand, participant observation was also determinant in the data collection, since it could allow us to collect first-hand data on both how the students learn through non-technology and technology-based approaches to reading, which we could compare directly and evaluate the impact, role, and effectiveness of technology on students' reading.

Research Procedure

Soliciting School

Any responsible and respected school leader or parent will refuse to allow research on

their students unless they are made aware of the research's uphold and takes. Thus, in order to conduct the research, we were obligated to seek permission from the school and parents and solicit help from both parents and teachers. And at the school level, we discussed with the principal the goal, process, and schedule of the experiences, materials, and population that we intend to involve in the research and requested approval. There was no opposition from the principal. According to her, as long as we do not indicate students' personal information, do not conduct any psychological or physical experiments, do not modify the school's schedule, and, most importantly, inform the involved students' parents about it and that they agree, there is no problem.

Soliciting Participants

A crucial first step in doing such research is to find participants. This can be done in a variety of ways, such as by informing potential participants about the study in advance of their enrollment to gauge their interest in and willingness to participate as research subjects (Iowa State University Institutional Review Board, 2016). In this way, all the information about the research should be as transparent as possible to allow the participants to make thoughtful decisions. Thus, to solicit participants (teachers and parents) in this study, we wrote a informed consent letter (Appendix A) in which we presented the research, the research questions, the purpose of the research, the process, and the time (5 to 10 minutes) that an interview will take. We had translated the statements into Chinese and shared both of the two versions (English and Chinese) with concerned groups. For the teachers, we posted the informed consent letter into the school teachers' WeChat group and asked anyone who is interested to confirm, whereas for the parents, we shared the consent letter with them individually. Regarding the "testing teachers" and the parents of the students who have participated in the experiences of observation, we provided them with the same informed consent letter and added on the process of the observation, the learning materials, the strategies that we will use, and the schedule of the observation. For the students, we focused the research on four of the classes (grades 5A and B and grades 6A and B) that we have and included only those students whose parents gave their approval.

Informed Consent

One of the cornerstones of research ethics is informed consent, which aims to ensure that human volunteers can attend studies freely (voluntarily), are fully informed about what it means to participate, and give consent before doing so (Oxford University, 2021). Thus, to get consent from the participants, we had to proceed as follows: For the interviewed teachers and parents, after having sent the informed consent letter, we followed with the following sentence: "I, (your full name), (the father or mother of the student's full name: for parents), have read and understand the file explaining the purpose of the research and my rights and responsibilities as a participant teacher or parent, and this text designates my consent to participate in the research, according to the terms and conditions listed in the file." The same approach was used with parents of the participant students, with the sentence, "I, (parent's full name), father or mother of (student's full name), have read and understand the file explaining the process of the reading experience and my rights and responsibilities as a parent. This text designates my consent for (student's full name) to participate in the reading experience and interview, according to the terms and conditions listed in the file." Since most of the contacts were done at a distance through WeChat, the agreed interlocutors were asked

to copy the sentence and resend it as approval, and for the others, only the fact that they wrote their names on the list of interviews was considered approval.

Data Collection Procedures

The data collection process is also an important component of research because it not only allows for the preservation of the research's integrity but also helps readers understand where the information comes from and how it is obtained, as well as serves as a guide for anyone who wishes to replicate the research. Thus, in this research, we used interview and observation approaches to collect data from the participants over the course of three weeks. Each week, we interviewed twenty to thirty participants (teachers and parents). However, there was no fixed schedule for the interviews. The interviews were conducted both online (through WeChat) and face-to-face according to the availability of the participants. The participants were interviewed separately to avoid influencing their responses. To minimize stress and avoid misunderstandings, those who did not speak English well were interviewed by a Chinese colleague in Chinese. We replaced the participants' names with numbers and letters to guarantee their anonymity and recorded each of them on a separate page to avoid confusion. Regarding the observations, during the first week we had conducted the non-technology-based reading approach through all four classes. The first observation took place on Monday from 6:50 p.m. to 8:20 p.m. with the 5A class, the second on Thursday from 6:50 p.m. to 8:20 p.m. with the 6A class, and the third and fourth on Saturday morning from 8:00 a.m. to 9:30 a.m. with the 5B class and from 2:30 p.m. to 4:00 p.m. with the 6B class. The observer (researcher) joined each of these classes to observe and collect as much information as possible. The same schedule and process of observation and information collection were used on the second week with the technology-based reading approach, but this time we added on interviews with the students to collect their opinion about the two reading approaches and their perception of technology.

Ethical Considerations

Ethics can be defined as standards of behavior that discriminate between acceptable and undesirable action as well as a process, strategy, or viewpoint for choosing how to act and delving into complex issues and problems (David & Resnik, 2020). In research, ethical practices not only assist the discipline's researchers in coordinating their actions or activities and establishing the public's trust in the discipline, but they also serve the aims or goals of the research by promoting knowledge, truth, and the avoidance of error and applying a truthful code of conduct to the researchers who conduct the research that makes research credible and legal in front of the regulations. In addition to this, ethical research practices enhance certain important moral and social values, such as social responsibility, animal welfare, human rights, compliance with the law, and public health and safety (David & Resnik, 2020), which are crucial in avoiding harm.

