Journal of Social Knowledge Education (JSKE)
Vol. 6, No. 1, February 2025, pp. 54~75
ISSN: 2722-046X, DOI: 10.37251/jske.v6i1.1291

Freshmen's Perceptions of the Effect of Technology on Learning English: A Case Study at the National University of Battambang, Cambodia

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Article Info

Article history:

Received: Dec 6, 2024
Revised: Jan 7, 2025
Accepted: Jan 11, 2025
Online First: Feb 8, 2025

Keywords:

Educational Technology
English language learning
Higher Education
Technology Integration
Technology Roles

ABSTRACT

Purpose of the study: This study investigates first-year students' perceptions and the impact of technology integration on English language learning at the National University of Battambang (NUBB).

Methodology: The research garthered data from 205 students across various majors through purposive sampling and a structured questionnaire. Data analysis involved descriptive statistics, independent sample t tests, one-way ANOVA, and regression analysis.

Main Findings: The findings indicate that online searches and computer software are the most frequently utilized tools, with mobile apps and software perceived as highly effective for enhancing language skills. Students exhibit positive attitudes toward technology, contributing to improve learning outcomes. While no significant gender differences were observed in most areas, female students demonstrated lower levels of technology integration compared to males. Additionally, age did not significantly influence general technology use but affected perceptions of its effectiveness in supporting language learning. Notably, technology-assisted language learning (TALL) had the strongest positive impact on English learning outcomes.

Novelty/Originality of this study: This study is original as no prior research at the National University of Battambang (NUBB) has focused on first-year students' perceptions or the impact of technology integration on English language learning. By surveying 205 freshmen from various majors using a quantitative approach, it provides a unique baseline for understanding how technology supports language acquisition in this context, addressing a critical research gap at the institution.

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1. INTRODUCTION

Technology provides valuable tools for learning English as a foreign language and has greatly influenced the field of education. Its widespread presence in society highlights the importance of integrating technology into classrooms. Despite the common belief that the "tangible" nature of technology and English teaching methods may not align, these approaches actually complement each other well. Together, they allow for innovative teaching methods that support diverse learners. In most Western schools, internet connectivity and computers are available in every classroom; however, the challenge remains to use these resources effectively. Educators and students

must shift their perspective from viewing devices such as computers, tablets, and iPads as mere entertainment to recognizing them as valuable learning tools [1].

In Cambodia, technology is leveraged to enhance language learning, foster learner autonomy and encourage a student-centered approach. By incorporating digital tools and online resources, students gain the ability to direct their own learning paths. This transition from traditional teacher-led instruction to interactive and engaging learning experiences enables students to learn at their own pace. Technology provides immediate feedback and diverse multimedia content, which improves language comprehension and retention. It also addresses issues such as limited access to high-quality resources and experienced teachers, particularly in rural areas. With the internet and mobile technology, students can obtain high-quality materials and interact with native speakers and peers to develop their language skills. As Jewell [2] and Kerimbayev et al. [3] noted, this promotes greater learner autonomy and supports a student-centered teaching model. Technology-driven language learning centers students in the learning process, making them more engaged than with conventional direct instruction methods.

Gibbs [4] suggested that technology encompasses much more than just computers do. As Haleem et al. [5] explained, technology includes devices and tools such as laptops, LED and LCD screens, remotes, webinars, video chats, Skype, voice calls, and various mobile applications. Learners should be encouraged to make active use of these technological resources, as they provide extensive materials and support for English language learners [6]-[8].

Moreover, technology plays a crucial role in advancing social integration through English language education in Cambodia. By enabling global communication and creating professional opportunities, it empowers learners to participate in international interactions. However, policymakers must ensure equitable access to technological resources and implement balanced language policies to preserve local cultural heritage while enhancing English language proficiency. Adopting such a comprehensive approach ensures that technology serves as an inclusive instrument for fostering social cohesion in an increasingly interconnected global landscape. As globalization heightens the demand for English proficiency, particularly in Cambodia, technology has become indispensable in supporting English language acquisition and promoting social integration. English, as the global lingua franca for communication, commerce, and education [9], [10], offers Cambodian learners opportunities to engage in international dialog, thereby facilitating their integration into the global community.

Digital technologies are profoundly reshaping language education. For example, mobile-assisted language learning (MALL) provides students with access to authentic linguistic environments, enabling them to practice communication in practical, real-world scenarios [11]. Applications and platforms such as Duolingo, Zoom, and Google Classroom facilitate global interactions between Cambodian learners and both native and nonnative speakers, fostering cross-cultural and linguistic exchange. This finding is consistent with research indicating that virtual interactions contribute to the development of intercultural competence and communication skills [12].

In the Cambodian context, English language proficiency is intricately tied to socioeconomic advancement and the country's integration into ASEAN and global markets [13]. With the nation experiencing rapid digitalization, the adoption of technology in English language education is critical for equipping students with the skills necessary to thrive in competitive job markets and engage in international collaboration. Studies suggest that Cambodian youth with advanced English proficiency often attain better employment opportunities in key sectors such as tourism, technology, and international development [14], [15].

The potential of technology to facilitate social integration depends significantly on equitable access and the development of digital literacy skills. A UNESCO report emphasized persistent disparities in technological infrastructure and internet connectivity in rural Cambodia, which further deepened the digital divide [16]. If these inequalities are not effectively addressed, the advantages of technology-assisted language learning may remain concentrated in urban areas, excluding rural communities from its benefits.

Moreover, while English proficiency is critical for global engagement, safeguarding local languages and cultural heritage is equally vital. As highlighted in [17], the global predominance of English poses risks to indigenous linguistic identities. In the Cambodian context, young learners who adopt English as a tool for socioeconomic advancement may inadvertently distance themselves from Khmer's cultural traditions and heritage, potentially leading to cultural disconnection.

In Cambodia, the integration of interactive whiteboards, e-learning platforms, and virtual classrooms is transforming education, promoting diversity and digital literacy while enhancing instruction across various subjects. As Al-Maashani and Mudhsh [18] noted, the role of technology in education has grown substantially over the past thirty years. Teachers and educators are continuously intrigued by advancements in technology, and we see widespread adoption of tools designed for diverse educational needs. According to Richey et al. [19], education is now under significant pressure to align with a technology-driven society and to incorporate tools such as ICT, mobile technology, and multimedia resources. Technology significantly elevates educational quality and supports teaching, making it essential for learning. Using technology in education is ultimately a systematic approach to planning, implementing, and evaluating the learning process.

English holds an essential place in people's lives, driving them to learn it for many different reasons. In many parts of the world, English is viewed as a second language. Mastery of English is necessary for advancement in nearly every sector, as the majority of research publications are in English. As a result, English is regarded as an important global language. Furthermore, numerous educational institutions, including schools and universities, use English as the primary language of instruction [20]-[23].

In connection with this, learning English can be quite challenging [24], [25]. Teaching methods have evolved substantially, each aiming to improve student learning. Traditional approaches have been enriched by media, including radio, television, and, more recently, information technology. The importance of technology in English education is widely acknowledged, with many regions recognizing its essential role. Technology has significantly supported and advanced English learning. As Graddol [26] and Stasberger [27] stated, "technology lies at the heart of the globalization process, affecting work, education and culture," which is especially relevant today as technology reshapes every part of our lives.

Research has shown that technology positively influences students' language skills, particularly speaking and writing. For example, Mustafa [28] investigated "The Impact of YouTube, Skype, and WhatsApp in Improving EFL Learners' Speaking Skill," and Yundayani et al. [29] looked at how the Canvas affects students' writing ability. The essential role of information technology in advancing English education, especially in improving skills such as listening, speaking, reading, and writing, is clear. A key benefit of using technology in language learning is its easy and timely access, which supports both teachers and students. Resources such as digital libraries, dictionaries, and thesauri accelerate learning and greatly enhance students' vocabulary, improving their reading and writing abilities. Additionally, technological tools promote more interactive and integrated learning, which is essential for developing listening and speaking skills. The integration of technology in English education is vital, as it has removed barriers and opened new possibilities in this information-driven and globalized era.

Although many studies emphasize the benefits of technology in improving teaching and learning, there remains a notable lack of research on the challenges teachers face when integrating technology in classrooms. Pham [30] noted that some teachers, especially those from older generations, may have limited technology skills, which can hinder their capacity to engage students effectively with digital tools.