Considerations During Intervention

Most of the literature reviewed during the research supports the idea that technology can play a great role in students' learning. For example, both Jaleel and Anuroofa (2017) and Rufaidah et al. (2021) claim that technology can increase students' learning outcomes by encouraging them to be more active, creative, innovative, and independent. Moreover, the Rufaidah et al. (2021) and Stearns (2012) studies claim that students become more independent and score better in a technology-based learning environment than in a

non-technology-based learning environment. As a result, we had considered that implementing both a technology-based and a non-technology-based reading approach would help us assess the impact of technology-based reading. In addition to this, the Reimaging the Role of Technology in Education: 2017 National Education Technology Plan Update (2017) claims that technology such as speech-to-text or text-to-speech apps, digital dictionaries or translators, word processors, audio and digital text formats of instructional materials, adaptive testing, programs that differentiate instruction, etc., network systems, and computers all support students of all categories, including language learners, to access the learning material, accommodate their needs, or increase their learning capacities. That is the reason that led us to believe that by implementing some of these technologies during a technology-based reading process, we would be able to observe how they influence the students' reading and thus determine their impact.

Indeed, most of the reviewed literature discussed the positive side of technology, while on the other hand, many others exposed the drawbacks of technology. For example, both Alhumaid (2019), the OECD (2020), Yücelyiit and Aral (2020), and Fernández-Batanero et al. (2021) examine several problems related to inappropriate use of technology by students and pressure on teachers to incorporate it, whereas Leu et al. (2014), Johnson et al. (2016), and the OECD (2021) reveal some challenges linked to its effective implementation in the teaching and learning process. Therefore, we assumed that by interviewing teachers and parents, we would be able to not only understand how they perceive the role of technology in their students' reading and how it impacts their interactions with their students, but also the risks that technology may present for the students beyond the benefits.

Considerations During Data Collection

One of the most important and challenging tasks for a researcher is ensuring that the risk of harm or the potential for an action or event to cause harm to the participants, whether they are humans or animals, is minimal. According to Federal regulations at 45 CFR 46.102 item (j), the risk of harm is considered minimal when "the probability and magnitude of harm or discomfort anticipated in the research are not greater in and of themselves than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests" (as cited in Research Risk Defined, 2021).

In the present case, we had worked with three groups of participants (teachers, parents, and students) and considered the risk of harm to be minimal for the participant teachers and students, since with the teachers, we had conducted interviews with them with questions focusing mostly on their daily life practices in their field, and as professionals, we had assumed that there were not conditions that could put them at risk of harm. To reduce risks for the students, the observations were conducted in the same environment, with the same teachers, learning materials, classroom, and time as before. The only potential risk that we had identified was the fact that in both of the two (non-technology-based and technology-based reading) observation experiments, students might face situations that they have never faced before. Therefore, in order to minimize harm such as stress, confusion, nervousness, etc., we encouraged the teachers to actively assist them all by respecting the aim and conditions of the research. However, we had some concerns with the parents. Chinese people are usually stressed or nervous when exchanging with foreigners, especially in a foreign language. That is why we allowed a Chinese collaborator to conduct the interview

with the parents in order to limit the risk of stress and nervousness.

Considerations of Researcher Bias

There are many factors that influence the credibility of research, including bias. In research, bias can be defined as "any trend or deviation from the truth in data collection, data analysis, interpretation, and publication that can lead to false conclusions" (Simundić, 2013, p. 12). It can happen at any point in the research process, including study design, data collection, data analysis, and publication (Pannucci & Wilkins, 2010, p. 1), and it can happen intentionally (as in immoral practice) or unintentionally. Thus, in the present research, we have used two types of data collection (semi-structured interview and participant observation) and tried our best to conduct them without bias.

To do so, for the interviews, we wrote the questions both in English and Chinese, used simple language, provided examples in necessary situations, focused the questions on the problem that we wanted to investigate, used the same set of questions for each group, allowed the interviewee to provide interpretation when they needed it, provided the necessary time to answer, avoided any leading questions, and constantly took notes. To avoid bias in participant observation, we provided the same training to the "testing teachers" (the teachers who delivered the classes during the observation activity), the same teaching plan and learning material, and asked them to deliver the classes in the same setting, so that all students could receive the same treatment, and had the observer (researcher) in the classroom to record all information and processes.

Summary

In this research study, we have investigated the role and impact of technology in students' reading and how it was perceived by the school stakeholders. To do so, we worked with three groups (teachers, parents, and students) of participants, used qualitative (semi-structured interviews and participant observations) data collection approaches, and completed all the processes of the data collection in three weeks. To respect the ethical requirements of research, we ensured the obtainment of the consent of all concerned participants (adults and parents of minors) and made sure that the data collection process was safe for the participants and did not present any bias.

DATA ANALYSIS AND RESULTS

Data analysis and results are the most crucial parts of any research. In this section, we will analyze and summarize the collected data and interpret it using analytic and logical reasoning to determine patterns, trends, and relationships. In the analysis part, we will describe the process that we used to analyze the data, and in the result part, we will present the results in the form of tables and narrative.

Data Analysis Procedure

The research was conducted with three groups of participants (teachers, parents, and students), focused on three aspects (role, impact, and teachers', parents', and students' perceptions of technology in students' reading), and used two data collection approaches (interview and observation). In order to conduct a data analysis in such a condition, we had to sort the data according to the categories of the data and the objective of the research (research

questions). For example: We used the observations' notes and the students' test results to analyze the impact of technology on the reading process. We used the data collected from the interviews to analyze how the participants perceive the impact of technology on students' reading. We used both the observations and the students' tests and interviews to analyze the role of technology in the reading process.

In both of the three research questions, we use content analysis to set conclusions. Content analysis is a research approach that examines and quantifies the presence of certain words, subjects, and concepts in text, videos, images, or audio messages. The approach helps to turn qualitative data into quantitative data, which allows the researcher to draw reliable conclusions about what participants think about a question or how they perform in an experience (Qualitative data analysis methods, n.d.). Thus, to analyze the data in order to determine the impact of technology with this approach, we read the notes and went through the students' test results many times, trying to detect similarities and draw conclusions. We used the same methods to investigate the role of technology and participants' perceptions of it on students' reading.

Validity and Reliability

Ensuring validity and reliability in research is crucial, not just for the data collection but also for producing the results. In data analysis and results, validity is the accuracy with which a method measures what it is supposed to assess and produces data that truly represents "reality," whereas reliability relates to the consistency of the research findings (O'Connor & Gibson, 2003, p. 72). According to Mohajan (2017), "establishing reliability and validity in research is essential to ensure that data are sound and replicable and the results are accurate" (p. 2). Therefore, in the present case, to ensure valid and reliable results, we started by creating a strong research design by assessing both of the two interventions, choosing appropriate methods (interview and observation), selecting appropriate samples ($n > 13$ for each group of participants), and conducting the research carefully and consistently. We translated the questions into Chinese and had a Chinese colleague conduct the interviews in order to minimize bias and increase the accuracy of the results. During the data analysis, each observation note and participant response is read many times, analyzed, and interpreted by two researchers, and their conclusions are compared. If they match, they are considered valid; otherwise, there will be a discussion to see what makes the difference.

Results

As mentioned above, we used the content analysis approach to analyze the collected data; therefore, we will describe the findings below using tables, narrations, and comparisons. We will design the tables based on the groups of participants and the objectives researched.

Presentation of the findings

Reading Experiments Observation		
	Non-Technology-Based Reading Approach	**Technology-Based Reading Approach**
Grade 5A **(7 students)**	**Text: The Boy Who Cried "Wolf!"** During the non-technology-based reading approach, the students of this class were very active and seemed to be familiar with the teaching approach	**Text: The Cap Seller and the Monkeys** During the technology-based reading approach experiment, we noticed that the students were less familiar with the

	and learning activities. Few students showed weakness in word pronunciation and meaning and difficulty reading certain complex words that required the intervention of the teacher or peers. At the end of the class (before the test), five of the seven students could read the text without any assistance from the teacher or peers, and the other two needed significant help.	teaching approach but were still very engaged through all the learning activities. We had noticed more participation and collaboration between students in the technology-based reading approach. We had noticed a competition between who knew how to do what and who could do it first. Students were professionals at using Baidu, their electronic dictionary, and the Sinkey text-to-speech app for word translation and practicing the pronunciation. At the end of the class (before the test), four of the seven students could read the text without any assistance from the text-to-speech app or their peers; one needed minor help, and the other two needed more help.
Grade 5B **(10 students)**	**Text: The Cap Seller and the Monkeys** The same phenomenon as in Grade 5A was observed in this class, and at the end of the class (before the test), seven of the 10 students could read the text without any assistance from the teacher or peers, two with minor help, and one with significant help.	**Text: The Boy Who Cried "Wolf!"** Almost the same phenomenon as in Grade 5A was observed in this class, but some students demonstrated some weakness in their use of Baidu, electronic dictionary, and the text-to-speech app, necessitating teacher assistance. At the end of the class (before the test), five of the 10 students could read the text without any assistance from the text-to-speech app or peers, three with minor help, and two with significant help.
Grade 6A **(12 students)**	**Text: Mystery Train (Level 1)** The same phenomenon as in the previous grades (5A and 5B) was observed regarding students' engagement and familiarity with the teaching approach and learning activities. However, more students faced more challenges in different aspects, including reading complex words and understanding their pronunciation and meaning. At the end of the class (before the test), only	**Text: Amazing Adventurers (Level 1)** During the technology-based reading, the students in this class were less engaged than those in the previous classes. Their collaboration and participation were limited, as were their abilities to use their devices and apps fully, leading to constant intervention from the teacher. At the end of the class (before the test), among the 12 students, five could read