Moreover, many schools, colleges, and universities now integrate technology into their learning environments [31]-[35]. However, both students and teachers often encounter difficulties when using technology to learn English. For example, they may struggle with establishing effective connections, and teachers may find it harder to motivate students to obtain traditional methods. As a result, some are hesitant to adopt technology in education. Nevertheless, the use of technology in learning, including English, is growing due to its many advantages. Pronunciation apps can enhance pronunciation, and communication skills can become more polished. Technology also expands educational opportunities, helping individuals make significant progress in their learning, particularly in English language education.

Interestingly, MoEYS [36] highlighted a concern raised during the annual Education Congress about the integration of educational technology into higher education. The focus was on the insufficient capacity of researchers to address the challenges brought about by the digital era. This includes a shortage of researchers and a lack of expertise in understanding and addressing the complexities of how the digital age impacts society. Additionally, it highlights the scarcity of scholars and professionals capable of effectively analyzing, evaluating, and solving issues at the intersection of technology and education. Furthermore, Cambodian higher education faces challenges such as limited access to information technology (IT) and unreliable internet connections on campuses, particularly in rural areas [37]. These issues hinder the effectiveness of higher education in Cambodia, with teachers struggling to incorporate IT into their teaching and students finding it difficult to access the internet to complete assignments because of spotty connections at some campuses. Existing studies emphasize the advantages of technology in language learning but often fail to consider localized challenges, such as Cambodia's limited IT infrastructure and unreliable connectivity. Additionally, there is a lack of research on how gender and age influence perceptions of technology use. This study aims to fill these gaps by investigating educational technology usage among freshmen at NUBB, exploring demographic differences, and assessing its impact on English learning outcomes. By addressing these issues, this timely and innovative research offers valuable insights for improving teaching strategies and enhancing student success in English education.

This research aims to investigate students' perceptions and effects of technology integration in English-language learning among freshmen in higher education. The technology in this research focuses mainly on computer software (i.e., Google Translate Desktop, and Longman Dictionary), social networking sites (i.e., Facebook, Twitter, Instagram, and Telegram), audio and video online (i.e., YouTube, Skype, MP3 players, Tik Tok, and podcasts), smartphone and tablet apps (i.e., Learn English Grammar App, Dictionary App, Paragraph App, and English Listening App), and word processing (i.e., Google Docs, Mind Map, and Microsoft Word). This research will benefit students and teachers most like to enhance instructional methods, address research gaps, support students' academic success in higher education, and prepare them for a digital future. To address these issues, this study aims to answer the following questions:

1. What are the current states of educational technology usage in NUBB?

2. Is there a statistically significant difference between male and female freshmen in their perceptions of the integration of educational technology in English learning?
3. Are there significant differences in freshmen's perceptions of educational technology integration in English learning across different age groups?
4. What is the positive impact of educational technology on students' outcomes in learning English?

2. LITERATURE REVIEW

Ahmadi [38] described technology as a means to accomplish tasks, particularly through the use of technological processes, techniques, or information. It is defined as the practical application of knowledge, especially in a specific field. Scholars offer various definitions of "educational technology." According to Januszewski and Molenda [39], educational technology involves the research and ethical practices of developing, using, and managing appropriate technological processes and resources to enhance performance and support learning.), from a systems perspective, defines educational technology as a goal-oriented approach to problem-solving, which incorporates tools, strategies, theories, and methods from various fields of knowledge to: (1) effectively design, develop, and assess human and mechanical resources to facilitate and enhance all aspects of learning, and (2) drive change and transformation in educational systems and practices to promote social change [40], [41].

On the other hand, Dey [42] suggested that by distinguishing between the terms "education" and "technology," we can gain a clearer understanding of the concept of "educational technology." "Technology" refers to the field of advanced scientific study involving sophisticated hardware and software, and it focuses on applying knowledge for practical purposes. Education, on the other hand, is the process of changing behavior, socializing, becoming socially skilled, adapting to one's environment, and developing a person's personality in a balanced and holistic manner. The study of educational technology emphasizes teaching and learning methods that incorporate various forms of media.

Richey et al. [19] and Xu [43] define "educational technologies" in a broad sense as any resources—such as methods, tools, or processes—that are used to manage activities in education. In this context, educational technologies include the presence of a teacher, written materials such as books, physical tools such as alphabet blocks, display media such as chalkboards or overhead projectors, instructional techniques such as lectures or hands-on labs, and even assessment tools.

The widespread availability of smartphones with mobile network connectivity and educational apps has made mobile teaching and learning a practical option for both educators and students. With the rise of smartphones and advanced technology, language teaching has become more accessible and convenient. The popularity of mobile devices such as iPods, iPads, and smartphones has made mobile education more feasible. These devices serve as tools for information and communication technologies (ICTs). For ICT-based teaching to be effective, teachers must have a strong understanding of information technology and a willingness to adapt their teaching approaches [44], [45]. In this study, the term "technology" is specifically defined to include computer software, social networking sites, online audio and video, smartphone and tablet apps, and word processing. The researcher aims to explore the impact of technology integration in English language learning among freshmen at the National University of Battambang in Cambodia.

The Royal Government of Cambodia (RGC) aims to transform the national economy and industry by 2025, shifting from a labor-intensive economy to a knowledge-driven economy, while improving the lives of its citizens by strengthening the use of ICT in all aspects of life. According to the Ministry of Education, Youth, and Sport (MoEYS), a nation's competitive edge depends on its human resources' proficiency in 21st-century skills, particularly in the effective use of ICT (information and communication technology). Furthermore, MoEYS plans to develop the capacity to lead ICT innovations in education through the Department of Information Technology (DIT). The DIT will assess the relevance of international lessons in the context of Cambodia and provide recommendations to MoEYS' technical departments on how to use ICT to increase productivity. MoEYS aims to increase efficiency while providing data to support evidence-based leadership decisions. Additionally, the organization aims to produce graduates capable of thriving in the information and knowledge-driven economy and society through improved teaching and learning for all students. MoEYS's ICT in Education objectives are twofold: (1) update procedures and improve the governance and performance monitoring of the education sector for greater efficacy, efficiency, and transparency, and (2) prepare students for the workforce of the 21st century by integrating ICT as a tool for teaching, learning, and knowledge-sharing across the education sector (MoEYS, 2018).

Technology functions as a transformative instrument for integrating English language acquisition with the development of social skills. Grounded in theoretical frameworks such as sociocultural theory and the interaction hypothesis, alongside advancements in tools such as mobile-assisted language learning (MALL) and gamification, research highlights the potential of technology to enhance both linguistic proficiency and interpersonal competencies. By incorporating these tools, educators can design dynamic and interactive learning environments that equip students with authentic communication and collaboration in real-world contexts.

The integration of technology into English as a second language (ESL) education has revolutionized learning by fostering both language acquisition and social skill development. This dual advantage arises from the interactive and collaborative features of modern technological tools, which blend linguistic practice with meaningful social interaction. Vygotsky's sociocultural theory, a foundational framework in this area, asserts that learning occurs within social contexts through interaction with more knowledgeable peers or tools [46]. Technologies such as video conferencing platforms and collaborative applications facilitate these interactions, enabling real-time communication and cross-cultural exchanges. For example, tools such as Google Docs support collaborative writing projects, encouraging teamwork while simultaneously enhancing students' English proficiency.

Similarly, social presence theory emphasizes the important of social connection in effective communication [47]. This theory is particularly relevant in digital language learning environments, where platforms such as Zoom and Microsoft Teams create immersive and socially engaging spaces that promote interpersonal interactions. Rosell-Aguilar's study [48] demonstrated that video-based interactions on these platforms not only enhance language fluency but also boost learners' confidence in social settings.

Long's interaction hypothesis [49] further highlights the critical role of meaningful interaction in language acquisition. Technology amplifies this process by offering authentic contexts for communication. Virtual learning environments, such as Second Life, provide students with opportunities to participate in real-time conversations, simulating real-world social scenarios. These interactions contribute to the development of both linguistic proficiency and social competence [50], [51].

Mobile-assisted language learning (MALL) leverages the portability and accessibility of mobile technology to facilitate collaborative learning experiences. Applications such as WhatsApp and Telegram have been shown to enhance English language skills while promoting teamwork and peer communication. Mobile tools enable learners to engage in informal interactions, creating natural contexts that foster both linguistic and social development [52].

Additionally, research highlights the impact of gamification in language learning through platforms such as Duolingo or interactive games such as Kahoot. These tools encourage social interaction through collaborative and competitive activities. Peterson [50] reported that learners who participated in multiplayer language games exhibited increased teamwork, communication, and problem-solving abilities, illustrating the interconnected development of language proficiency and social skills.

Furthermore, technology-enhanced language learning has been instrumental in cultivating intercultural competence. Virtual exchange programs utilizing platforms such as Skype or Zoom facilitate communication between learners and peers from diverse cultural backgrounds, broadening their understanding of global social norms and communication styles [53].

However, equitable access to technology presents a significant challenge. According to UNESCO [54], disparities in internet connectivity and digital literacy disproportionately affect rural areas, limiting the benefits of technology-assisted learning. Bridging these gaps is imperative to ensure that all learners can access the opportunities that technology provides to develop both language proficiency and social competencies.

In addition, for educators new to incorporating ICT in language instruction, Dudeney [55] and Meutia et al. [56] provide advice on utilizing websites and lesson plans effectively. It is important to plan carefully and ensure that the website is reliable, ideally opting for a professional website. Teachers should prepare all materials in advance and be ready to handle any unexpected technical issues or power outages, with a backup plan in place. When working with younger students, educators should check the content and websites, either by using software to restrict access or ensuring that the language is suitable for younger audiences. However, ensuring that students know how to navigate the internet is a more effective approach.

Various studies emphasize the importance of integrating technology into teaching practices, suggesting that it enhances the engagement of both teachers and students in the learning process [57]. The researcher continues that using technology in the classroom helps teachers develop expertise in both pedagogy and their subject matter while also enabling students to use technology more effectively. Other research also underscores the advantages of technology use for teachers. For example, Vongkulluksn et al. [58] reported that teachers who are proficient with technology prefer to spend more time teaching in the classroom. Their performance improves as their technological skills make it easier for them to adopt various teaching methods and strategies.

Moreover, Englund et al. [59] outlined five approaches for integrating technology into teaching. The first is a teacher-centered approach, where technology is used primarily to deliver subject-specific content with little interaction from students. The focus is on demonstrating and presenting facts and skills, with technology as a supplementary tool. The second approach is similar, with the teacher still central to content delivery, but various methods are employed to increase student understanding. Technology is used to help students grasp the concepts of the syllabus through preset content provided via institutional platforms. The third method builds on this by incorporating communication technologies that allow for student engagement through activities such as digital simulations, projects, and group discussions. In the fourth approach, the teacher uses technology to foster collaboration and communication among students, promoting problem-based learning where students create their

own digital resources. Virtual environments are utilized to create authentic learning settings where students actively participate in knowledge creation. Finally, the fifth approach places students in the lead, allowing them to design and create their own learning experiences through virtual environments or multimedia tools. Both teachers and students collaboratively develop curriculums and materials, with open educational resources and social media platforms supporting the learning process. In this approach, students drive the creation and delivery of digital resources, preparing them for future professional roles.

Keo et al. [60] suggested that effectively integrating technology into Cambodian higher education requires addressing the highlighted challenges and taking advantage of the identified opportunities. Moreover, Vireak and Bunrosy [23] proposed that to improve effectiveness, teachers should integrate technology, use communicative teaching methods, and create a learner-centered environment. In addition, Vonog [61] showed that digital platforms such as Zoom, Skype, Webinar, and Discord can be effective ways to carry out the educational process of teaching English. These platforms allow screen sharing, interactive gestures, audio and video communication, and chat. However, features such as installation, free access, video recording, waiting areas, private session rooms, and calendar integration set them apart. The technical and financial resources of the educational institution, the objectives of the teachers, and their experience all play a role in selecting a particular tool. By simulating live communication, digital platforms enable the implementation of English learning in a manner as close to traditional methods as possible. They encourage a learner-centered approach to English instruction by supporting methodical and systematic support of the educational process, including interaction and monitoring of student results.

Moreover, online discussion forums play crucial roles in enhancing interaction, motivation, and engagement among learners and instructors in the educational process. According to Hussin et al. [62], online discussion forums such as Google Group, Yahoo Group, ESL Café Forum, and SIEC enable learners and instructors to exchange ideas and maximize interaction. According to Jose and Zianol Abidin [63], online discussion boards can also increase students' motivation and involvement in the learning process. By taking part in conferences, debates, and discussions, they also have the potential to engage students [64]-[66].

More interestingly, email and instant messaging apps are essential tools, that facilitate quick communication and interactive learning experiences for students. Email is thought to be the most common [67]-[69]. E-mail enables students to communicate with peers and instructors quickly. The most popular instant messaging apps are WhatsApp, Facebook, Twitter, and WeChat. These platforms allow students to communicate synchronously or asynchronously. Zoom and Skype allow teachers to add to the teaching of English and give students a variety of feedback options by simulating live interaction [70], [61], [71]

Many learners frequently use a variety of technology tools, including computers, MP3 players, mobile phones, televisions, and personal digital assistants. These electronic devices make language learning more accessible, allowing learners to access lessons on their computers or phones from anywhere outside the classroom. With ongoing technological advancements, students can learn English independently, without needing to enroll in formal classes. This self-directed learning is facilitated by numerous user-friendly tools designed to be easily used by any learner [72].

Similarly, advancements in technology are making society more interconnected. Businesses recognize the importance of having a global presence and understanding the international market for their survival. Additionally, people are becoming more mobile [73]. Many colleges and universities now offer opportunities to study abroad, making learning a second language highly advantageous for students. This is particularly true in regions where English is not the primary language. Teaching English is a lucrative business in both English-speaking and non-English-speaking areas. For example, Chinese students make up the largest group of international students in American universities, with 40,000 of them learning English [74]. Students from foreign countries can use various approaches to better adapt to their new environments.

The four skills learned through mobile devices (m-learning) are considered crucial for language acquisition. According to Laufer & Nation (as cited in [75]), English as a Foreign Language (EFL) learners need to know at least 5000 base words to comprehend English effectively. In addition to traditional technologies such as audio CDs, DVD players, and portable radios that have improved learners' knowledge, mobile learning is defined by its portability, allowing use at any time. M-learning offers unique benefits, including the flexibility to use the device whenever desired. It also provides a less stressful environment for assessment than paper-based methods do, and it maximizes learning opportunities by enabling practice even in short periods of free time [75].

Research by Abu Seileek [76] and Sulistyaningrum [77] demonstrated that word processors significantly impact teaching and learning writing skills. The study revealed that students could identify and correct their mistakes more effectively because of the organized writing environment provided by word processors. Additionally, students had the opportunity to engage in numerous word-processor-based activities, such as checking style, grammar, and spelling errors.

Self-directed, informal learning plays a crucial role in education and lifelong learning, offering flexibility and independence that can be enhanced through technology and effective learner-centered techniques. As Morris [78] noted, self-directed learning, or informal learning, is familiar to many people and is not a new experience for

adults. This method does not require an authorized tutor, as motivated learners can teach themselves. Unlike formal classroom learning, the responsibility for learning lies with the learners themselves [79], and it can take place anywhere via any method. Studies have shown that informal learning in the workplace constitutes approximately 90% of learning [80], yet its importance is seldom discussed [73].

Many believe that the 21st-century generation will benefit greatly from lifelong, informal learning. Changes in educational discourse have led to the development of effective learner-centered techniques [81]. Technological advancements and the resulting new possibilities contributed to this shift. Information and communication technologies (ICTs) can facilitate learning at all life stages, promoting more educated societies. A new era of lifelong learning is emerging, where technology tools enable cost-efficient, individualized education [73]. Additionally, lifelong learning is said to benefit society as a whole, a view supported by individuals, educators, and political organizations. The link between informal learning and independence is expected to grow in importance as informal learning continues to play a crucial role in education and throughout life.

To be effective in an online ESL learning environment, self-directed learners should a) understand when to seek help. b) Find alternative sources of assistance. c) Enhance the learning process through discovery. d) Learn at their own pace and manage their time effectively. e) Increase their ability to learn from mistakes [82].

Modern technological tools and applications have greatly enhanced student engagement and participation in English classrooms, replacing outdated traditional teaching methods. Kaur and Nadarajan [83] reported that teachers could significantly improve student engagement and active participation in classrooms by utilizing technological hardware and software such as computers, tablets, and online teaching and learning applications. Traditional methods of teaching English, which involve merely delivering knowledge through classroom activities supported by cassette players, blackboards, and white chalk, have become outdated. Instead, modern devices such as TVs, projectors, and interactive whiteboards are now being used in teaching English.