	six of the 12 students could read the text fluently without help from the teacher or peers, two with minor help, and four with significant help.	the text fluently without help from the text-to-speech app or their peers; three required minor help; and four needed great help.
Grade 6B **(9 students)**	**Text: Amazing Adventurers (Level 1)** The students in this class were more engaged than in the previous classes. They showed less weakness in all the aspects of reading, and at the end of the class (before the test), they all could read the text without assistance except one, who needed guidance from the teacher.	**Text: Mystery Train (Level 1)** Beyond their engagement, the students in this class showed more professionalism in their collaboration and participation, as well as in the use of their devices and apps, than all the other three classes combined. The teacher of this class has provided less assistance than the others, and at the end of the class (before the test), only one student needed assistance with the text reading.
Comprehension Test Results		
	Non-Technology-Based Reading Approach	**Technology-Based Reading Approach**
Grade 5A	During the non-technology-based reading approach, among the seven students who participated in the reading experiment, four of them scored 4/4, two scored 3/4, and one scored 2/4 on the test.	During the technology-based reading approach, among the seven students who participated in the reading experiment in this class, four of them scored 5/5, one scored 4/5, and two scored 3/5 on the test.
Grade 5B	Among the 10 students who participated in this reading experiment in this class, six of them scored 5/5, two scored 4/5, and two scored 3/5.	Among the 10 students who participated in this reading experiment in this class, five of them scored 4/4, three scored 3/4, and two scored 2/4.
Grade 6A	Among the 12 students who participated in this reading experiment in this class, seven of them scored above 12/16, three scored above 8/16, and two scored below 8/16.	Among the 12 students who participated in this reading experiment in this class, six of them scored above 15/20, four scored above 10/20, and two scored below 10/20.
Grade 6B	Among the nine students who participated in this reading experiment in this class, seven of them scored above 15/20 and two scored above 10/20.	Among the nine students who participated in this reading experiment in this class, seven of them scored above 12/16 and the two others scored above 8/16.

Students' Interviews	
Questions	**Responses**
What is your favorite technological device for	Tablet, computer, cellphone, and electronic dictionary are the four devices mentioned for reading.

reading?	
Why do you like this device best?	Most of the students say that they use these devices because they are easy to use; the others claim that it is because they have access to only one of these devices.
What type of apps do you use on your device for reading English?	Meiri yingyu yuedu, iBook, the Sinkey English text-to-speech app, and Baidu Translator are the apps identified by the students for reading English.
Why?	Most of the students claim that it's because some of the apps were suggested by their teachers and parents.
How often do you use them?	Many students claim that they only use their reading apps when they have reading assignments, while others claim that they use them after school and on weekends, with and without reading assignments.
How do your apps and technology devices help you in your reading?	All the students claim that their apps and devices help them practice reading with their read-aloud option and understand the text by translating.
Which one do you like best: an electronic or paper book?	25 of the 38 students vote for the electronic book, and the rest of the 13 vote for the paper book.
Why?	Fans of electronic books emphasize the ease with which their apps help them read and understand electronic books, whereas fans of paper books emphasize health (eye) issues and the ability that books offer them to take notes directly on them.
Which one did you like best: the non-technology or technology-based reading approach?	22 of the 38 students vote for the technology-based reading approach, and the rest of the 16 vote for the non-technology-based reading approach.
Why?	In addition to loving their devices, most of the pro-technology-based reading students point out the advantages that technology (text-to-speech apps and translators) gives them in reading and understanding texts. Some of them argue that during the technology-based reading approach with their apps, they could repeat the same tasks many times, whereas with the teacher, they couldn't ask the same questions many times during the non-technology-based reading approach. For the pro-non-technology-based reading students, beside those who mentioned their eyes' problems, some claim that during the non-technology-based reading, the teacher explained the text, detailed the difficult words, and used many examples, whereas they could not do this during the technology-based reading approach.
Teachers' Interviews	
Questions	**Responses**

What is your opinion of the use of technology for schooling?	The responses revolve around the following: technology makes it easy for students to access information, accelerates and makes learning fun, and also allows students to explore new subjects and more thoroughly understand challenging ideas and concepts in their studies.
How often do you use technology to support your students' reading?	All the interviewed teachers claim that they use technology frequently to assist students in reading.
How are you using technology to support your students' reading?	14 of the 17 interviewed teachers state that they use technology to assist students and assign reading at home, and the other three claim to use technology to assist and assign reading both in the classroom and at home.
Can you name some concrete advantages and disadvantages of the use of technology for reading purposes?	Advantages: Most of the interviewed teachers point out only the advantages. They consider technology to increase students motivation to read, facilitate text comprehension, and improve students pronunciation. Disadvantages: Only two of the teachers point out the disadvantages of technology for students' reading. To them, the overuse of technology (text-to-speech apps and translators) in the reading process can make students dependent, hindering their ability to develop their reading potential.
What are your favorite app(s) for supporting students' reading?	Wechat, the PEP book website, Meiri yingyu yuedu, iBook, the Sinkey English text-to-speech app, and Baidu Translator were the apps that were frequently mentioned.
Why do you prefer this/these app(s) over others?	Most of the teachers mention the aspects of their easy and free access, their possibility to group students, and their ability to make text accessible for students of all levels.
How has technology impacted your face-to-face reading teaching?	Most of the teachers claim that the use of PPT has helped them present new vocabulary in a more clear and effective way. Some add that the use of computer program players to adjust reading audio has helped them to accommodate students reading pace and form groups for reading. Beside this, the use of text-to-speech apps, an electronic dictionary, and translators is believed by many of them to have helped them assign students different tasks and have them work independently.
How has technology impacted your online teaching (reading) during the COVID-19 pandemic?	All the interviewed teachers state that technology has had a great impact on their teaching of reading. According to them, the use of WeChat to send homework, the text-to-speech apps, Meiri yingyu yuedu, and iBook were a great help to get students practicing reading at home and to maintain their level of reading.
Have you ever faced any	Most of the teachers point out challenges they faced at the