The integration of computers in English-language classrooms benefits both teachers and learners. Today, a wide array of software applications is available, including programs for vocabulary, grammar, and pronunciation; spelling check tools; electronic workbooks; and reading and writing programs. These various learning packages aid instructors in developing tutorial exercises to enhance their English language courses [84]. This section will discusses the impact of technology on both formal and informal learning aimed at enhancing English language skills. Chapelle [85] emphasized that technology is essential for improving students' language abilities both inside and outside the classroom. ESL teachers acknowledge that students need to use English beyond the classroom to enhance their communicative competence. Additionally, Chapelle noted that learners are generally more motivated when technology is integrated into their English language learning process.

Gordon [86] provided valuable discussion on the use of technology to support language learning. Her work is strongly supported by various reports that indicate significant improvements in teaching and learning practices, particularly in content and methods, due to technology. Additionally, the researcher noted that technology can greatly enhance young learners' understanding and open-mindedness. Consequently, technology tools offer numerous benefits that enhance the learning process.

The literature highlights the many ways in which technology influences reading and writing. Initially, simple word processing programs were used, but now the same technology has evolved to support reading and writing in English for online use. Word processing programs are user-friendly and thus ideal for developing reading and writing skills. Quishpi Espinel [87] mentioned that technology has improved ESL students' reading and writing abilities through the use of word processors and the internet.

Kasapoglu-Akyol [88] noted that the importance of using technology tools to enhance reading and writing abilities, particularly for English language learners who need to catch up on lessons or acquire knowledge, is discussed. His research supports the effectiveness of word processing for learners in improving reading and writing skills. The researcher also stated that "word processors, including some that are bilingual, are an excellent way to further writing development and motivate students to write" (p.229). This view is reinforced by a study conducted by Peregoy and Boyle [89], which revealed that technology tools improved students' reading and writing abilities because of their user-friendly nature, allowing faster and more effective learning. Their research also demonstrated that students learn more efficiently with technology than with traditional methods, as the primary language of the internet and many ESL sites are English, creating a conducive learning environment. These tools provide a new platform, giving them convenient access to English learning lessons, regardless of their location.

The research also supports the use of word processing in the reading and writing processes for learners. Kasapoglu-Akyol [88] noted that "word processors, including some that are bilingual, are an excellent way to further writing development and motivate students to write" (p.229). This view was confirmed by a study conducted by Peregoy and Boyle [89], which revealed that technology tools enhance students' reading and writing abilities because of their user-friendly nature, enabling them to learn more quickly and effectively.

Herron and Seay [90] conducted a study on the listening skills of EFL learners via video chat. In this study, middle-level learners were divided into two groups: a control group and an experimental group. The experimental group replaced their regular class activities with listening to radio tapes, whereas the control group continued with their usual class activities without radio tapes. The findings indicated that the experimental group

performed significantly better than the control group. By watching videos of native English speakers engaged in everyday conversations, the learners were exposed to a variety of linguistic contexts. The visual component of the video is thought to reduce uncertainties more effectively than audio cassettes, thereby motivating students to learn more.

Moreover, several scholars have explored the relationship between listening and the use of technology tools in language learning, revealing positive correlations in their findings [91]-[93]. These studies indicate that advancements in digital technology, including the enhanced use of multimedia, the internet, and constantly evolving websites, have been beneficial. YouTube, for example, is a popular platform that offers a wide range of videos. Its ability to allow students to share videos has proven to be particularly advantageous [94], [95].

By using technology, students can independently enhance their language learning skills (reading, speaking, listening, and writing) through various resources such as instructional videos and different apps or platforms. In a study on the opinions of ELT students regarding technology-based classrooms, Kazu and Issaku [96] reported that students in the ELT department believe that technology improves their English learning experience. Most students feel that they can learn English on their own with the help of technology, and they view technology in the classroom as a means to become more self-directed in their learning. Additionally, they believe that they can manage their own educational journey without constant instructor guidance. However, the study also highlighted that while technology-based classrooms in universities offer benefits, further improvements are needed to fully leverage their potential. This includes upgrading equipment, incorporating new devices, providing effective teacher training, and educating students about the value of technology in language learning settings.

A study by Shah et al. [97] demonstrated that digital tools, such as smartphones, help IELTS learners improve their listening skills. Additionally, Hossain [98] suggested that numerous apps available for smartphones can be used to enhance English learning, as they allow students to develop the four major language skills, improve vocabulary and pronunciation, practice tests, learn tips, and access lectures. This means that students can gain both technological and linguistic knowledge in an engaging way, learning whenever and wherever they choose. In summary, smartphones are valuable for both teachers and learners, as they provide convenience and a wealth of resources.

Technology skills, a crucial component of 21st-century literacy, are vital for all students, as they enable faster learning, increased motivation, enhanced confidence, and improved creativity. Additionally, a study by John [99] highlighted that advanced technologies such as computer-assisted language learning (CALL), robot-assisted language learning (RALL), and mobile-assisted language learning (MALL) have significantly improved second and foreign language acquisition. The researcher continued that these technologies integrate reading, writing, speaking, and listening activities, helping reduce anxiety and increasing motivation. Game-based activities and opportunities for creativity are common features. Moreover, digital technology allows learners to develop social identities online, enhancing their confidence when communicating with native speakers. This technology not only bridges the gap between first and foreign language learning but also provides real-time feedback on assessments, making it easier to track learning progress [99], [100]. Finally, John [99] emphasized that digital technology helps alleviate language learning anxiety and fosters motivation through engaging in game-based tasks and creative outlets, while supporting the development of social identity and increasing confidence in communicating with native speakers.

In Cambodia, many educators strive to utilize available educational technologies to enhance authentic teaching and learning experiences for both teachers and students. For example, Doeur [101] highlights that digital apps are created to complement classroom instruction and increase students' interest in learning a foreign language. Facebook and Telegram, for example, are popular technological tools that support language teaching and learning, with widespread use in Cambodia for social networking, marketing, and educational purposes, particularly in language acquisition.

The study by Shadiev and Wang [102] classified technologies into eight categories on the basis of their functions: (1) collaborative tools (e.g., Google Docs or Padlet) that allow students to work together on projects by sharing and coediting information; (2) social tools (e.g., Facebook or Skype) that enable students to communicate and share content in real-time or remotely via text, audio, and video; (3) creative tools (e.g., Photo Story or Adobe Spark) that help students create projects such as digital stories or videos; (4) learning management systems (e.g., Moodle) that integrate learning resources and activities for personalized online learning; (5) classroom interaction tools (e.g., Quizlet or Kahoot) that support quizzes and other interactive classroom activities; (6) multimedia resources, including online audio, video content, or multimedia textbooks; (7) presentation tools such as PowerPoints that assist students in presenting their work digitally; and (8) wearable technologies, such as Google Glass, that allow students to engage with or observe information in virtual reality settings.

Hypothesis

H1: Usage purpose (UP) influences English learning outcomes (ELOs)

H2: Types of technology (TTs) influence English learning outcomes (ELOs)

H3: Attitude toward utilizing technology (AUT) influences English learning outcomes (ELOs)

H4: Technology assisting in language learning (TALL) influences English learning outcomes (ELOs)

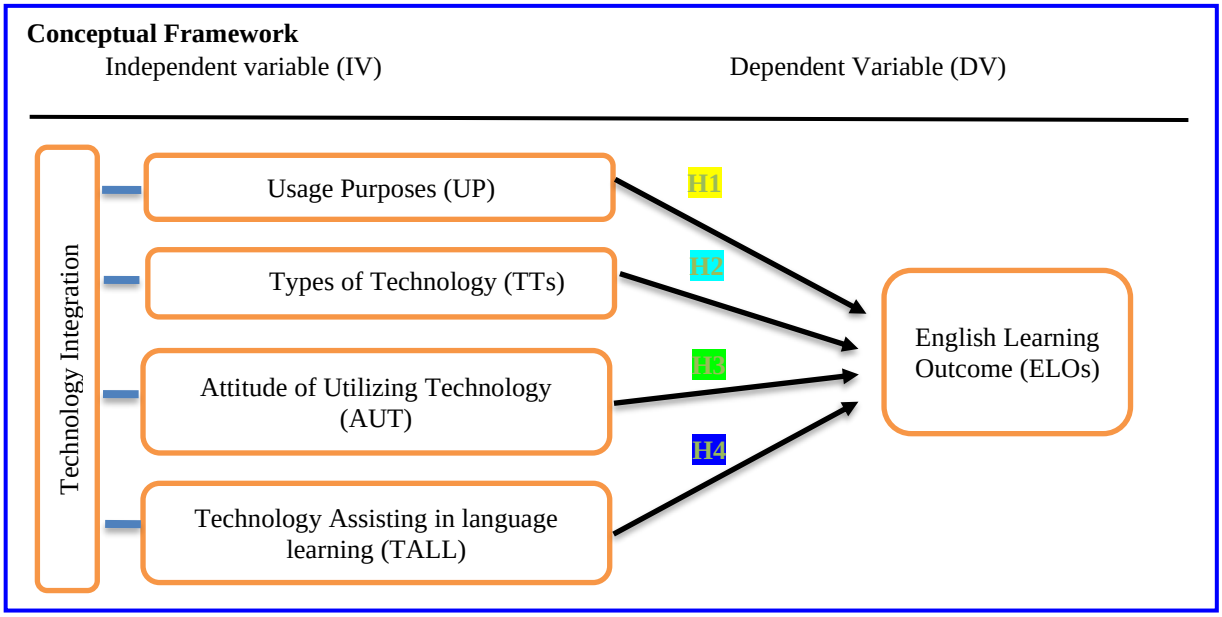

Figure 1: Conceptual framework

3. RESEARCH METHOD

3.1. Research Design

This research aims to investigate students' perceptions and effects of technology integration in English language learning among freshmen in higher education: a case study at the National University of Battambang in Cambodia. The research method applied in this study is quantitative. Three tools of quantitative research are used: descriptive statistics are used to describe the agreement and frequency of the items, and inferential statistics, shown via t tests and ANOVA, describe the differences among groups and between groups. A regression analysis is also employed to investigate how the independent variables influence the dependent variable.

3.2. Population and sample size

The respondents in this case study were EFL learners from the foreign language faculty at the National University of Battambang, a leading public university in Cambodia. The participants included freshman, sophomore, junior, and senior EFL learners. A random sample of 200 EFL learners (both female and male) was selected [103]-[105]. A sample size of 200 is sufficient to represent a population of 400 [106]-[108]. The researchers chose NUBB, a leading public university in northwestern Cambodia, for the study and used purposive sampling to collect data from 205 freshmen among the whole population of year-one students across various majors, including social science, science, English literature, and ICT, through a purposive sampling method.

3.3. Research instrument

A survey questionnaire adapted from Alsulami [72] with slight modifications to align with the research context was used as a research instrument. The questionnaire was divided into two sections. The first section collected demographic information about the participants, including general questions about sex, age, major, and income. The second section contained four specific questions about the use of technology tools. The second section was conducted via a frequency and agreement scale with a Likert scale. The participants completed the questionnaires individually during class, and the researcher distributed them with the instructors' permission. Each participant took approximately 30 minutes to complete the questionnaire. To ensure full understanding, the researcher provided explanations in both Khmer and English.

3.4. Data collection

The process of collecting data from participants was carried out individually for the primary data. The researcher was permitted by the Department of IFL to distribute questionnaires to students while the procedure was carried out during class. Each participant spent approximately 20 minutes responding to all the opinions organized on the questionnaire sheets. The researcher explained and translated the questionnaire from English to Khmer so that the respondents could fully understand it. Furthermore, secondary data are gathered from the primary source, which includes research studies, academic publications, and empirical investigations.

3.5. Analyzing the data

This study aims to examine students' perceptions and the impact of technology integration on English language learning among freshmen at the National University of Battambang, Cambodia. The data analysis methods included descriptive statistics, independent sample t tests, one-way ANOVA, regression coefficients and hypothesis testing. Descriptive statistics were used to understand the basic characteristics of the data and provide clear summaries of the sample and measures. Independent sample t tests were used to assess differences in perceptions of technology integration between genders, whereas one-way ANOVA was used to explore differences among various age groups regarding technology use in English learning. Regression analysis was applied to evaluate the effect of technology on English learning outcomes and to test the hypotheses of whether technology integration such as UP (H1), TTs (H2), AUT (H3) and TAL (H4) supports ELOs. The data from the surveys were processed and analyzed via SPSS version 25.0. Correlation analysis was also used to assess the relationships between variables, and both descriptive and inferential statistics were employed to summarize and test the data [109].

4. RESULTS AND DISCUSSION

4.1. Reliability of the questionnaire

Before the questionnaire was pilot tested to establish its validity, the researchers sought feedback and comments from an expert in the field of education. This consultation focused on the context, content, and structure of the questionnaire to ensure comprehensive coverage of the research questions [110], [111]. The expert's feedback also aimed to ensure correct wording and address any grammatical errors that could impact the study's results. Data collection was treated confidentially, with only the researchers having authorized access. To examine the internal reliability of the questionnaire, the coefficient alpha method [112], [113] was calculated via the Statistical Package for Social Sciences (SPSS). The reliability of the instrument, on the basis of the data gathered, was calculated to be approximately 0.70 or higher, meeting the acceptable standard for reliability tests.

Table 1. Questionnaire reliability

Categories	Number of items
Usage purpose (UP)	2
Types of technology (TTs)	5
Attitude of uttilizing technology (AUT)	7
Technology assisting in language learning (TALL)	5
English learning outcomes (ELOs)	5
	24 items
Total	Cronbach's Alpha = 0.703

The following results are interpreted through mean rank interpretation.

Table 2. Mean Rank Interpretation

3.01-4.00	High degree of significance of using technology
2.01-3.00	Moderate degree of significance of using technology
1.00-2.00	Low degree of significance of using technology

4.2. Respondents' demographic profile

Table 3. Demographic profile of the participants

Characteristic		Frequency	Percentage
Gender	Male	46	22.4
	Female	159	77.6
Major	Science	107	52.2
	Social Science	44	21.5
	ICT	21	10.2
	English Literature	33	16.1
Age	18-20	183	89.3
	21-25	21	10.2
	26- above	1	.5

4.3. The findings are based on research question number one: What are the current states of educational technology usage at NUBB?

a. How frequently do students use technology in learning English?

Table 4. Usage purposes

Items	Statements	Level of Agreement %			M	SD
		Always	Sometimes	Never		
UP1	I use technology tool to watch TV/Videos/Films in English	36.1	60.5	3.4	1.67	.538
UP2	I use technology tool to search for information on websites in English	57.6	38.0	4.4	1.47	.582

*Level of frequency: 1= Always, 2= Sometimes, 3= Never

Table 4 shows that students more often use technology to search for information in English (M= 1.47) than to watch TV, videos, or films in English (M= 1.67). This means that they search online more regularly, while watching media happens "sometimes." In short, searching for information online is a greater part of English learning than watching videos. These results highlight the importance of incorporating digital literacy training, offering carefully selected resources, and including media-based activities to establish a more well-rounded and holistic approach to learning English. To enhance both language skills and social interaction, integrating digital literacy training with media-based activities is essential. For example, group tasks involving online research or discussions about English videos can promote teamwork, communication, and cultural awareness. A balanced approach combining these activities creates opportunities for both linguistic growth and meaningful social engagement, encouraging students to use technology not only for individual learning but also for collaborative and interactive purposes.

b. What technologies (e.g., computer software, online audio and video tools, Facebook, Twitter, WhatsApp, Telegram) do students use in learning English?