challenges in your use of technology when teaching reading?	beginning during their first use of technology for teaching due to their lack of experience and problems related to the internet and apps' technical issues.
How do your students perceive technology in their reading?	Twelve of the teachers consider that their students perceive technology positively. To them, their students are more excited to complete tasks through technology than in the traditional way. Two of the teachers claim to not know, while three believe that their students are not interested in using technology for learning.
Have you observed any negative effect on students' using technology for reading? If yes, what are they?	The eleven teachers who have responded yes consider that overexposing students to reading apps and electronic translators has made some of their students dependent on them and reluctant to produce their own efforts.
Does your school promote the use of technology? If yes, how?	All the teachers believe that the school promotes the use of technology, and their arguments revolve around the fact that the school has equipped all classrooms with modern technology, invested money in learning apps, and encourages teachers to use technology.
Does your school provide adequate technology-use training? If yes, how?	Most teachers believe that the school provides adequate training since it usually provides training when a new application or e-book is introduced or updated.
Parents' Interviews	
Questions	**Responses**
How do you perceive technology in your children's learning?	Most of the interviewed parents affirm that they perceive technology positively and that it has a great impact on their children's learning, and few of them are sceptical about the impact of technology on their children's learning.
What technology devices, apps, and websites do your children use mostly for reading?	Devices: tablet, cellphone, computer, and electronic dictionary Apps: the Sinkey app, Meiri yingyu yuedu, WeChat, and iBook Websites: Baidu translator and PEP book website These are the several elements mentioned by the parents.
Why these particular technologies?	All the parents who responded to this question insist on the fact that these technologies are very common. Some of them estimate that it is because they are suggested by teachers.
How often do your children use these technologies?	Most of the parents claim that their children use these technologies only when they have assignments; others state that their children use them always after school and on the weekends.
Do you think that these technologies have real benefits for your children's reading skills? If yes, how? If	Among the 31 participant parents, 24 believe that the technologies used by their children have real benefits for them, and they base their arguments on the fact that the text-to-speech apps and translators help their children with

no, why?	the pronunciation and text understanding, which they (the parents) are unable to provide for their children. Four of the participant's parents believe that reading with physical books is more beneficial because it is more practical.
Is there any negative effect that you've noticed with your children using technology? If yes, what are they?	Among the 27 parents who responded yes, 14 focused their arguments on the distraction side of technology, claiming that due to advertisements and games, their children are less focused when using technology than with physical books. Ten articulate their arguments around health problems due to long-term screens, and the other three insist on the consequences of depending on technology.
Have you or your children experienced any challenges using technology for reading? If yes, what are they?	16 of the 31 parents affirm having faced some use of technology challenges in the past, and all of them mention technical issues mostly related to a lack of experience.
Was technology helpful to you and your children during the COVID-19 lockdown? If yes, how? If no, why?	All the parents claim that technology has been a great help for them and their children. Most of them point out the assistive side of technology as an argument, while others insist on the distractive side, claiming that technology has helped them keep their children focused on something.

DISCUSSION AND CONCLUSION

In this section, the task is to verify whether the findings respond to the research questions, and to do so, we will first analyze the two tables to try to understand the role of technology on students' reading English as a second language, then analyze the first table to see whether technology can impact students' reading, and finally analyze the second table to see how technology is perceived by the school stakeholders.

Outcome Analysis

- What is the possible role of technology in students' reading processes?

Considering all the presented data above, we can say that technology plays a great role in students' reading. From the observations, we can see that technology can increase students engagement, independence, and collaboration, but it can also reduce or facilitate teachers work. Considering the interviews, we can see that beyond increasing students engagement, independence, and collaboration, technology such as text-to-speech apps, translators, and certain reading websites can help parents assist their children with their reading and teachers assist them in practicing reading at a distance and in the classroom, as well as permit all students access to the reading content.

- What is the impact of technology on students' reading?

Based on our observations, we can conclude that technology has a significant impact on students' reading. During the technology-based reading approach, despite their unfamiliarity with the teaching approach using their devices and apps, the students of three classes were more motivated, more collaborative, and participated better in the learning activities than during the non-technology-based reading approach. Alone with their technology, they were

able to help themselves understand and read the text. The technology has then increased their motivation and capacity to collaborate and take control of their own learning, which concurs with the Rufaidah et al. (2021) research results. Whereas, based on the tests done after reading, we can say that technology has not had a great impact on students' reading since only one class has managed to maintain the same score in both the non-technology and technology-based reading approaches differently from the ones in Rufaidah et al. (2021) and Stearns (2012), where students performed higher under technology-based learning than under non-technology-based learning. In the present case, the number of students capable of reading the text without any assistance has declined in three classes, as have the scores. This can also be explained by the fact that students were familiar with the technology used but unfamiliar with the teaching approach.