Table 5. Types of Technology

Items	Statements	Level of Agreement %			M	SD
		Always	Sometimes	Never		
TTs1	1-I use computer software for learning English (i.e., Google Translate Desktop, and Longman Dictionary) to improve my English Skill.	51.2	44.4	4.4	1.53	.582
TTs2	2- I use social networking sites (i.e., Facebook, Twitter, Instagram, and Telegram) to improve my English Skills.	44.4	50.7	4.9	1.60	.582
TTs3	3-I use online audio and video tools (i.e., YouTube, Skype, MP3 players, Tik Tok, and podcasts) to improve my English Skills.	42.9	54.6	2.4	1.60	.540
TTs4	4- I use smartphone or tablet apps (i.e., Learn English Grammar App, Dictionary App, Paragraph App, and English Listening App) to learning English.	47.3	46.8	5.9	1.59	.601
TTs5	5- I use word processing (i.e., Google Docs, Mind Map, and Microsoft Word) to improve my English Skills.	26.3	57.1	16.1	1.91	.661

*Level of frequency: 1= Always, 2= Sometimes, 3= Never

Table 5 shows that students use different types of technology to improve their English skills, with varying frequencies. Word processing tools, such as Google Docs and Microsoft Word, have the highest mean

score (M = 1.91), indicating that students use them less frequently, mostly "sometimes." Social networking sites (M = 1.60) and online audio/video tools (M = 1.60) are used with similar frequency, typically between "sometimes" and "always." Smartphone or tablet apps (M = 1.59) are also regularly utilized, slightly more often than social media and online tools. Computer software (M = 1.53) has the lowest mean score, showing that it is the most frequently used, leaning more toward "Always." This means that while students use a variety of digital tools, they consistently rely on computer software to increase their English skills, whereas word processing tools are used less frequently. As a result, educators should increase the use of word processing tools to enhance writing skills, optimize the potential of computer software for advanced language learning functionalities, and promote a balanced integration of apps, social media, and online audio/video tools to support a more comprehensive and diverse approach to English language acquisition. To enhance social interactions, educators should focus on collaborative activities with word processing tools, such as group editing or peer feedback, to improve writing and teamwork. Integrating social media and audio/video tools into group tasks can foster communication and cultural exchange. Additionally, smartphone and tablet apps offer opportunities for interactive learning, and using them for group activities can further develop students' social and linguistic skills. A balanced use of these tools creates a dynamic learning environment, promoting both language proficiency and meaningful connections.

c. How do you feel about using the technology tools for learning English?

Table 6. Attitudes toward Utilizing Technology

Items	Statements	Level of Agreement %				M	SD
		SD	D	A	SA		
AUT1	I enjoy using technology while learning the English Language.	3.4	2.9	67.3	26.3	3.17	.635
AUT2	I know that technology can help me improve my English language learning.	2.4	1.0	57.6	39.0	3.33	.624
AUT3	I prefer using technology to enhance my speaking, reading, writing, and listening skills.	2.9	2.4	58.0	36.6	3.28	.655
AUT 4	I truely like studying the English language using online learning websites.	3.9	14.1	70.7	11.2	2.89	.633
AUT5	I believe that multimedia (i.e., computers, YouTube, Face book, Tik Tok, and Telegram) is an excellent technique to learn English.	1.5	8.8	70.7	19.00	3.07	.577
AUT6	I think using technology in mastering the English language is necessary.	4.9	5.9	39.0	50.2	3.35	.800
AUT7	I believe that technology tools are more effective in improving my language skills.	2.0	3.9	69.3	24.9	3.17	.582

*Level of Agreement: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4= Strongly Agree

The results in Table 6 indicate that students generally have a positive attitude toward using technology for English-language learning. Across the various statements, the mean scores range (M) from 2.89 -- 3.58, indicating that most students agree with the positive statements regarding technology's role in their language education.

Students show moderate agreement with the enjoyment of using technology in their English studies (M = 3.17) and recognize its ability to enhance their language skills, including speaking, reading, writing, and listening (M = 3.28). They also believe in the value of multimedia platforms such as YouTube, Facebook,

TikTok, and Telegram for learning English, with a mean score of 3.07, indicating a favorable but slightly more neutral stance compared with other items.

The belief that technology is necessary for mastering English is strongly supported (M = 3.35), as is the effectiveness of technology tools in improving language skills, which garnered the highest level of agreement (M = 3.58). The slightly lower score for studying English via online learning websites (M = 2.89) suggests that while students are generally positive, they might have some reservations or prefer other methods of using technology.

On the basis of these findings, educators are encouraged to integrate multimedia platforms such as YouTube and Telegram into their teaching strategies to leverage students' positive perceptions. Additionally, addressing potential reservations about online learning websites by enhancing accessibility and the user experience is crucial. Educators should also design engaging and enjoyable activities that incorporate technology to further motivate students in their English language learning journeys. Additionally, these findings provide important insights for fostering students' social engagement in language learning. Educators should consider integrating multimedia platforms such as YouTube and Telegram into teaching strategies, as students already perceive these platforms as valuable resources for English learning. These platforms can facilitate collaborative activities such as group discussions, video creation, or cultural exchange projects, promoting communication and cultural understanding among peers.

d. Which of the following technologies are helpful for enhancing or improving your knowledge and skills in learning the English language?

Table 7. Technology assisting in language learning

Items	Statements	Level of Agreement %				M	SD
		SD	D	A	SA		
TALL1	Computer software (i.e., Google Translate Desktop, and Longman Dictionary) for learning English is very helpful to improve my language skills.	1.0	4.9	69.3	24.9	3.18	.553
TALL2	Social networking sites (i.e., Facebook, Twitter, Instagram, and Telegram) are very helpful to develop my communication, reading, and writing skills.	.5	5.9	71.2	22.4	3.16	.529
TALL3	Online audio and video tools (i.e., YouTube, Skype, MP3 players, Tik Tok, and podcasts) are very helpful to enhance my speaking and listening kills.	2.4	8.3	68.3	21.0	3.08	.621
TALL4	Smartphone or tablet apps (i.e., Learn English Grammar App, Dictionary App, Paragraph App, and English Listening App) are very useful to develop my language skills.	2.0	.0	65.9	32.2	3.30	.501
TALL5	Word processing (i.e., Google Docs, Mind Map, and Microsoft Word) is very useful in developing my writing skills.	1.0	8.8	72.2	18.0	3.07	.551

*Level of Agreement: 1= Strongly Disagree, 2= Disagree, 3= Agree, 4= Strongly Agree

The findings from Table 7 indicate that all the listed technologies are generally perceived as helpful in enhancing English language skills, with mean scores (M) ranging from 3.07 -- 3.30. The smartphone or tablet apps received the highest agreement (M = 3.30), followed by computer software (M = 3.18) and social networking sites (M = 3.16). Online audio and video tools (M = 3.08) and word processing tools (M = 3.07) were also viewed positively. On the basis of these findings, teachers should prioritize the integration of mobile

apps into their curriculum to increase student engagement, utilize computer software and social networking sites to cater to diverse learning needs, and incorporate online audio/video tools and word processing applications to further enhance and diversify language learning experiences. Moreover, to support students' social interactions, educators should integrate mobile apps, which enable group challenges, real-time communication, and collaborative tasks, to help students build linguistic and social skills. Computer software and social networking sites can also facilitate authentic conversations and group activities, enhancing cultural exchange and communication. Additionally, online audio/video tools and word processing applications foster collaboration on multimedia projects, promoting interaction and feedback.

In short, to answer research question one, the results in terms of the current state of technology usage at NUBB show that students frequently use technology for English learning, with online searching (M = 1.47) being more common than watching media (M = 1.67). Computer software is the most commonly used tool (M = 1.53), whereas word processing tools are used less often (M = 1.91). Students have a generally positive attitude toward technology in their learning, with strong agreement on its effectiveness in improving language skills (M = 3.58). Mobile apps are viewed as the most helpful (M = 3.30), followed by computer software (M = 3.18), showing a clear reliance on digital tools for language learning.

The findings suggest that students at NUBB frequently use technology for English learning, with online searching being more common than watching media. Educators should consider incorporating more opportunities for students to engage in online research and integrate computer software and mobile apps, which students find particularly helpful. Given the positive attitude toward technology effectiveness, teachers should leverage mobile apps and computer software to enhance language learning and ensure that tools such as word processors are utilized more effectively in the classroom. This approach can help maximize the benefits of digital tools in language education. Interestingly, given the positive perception of technology, educators should use mobile apps and computer software to promote active learning and communication. These tools allow students to engage with peers, participate in discussions, and access language resources, supporting both social and language skill development. The incorporating of word processors and collaborative tools can further encourage group work and peer feedback, promoting an interactive learning environment. By focusing on these tools, educators can enhance linguistic growth and social interaction, preparing students for effective global communication.

4.4. The findings are based on research question number two: Is there a statistically significant difference between male and female freshmen in their perceptions of the integration of educational technology in English learning?