- How do stakeholders of the school perceive the role of technology in reading in general and during the COVID-19 lockdown?

Considering all the interviews, we can say that most of the students, teachers, and parents perceive technology positively. For the students, the fact that their devices and apps assist them in reading and comprehending the texts makes technology an important element of reading. For teachers, in addition to the fact that technology helps them to assist their students at a distance during the pandemic and to practice reading independently, they believe that technology makes it easy for students to access information, accelerates and makes learning fun, and also allows students to explore new subjects and more thoroughly understand challenging ideas and concepts in their studies, as well as allow them to design content for different levels of learners. Most parents also estimate that technology is helpful for their children's reading. To them, the text-to-speech apps and translators were crucial in assisting their children during the COVID-19 pandemic lockdown. However, to get the full picture of how technology is perceived by the participants, it is crucial to consider the reservations or disagreements of some of them regarding certain questions. For example, aside from the health problems due to long-term screens and the consequences of technology dependence, both some students, teachers, and parents consider that reading paper books is more practical than the technology-based reading approach, and we believe their arguments and concerns deserve a reflection and investigation.

Learning Themes

Reflecting on the research theme, we have noticed several aspects, including the theme (technology in education) itself, the data collection method, and the nature of the data, that have caught our attention. Technology is used in education in different ways and for different reasons, making it a vast theme for exploration. Thus, at the beginning of this research, we were a little confused about where and on which aspect of technology in the teaching and learning process we should focus our research questions. The data collection method and nature of the data are the two other aspects that have challenged us during this research. During the data analysis, we realized that the data collected through the observations and interviews was not strong enough to respond effectively to the research questions. For example, we believe that in addition to the two (non-technology and technology-based) reading experiments, if we had added another "teacher and technology-based reading" experiment observation between them, we would have another set of data that could help us see the effects of technology when it is used effectively by teachers in the classroom. On the

other hand, adding this reading experiment observation would help to prepare the students for the full technology-based reading experiment and make the data from this one more reliable since we had noticed during the technology-based reading experiment that students were familiar with the used technology but unfamiliar with the concept. Also, the data from the interviews was a little difficult to analyze due to the fact that we used many open-ended questions that led to many different answers to the same question. We believe that if we had converted some of the questions into close questions using a Likert scale approach, we would have had more precise responses that would have been easier to analyze.

Implications

Based on the data gathered, we can conclude that any teacher who wishes to promote the use of technology to assist students in their reading should be proactive in their search for a suitable one. Most of the students and parents affirm that the apps and websites that they are using were suggested by their teacher, letting us believe that the teacher's role in the selection of suitable reading apps and websites is crucial, and when selecting a reading app or website for second language learning, it is important to consider options like text-to-speech and translation. These two options were the ones that were used the most by students during the technology-based reading experiment, and they are viewed by almost all the students, teachers, and parents as indispensable for practicing pronunciation and understanding texts. On the other hand, we believe that the teaching and learning process should not be totally based on technology (text-to-speech apps, translators, electronic books, etc.). Teachers should also promote non-technology-based teaching and learning approaches to take into consideration students with eye problems, reduce technology dependence, and address some students' preferences. Thus, for an effective use of technology for reading, we suggest schools invest in technology that is relevant to learning, provide continuing training to their teachers, and teachers should invest time in researching adequate reading apps, train their students and parents on how to use them, and try to address issues related to technology use. By the way, we believe further research focusing on the different aspects of an effective use of technology for reading would help both schools and teachers in implementing it successfully.

Conclusion

Considering the findings and everything that is said in this research, we can say that technology has a great role and impact on students reading. Even if the research failed to demonstrate whether technology increased students scores in reading, it has shown that technology helps students to be independent, more active, more motivated, and more collaborative (Rufaidah et al., 2021; Jaleel & Anuroofa, 2017). Text-to-speech apps, translators, electronic dictionaries, and other reading apps, as well as certain reading websites, can provide access to any text to students of all categories, including language learners, students with diverse learning styles, and students with learning needs, just as said in Reimagining the role of technology in education: 2017 National Education Technology Plan Update (2017). The research has shown that the previous technologies are welcomed by most students, teachers, and parents and can be an asset for both teachers and parents in assisting their students in reading. However, the research has also shown that these technologies may be sources of worries related to dependence on them, eye problems due to long-term screen

use, and distractions. As a result, we recommend that any teacher who intends to promote their use consider both their benefits and drawbacks.

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Section Appendix
Appendix A
Participants Letter
参与者的信

Information
信息

Course: _____
Researcher Name: _____ Researcher Email: _____
Researcher Phone: _____
Location of Proposed Intervention/Innovation: _____

课程： _____
研究人员:
名称：_____；电子邮件：_____；电话:_____;
地点: _____

Purpose: The purpose of this research is to investigate the role and impact of technology in students' reading processes and how it is perceived in students' reading in general and during the COVID-19 pandemic by the school stakeholders.

目的：这项研究的目的是调查技术的作用和影响在心柯文化发展学校的学生阅读过程中，检查学校的家长，老师，和学生怎么感知技术在学生使用技术阅读。

Participation: You (teachers and parents) will be asked to share your experience and opinion with technology to support students' reading both in general and during the COVID-19 pandemic.
参与：您将被要求与技术分享您的经验和意见，以支持学生阅读。

Risks: There are no foreseeable risks to you as the subject.
风险：作为主题，没有可预见的风险。

Personal Benefits: There will be no personal benefits to you from your participation in this research.
个人福利：您参与这项研究将不会给您带来个人利益。

Time: Your participation in the action research study will take approximately 5 to 10 minutes and the duration of this research project is from January 3, 2023, to January 24, 2023.
时间：您参与行动研究的时间大约需要 5 到 10 分钟，该研究项目的持续时间为 2023 年 1 月 3 日至 2023 年 1 月 24 日。

Voluntariness: Your participation in this research is strictly voluntary. You may refuse to participate at all, or choose to stop your participation at any point in the research without fear of penalty or negative consequence.

自愿：您参与这项研究是严格的自愿。 您可以完全拒绝参加，或者选择在研究的任何时刻停止参与，而不必担心受到惩罚或负面影响。

Confidentiality: The information/data you provide for this research will be treated confidentially, and all raw data will be kept in a secured file by the researcher. Personally identifiable information will not be shared.
机密性：您为本研究提供的信息/数据将得到秘密处理，所有原始数据都将由研究人员保存在安全文件中。 个人身份信息将不会共享。

Review of Research: You also have the right to review the results of the research if you wish to do so. A copy of the results may be obtained by contacting the researcher:_____ at _____ or _____

研究审查：如果您想这样做，您还有权审查研究结果。 可以通过联系研究人员获得结果的副本：_____ at _____ 还是 _____
If you agree to participate, please select your position and sign your name below.
如果您同意参加，请选择您的地位并在下面签名。

Required Signatures

Supervisor Consent

主管同意

I, _____ have communicated with the researcher during the planning stages of their proposed research study and approve of their proposed study including the pending intervention/innovation. My signature as the supervisor indicates the student conducting this proposed research is an employee under my supervision. I further acknowledge receipt and viewing of all signed and returned Informed Consent forms completed by participants and/or adults of minor children participating in said action research intervention/innovation.

Name of Supervisor: _____ Position/Title:_____
Phone:_____ Email:_____
Signature:_____ Date:_____

我，约翰在他们提议的研究的计划阶段与研究人员进行了沟通，并批准了他们提出的研究，包括待处理干预/创新。我作为主管的签名表明，在我的监督下，进行这项拟议研究的学生是一名雇员。我进一步承认，参与者和/或参加该行动研究干预/创新的未成年儿童的参与者和/或成年人填写的所有已签署和退回的知情同意书的收据和查看。

主管名称：_____置于职位/标题：_____

电话：_____电子邮件：_____
签名：_____

Teachers' participation agreement
I, (your full name) have read and understand the file explaining the purpose of the research and my rights and responsibilities as a participant teacher, and this text designates my consent to participate in the research, according to the terms and conditions listed in the file.

Parents participation agreement
I, (parent's full name), (student's full name) have read and understand the file explaining the purpose of the research and my rights and responsibilities as a parent, and this designates my consent to participate in this research, according to the terms and conditions listed in the file.

我 (你的全名)，(孩子的全名)的父母已经阅读并理解了解释研究目的以及我的权利和责任的文件，这根据文件中列出的条款和条件表示了我同意参加这项研究的同意。

Students' parents participation agreement
I, (parent's full name), have read and understand the file explaining the process of the reading experience and my rights and responsibilities as a parent. This text designates my consent for (student's full name) to participate in the reading experience and interview, according to the terms and conditions listed in the file.

我 (你的全名)，(孩子的全名)的父母已经阅读并理解解释阅读体验过程以及我作为父母的权利和责任的文件。 根据文件中列出的条款和条件，此文本表示我同意 (孩子的全名) 参与阅读体验和访谈。