Table 8. Independent sample t test between sexes

	Gender	N	Mean	SD	t	df	Sig
totalup	Male	46	1.64	.443	-1.224	73.621	.225
	Female	159	1.55	.447			
totaltts	Male	46	1.72	.392	-1.536	68.660	.129
	Female	159	1.62	.361			
totalaut	Male	46	3.10	.508	1.247	59.989	.217
	Female	159	3.20	.376			
totalelos	Male	46	3.00	.379	2.162	70.271	.034
	Female	159	3.14	.361			
totaltall	Male	46	3.13	.346	.707	74.726	.482
	Female	159	3.17	.356			
p value < 0.05 =statistically significant; p value ≥ 0.05 = not statistically significant							

Table 8 presents the results of an independent sample t-test to analyze gender differences in the integration of educational technology at NUBB. The p-values for most variables—totalup (p = 0.225), totaltt (p = 0.129), totalaut (p = 0.217), and totaltall (p = 0.482)—are greater than 0.05, indicating that there are no statistically significant differences between male and female students in these areas. However, the totalelo variable (p = 0.034) is statistically significant, showing that females are more likely to integrate technology at lower levels than males are. This could be attributed to factors such as a greater sense of responsibility toward academic performance or a greater level of motivation to improve language skills, which often results in better overall outcomes. Furthermore, females may exhibit more consistent and deliberate use of technology, leading to more effective and focused learning, which in turn enhances their language proficiency. To empower students' social connections, educators can design technology-based activities that encourage collaboration between genders, leveraging the strengths of both groups. For example, group projects using educational apps or collaborative platforms can promote interaction, teamwork, and the exchange of ideas. Additionally, teachers

could provide targeted support to ensure that both male and female students engage with technology at various levels, helping to create a balanced and inclusive learning environment.

4.5. The findings are based on research question number three: Are there significant differences in freshmen's perceptions of educational technology integration in English learning across different age groups?

Table 9. One-way ANOVA among ages

		Sum of Squares	df	Mean Square	F	Sig.
Usage Purpose (UP)	Between Groups	.410	2	.205	1.028	.360
	Within Groups	40.314	202	.200		
	Total	40.724	204			
Types of Technology (TTs)	Between Groups	.428	2	.214	1.573	.210
	Within Groups	27.479	202	.136		
	Total	27.907	204			
Attitude of Utilizing Technology (AUT)	Between Groups	.805	2	.402	2.422	.091
	Within Groups	33.558	202	.166		
	Total	34.363	204			
Technology Assisting in Language Learning (TALL)	Between Groups	1.348	2	.674	5.650	.004
	Within Groups	24.091	202	.119		
	Total	25.439	204			
English Learning Outcomes (ELOs)	Between Groups	.942	2	.471	3.553	.030
	Within Groups	26.782	202	.133		
	Total	27.724	204			

p value < 0.05 =statistically significant; p value ≥ 0.05 = not statistically significant

Table 9 shows the results of a one-way ANOVA examining the impact of age on freshmen's use of technology for learning English. The ANOVA results revealed no significant differences among the age groups in terms of usage purpose or type of technology used ($p = 0.36$; $p = 0.210$). However, attitudes toward utilizing technology are approaching significance ($p = 0.091$). Significant differences are found in how technology assists in language learning ($p = 0.004$) and its impact on English learning outcomes ($p = 0.030$), indicating that age influences these perceptions. These findings suggest that while age does not significantly affect how technology is used, it does impact the effectiveness of technology in supporting language learning and improving English outcomes.

The findings suggest that while age does not significantly influence the types of technology used for English learning, it does affect students' perceptions of technology effectiveness in improving their language skills. Educators should consider tailoring instructional strategies on the basis of age-related differences in how students perceive the impact of technology, particularly in terms of its role in enhancing learning outcomes. This could involve offering age-specific training or support to maximize the effectiveness of technology in language education. Ultimately, to enhance students' social interactions, educators can implement collaborative activities, such as group assignments or mentoring programs, that bring together students from different age groups. Engaging in real-time discussions, role-playing scenarios, and problem-solving exercises can foster teamwork while developing both linguistic and interpersonal abilities. Acknowledging age-related differences in perspectives can contribute to creating a more inclusive and supportive learning environment.

4.6. The findings are based on research question number four: What is the positive impact of educational technology on students' outcomes in learning English?

Table 10. Regression coefficients and hypothesis testing

Hypothesis	Relationship	Beta	SE	t value	Sig.	Decision
H 1	UP → ELOs	.047	-.126	-2.192**	.030	Supported
H 2	TTs → ELOs	.058	-.106	-1.817*	.071	Supported
H 3	AUT → ELOs	.053	.155	2.602**	.010	Supported
H 4	TALL → ELOs	.063	.511	8.516***	.000	Supported

Beta=regression weight. SE=standard error. Sig. = Significant, *p<.10 (marginally significant); **p<.05 (significant); *** p<.01 (highly significant)

The regression coefficients and hypothesis testing show that UP (H1) has a significant positive effect on ELOs (β = 0.047, p = 0.030). This means that as UP increases, ELOs also increases. AUT (H3) has a significant positive effect (β = 0.053, p = 0.010). This means that as AUT increases, so does ELOs. In addition, TALL (H4) has a strong, highly significant positive effect (β = 0.063, p = 0.000). Therefore, the relationships between H1, H3, H4 and ELOs are well supported. On the other hand, the effect of TTs (H2) on ELOs is only marginally significant (β = 0.058, p = 0.071) but still provides support for this relationship. This suggests that while most relationships are strong and reliable, the effect of TTs requires further investigation because of its borderline significance.

On the basis of these findings, educators and curriculum developers should focus on fostering a purposeful and positive attitude toward technology in their teaching strategies. Encouraging students to use technology with clear, goal-oriented purposes and integrating effective technological tools that assist in language learning can enhance their academic performance. Additionally, while the type of technology (TT) has a marginally significant effect on ELO, further research and refinement of technological tools may be necessary to fully understand and optimize its role in language learning. Educators can enhance social interactions by incorporating technology into collaborative tasks such as group projects, virtual discussions, and peer review activities. The use of tools such as messaging apps, collaborative platforms, and virtual whiteboards promotes teamwork, active participation, and practical language use. By focusing on purposeful, interactive activities and tailoring technological tools to meet students' needs, educators can strengthen both language proficiency and interpersonal skills while fostering an inclusive learning environment.

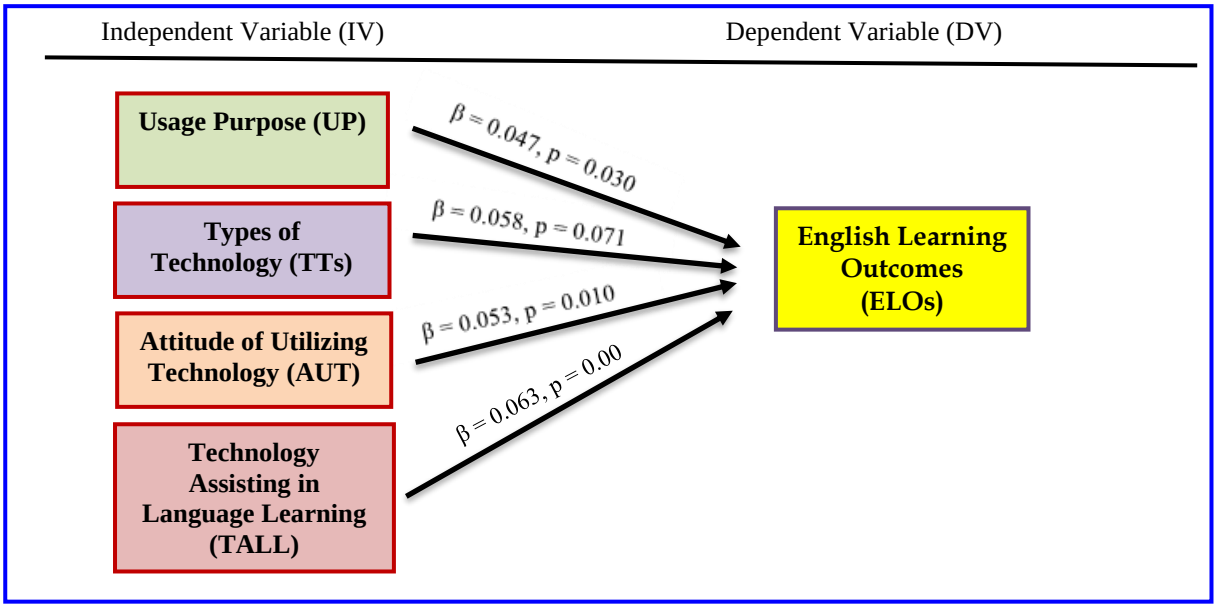

Figure 2. Regression and hypothesis testing

The primary objective of this study was to investigate the students' perceptions and influence of technology integration on their learning outcomes in English at the National University of Battambang (NUBB). Several key findings emerged from the analysis, which addressed the research objectives and provided insight into how educational technology impacts English learning outcomes.