Appendix B
Teaching Plan

	Non-Technology-Based Reading Approach	Technology-Based Reading Approach
Topic	**Grade 5:** The Boy Who Cried "Wolf!" and The Cap Seller and the Monkeys **Grade 6:** Amazing Adventurers (Level 1) and Mystery Train (Level 1)	**Grade 5:** The Boy Who Cried "Wolf!" and The Cap Seller and the Monkeys **Grade 6:** Amazing Adventurers (Level 1) and Mystery Train (Level 1)
Background	The students should be able to understand basic English communication, read complex words and sentences, and know how to use a dictionary.	The students should be able to understand basic English communication, read complex words and sentences, and know how to use technology such as electronic dictionary, computer or tablet, internet, etc.
Goal	To develop students comprehension, vocabulary, and reading ability.	To develop students comprehension, vocabulary, and reading ability.
Objectives	At the end of the course, the students should be able to read the text fluently, understand the stories by answering the proposed questions, and be able to retell them in their own language.	At the end of the course, the students should be able to read the text fluently, understand the stories by answering the proposed questions, and be able to retell them in their own language.
Audience	Grade 5 or 6 students	Grade 5 or 6 students
Activity #1: Storytelling	In this section, the teacher should start by introducing the story, then read it before having the students tell similar stories they know or have experienced.	The teacher will begin by having the students retell the previous story that they saw during the non-technology-based reading course and then have them listen to the new text read through technology (a text-to-speech app on their tablets or computers, or audio).
Activity #2: New vocabulary mastery	After the students have finished telling their stories, the teacher can engage the students in the new vocabulary mastery. Thus, the students will be asked to identify all the words that seem difficult to read or for which they don't know the meaning, and once they have identified them, they can list them on the whiteboard, proceed to a read-aloud, and then use a graphic organizer (the Concept Definition	After the students have finished listening to the new text read through their technology, the teacher can engage them in the new vocabulary mastery. And similarly to the "Non-technology-based reading approach," the students will be asked to identify all the words that seem difficult to read or for which they don't know the meaning, and once they have identified them, they can list them on

	Map) to organize, define, and use them to build sentences.	the whiteboard, proceed to a read-aloud, and then use a graphic organizer (the Concept Definition Map) to organize, define, and use them to build sentences. But this time, the teacher can only provide assistance with the use of technology. If the students have difficulty reading or understanding a word, they can use their laptop, tablet, electronic dictionary, or Baidu to help themselves.
Activity #3: Text reading	This section consists of having the students practice their reading fluency by giving them the opportunity to read the text many times. To do so, the teacher will provide enough time, pair advanced readers with low-level readers, and assist those in need.	The same process as in the "non-technology-based reading approach" will be used, consisting of having the students practice their reading fluency by giving them the opportunity to read the text many times with the assistance of technology.
Activity #4: comprehension	In this section, the students will be asked to complete several comprehension questions before retelling the story in their own language.	The same process as in the "traditional-based reading approach" will be used, consisting of asking the students to complete several comprehension questions before retelling the story in their own language.

Appendix C
Reading Texts

The Boy Who Cried "Wolf!" from EnglishLinx
https://core-docs.s3.amazonaws.com/documents/asset/uploaded_file/657379/3rd-Boy-Who-Cried-Wolf_week1.pdf

The Cap Seller and the Monkeys from EnglishLinx
https://www.scribd.com/document/470221597/3rd-Cap-Seller-and-Monkeys

Mystery Train (Level 1) from LearnEnglish Teens British Council
https://learnenglishteens.britishcouncil.org/study-break/reading-zone/b1-graded-reading/mystery-train-b1

Amazing Adventurers (Level 1) from LearnEnglish Teens British Council
https://learnenglishteens.britishcouncil.org/study-break/reading-zone/a2-graded-reading/amazing-adventurers-a2

Appendix D
Questions

Definition of technology: *In this study we refer to "technology" as any tool that can assist students in reading, including audio, video, mobile apps, computer software, phones, computers, online websites, etc.*

Questions for the teachers' interview

1. What is your opinion of the use of technology for schooling?
   .....
2. How often do you use technology to support your students' reading? Why?
   .....
3. Why?
   .....
4. Can you name some concrete advantages and disadvantages of the use of technology for reading purposes?
   .....
5. What are your favorite technology tool(s) for supporting students' reading?
   .....
6. Why do you prefer this/these tool(s) over others?
   .....
7. How has technology impacted your face-to-face teaching practices?
   .....
8. How has technology impacted your online teaching practices during the COVID-19 pandemic?
   .....
9. Have you ever faced any challenges in your use of technology for reading purposes?
   .....
10. How do your students perceive technology in their reading?
    .....
11. Have you observed any negative effect on students' using technology for reading?
    .....
12. If yes, what are they?
    .....
13. Does your school promote the use of technology?
    .....
14. Does your school provide technology-use training?
    .....

Questions for the parents' interview

1. How do you perceive technology in your children's learning?
   .....
2. What technology do your children use mostly for reading?
   .....

3. How often do your children use this technology?
   .....
4. What effect has this technology had on your children's reading?
   .....
5. Can you think of any benefits or drawbacks to your children using technology to read?
   .....
6. Is there any negative effect that you've noticed with your children using technology?
   .....
7. If yes, what are they?
   .....
8. Have you or your children experienced any challenges using technology for reading?
   .....
9. If yes, what are they?
   .....
10. What was the role and impact of technology on you and your children during the COVID-19 lockdown?
    .....

Questions for the students' interview

1. What is your favorite technology for reading?
   .....
2. Why do you like this technology best?
   .....
3. What type of app do you use on your device for reading English?
   .....
4. Why?
   .....
5. How often do you use it?
   .....
6. How do your apps and technology devices help you in your reading?
   .....
7. Which one do you like best: an electronic or paper book?
   .....
8. Why?
   .....
9. Which one did you like best: the non-technology or technology-based reading approach?
   .....
10. Why?
    .....