In response to the first research question, which examines the current state of educational technology use, the findings on technology usage at NUBB indicate that students frequently use technology for English learning, with online searching (M = 1.47) being more prevalent than watching media (M = 1.67). Dogruer et al. [114] reported in a previous study that certain online platforms, such as search engines, provided a comfortable environment for students, with 80% of the study participants preferring these tools because of their ease of use and efficiency. Computer software (e.g., Google Translate Desktop, Longman Dictionary) is the most utilized tool (M = 1.53), whereas word processing tools are used less frequently (M = 1.91). Students generally hold a positive attitude toward using technology in their learning, with strong agreement on its effectiveness in enhancing language skills (M = 3.58). These findings align with previous research reviewed in the literature. For example, Peregoy and Boyle [71] reported that user-friendly technology tools significantly improve students' reading and writing abilities, enabling faster and more efficient learning. Chapelle [86] and Gordon [87] similarly emphasized the crucial role of technology in enhancing language skills. Recent studies, such as Yuberta [115] and Ningsih et al.

[116], reported that students hold positive views on technology integration in their learning, whereas Nomass [85] reported a growing reliance on mobile apps and computer software for language learning, with tools such as grammar apps and dictionaries boosting confidence in reading and writing.

The second objective aimed to explore gender differences in the perception of educational technology integration. The results revealed no statistically significant differences between male and female students in most areas, including the frequency of technology use and overall perceptions. However, one significant difference was found: females were more likely than males were to engage in lower-level technology integration. This suggests that while overall technology adoption is similar across genders, specific types of technology use may vary, with females possibly relying more on foundational digital tools in their learning process. Gender differences in educational technology integration can be understood within the context of Cambodian social norms, where traditional roles and societal expectations significantly shape access to and use of technology. Cambodian females often face the dual responsibility of managing academic commitments alongside familial duties, which may explain their inclination toward using foundational digital tools that prioritize efficiency in learning. As Kay [117] and Korlat et al. [118] observed differences in how male and female students engage with technology, while there were no significant disparities in overall usage, variations did exist in specific patterns, such as greater adoption of lower-level or foundational technologies by females. In addition, these findings reflect Cambodia's wider sociocultural context, where female education is gaining more emphasis but continues to face obstacles rooted in traditional expectations [119].

To address the third objective–whether there are significant differences in freshmen's perceptions of educational technology integration in English learning across different age groups–the results from the one-way ANOVA demonstrated no significant differences in technology use across different age groups. However, significant differences were observed in perceptions of how technology supports language learning and its impact on English learning outcomes. This finding indicates that while the age of freshmen does not significantly affect their choice of technology, it does influence their attitudes toward the effectiveness of these tools in enhancing their English language skills. This finding suggests that younger and older students may perceive the benefits of educational technology differently, with age playing a role in shaping expectations and experiences. This result was the same as those of previous studies conducted by Teo [120], Staddon [121], Alzaidiyeen [122], and Haidari et al. [123], who reported no significant differences in attitudes toward technology between mature and younger students. However, Taghizadeh & Hasani Yourdshahi [124] reported that learners' perceptions of technology effectiveness in enhancing skills can vary with age. This suggests that while age does not directly influence technology use, it may shape attitudes toward its benefits and outcomes in language learning.

The final objective was to examine the positive impact of technology on students' English learning outcomes. The analysis revealed key factors affecting English learning outcomes (ELOs) for freshmen at NUBB. Usage purpose (UP, H1) had a positive effect on ELO ($\beta = 0.047$, $p = 0.030$), meaning that the more UP is present or increases, the better or higher the ELOs score. On the other hand, attitudes toward technology (AUT, H3) had a positive effect ($\beta = 0.053$, $p = 0.010$), indicating that students learn better when they use technology on their own. Technology assisted in language learning (TALL, H4) had the strongest positive effect ($\beta = 0.063$, $p = 0.000$), indicating that these tools are very helpful. Types of technology (TTs, H2) had a small effect ($\beta = 0.058$, $p = 0.071$), meaning that more research is needed to understand its role in improving students' English learning. In short H1, H3, and H4 support well-supported ELOs, whereas H2 marginally supports ELOs. The findings of this study are consistent with those presented in the literature review by Kasapoglu-Akyol [88], Peregoy & Boyle [89], and Herron & Seay [90], who demonstrated that utilizing educational technology enhances students' reading and writing abilities, accelerates and facilitates effective learning, promotes independent learning, and serves as a critical factor in effective language acquisition. Collectively, these improvements contribute significantly to achieving the desired learning outcomes. Similarly, a recent study by Rintaningrum [125] revealed that integrating learning apps enhances various language skills, including reading, writing, and collaborative abilities. However, challenges such as tool availability and the rapid pace of technological change may affect implementation, similar to the context at NUBB.

Additionally, several recent studies have further emphasized the positive impact of technology on English learning outcomes. Jennifer [126] indicated that technology integration enhances language learning skills and communication abilities, leading to improved outcomes. Meanwhile, Harper et al. [127] revealed that computer-assisted language learning (CALL) positively affected student outcomes, reinforcing the effectiveness of technology-assisted language tools in language learning. finally, Turdiyeva [128] demonstrated that interactive technologies increased motivation and engagement, further contributing to enhanced English learning outcomes.

A limitation of this research is the sample size and diversity. The study involved 205 freshmen from the National University of Battambang, which might not represent all freshmen in Cambodia. Additionally, the research only used a quantitative method. This means that it provides statistical data but does not capture the detailed experiences of students with technology in learning English. Using both quantitative and qualitative methods could provide a more complete understanding of the impact. Additionally, the technology illustrated in this research mainly refers to computer software, social networking sites, audio and video online, smartphone and

tablet apps, and word processing. This focus may overlook other forms of technology that could influence learning, limiting the comprehensiveness of the findings.

5. CONCLUSION

Research at the National University of Battambang (NUBB) shows that students frequently use technology for English learning, with online searches and computer software being the most common tools. Mobile apps and software are regarded as highly effective for improving language skills. Students also have a positive attitude toward technology, which increases their learning outcomes. However, there are no significant gender differences in most areas, except that female students integrate technology at lower levels than male students do. The findings also reveal that while age does not significantly affect general technology use, it influences how effectively technology supports language learning. Additionally, technology-assisted language learning has the strongest positive effect on English learning outcomes.

On the basis of these findings, educators should incorporate mobile apps and computer software to enhance students' social skills through collaborative activities, peer interaction, and immediate feedback. Technology can also help bridge gender differences by promoting inclusive participation and teamwork. Moreover, acknowledging age-related perspectives allows for more tailored learning strategies and encourages cross-generational collaboration. By strategically utilizing technology, educators can create an engaging, socially connected learning environment that promotes both language development and interpersonal skills, preparing students for effective global communication and cultural integration.

Future research should adopt a qualitative approach to explore individual experiences with educational technology, focusing on how specific tools enhance language learning. Attention should also be given to gender differences in technology use and age-related perceptions of its effectiveness to better understand its impact on English learning outcomes.

The recommendations for various stakeholders emphasize the need for an integrative approach to enhance English language learning. Teachers are encouraged to promote diverse technology use by introducing tools beyond basic online searches, such as language learning apps and educational software. Students should maximize the use of mobile apps and software like the Learn English Grammar App, Dictionary App, and Google Translate Desktop, which are highly effective for improving English skills. Additionally, universities should invest in updated educational technology, including advanced language learning software and mobile apps, to create a more supportive environment for English language acquisition.

ACKNOWLEDGEMENT

We extend our heartfelt gratitude to Dr. Sam Rany for his exceptional guidance, support, and expertise throughout this research project. His thoughtful feedback, encouragement, and unwavering commitment were instrumental in shaping the direction and quality of this study. Dr. Rany's profound knowledge in the field, coupled with his willingness to share insights and provide constructive criticism, greatly enriched this work. His mentorship and dedication have been a constant source of inspiration, and we feel truly privileged to have had the opportunity to learn from him.

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