

# Final-Year UPTM Undergraduates' Attitudes Towards Technology in Learning English

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## ABSTRACT

This study investigates final-year UPTM undergraduates' attitudes towards technology in learning English. Technology has been widely used in education for effective learning; therefore, it is crucial to understand students' attitudes towards it to develop better learning strategies. This research aims to identify which kind of technology is more effective for students in learning English and to investigate students' attitudes towards using technology in learning English. A quantitative approach was employed using a structured questionnaire distributed to 100 students across three facilities, all of which offer programmes for non-English majors. The collected data were analysed descriptively to measure the frequency and patterns of technology use. The findings revealed that the majority of students have positive attitudes towards technology, including Google Translate, WhatsApp, TikTok, Duolingo, and Google Docs. However, digital tools with limited accessibility, such as Apple Pages, showed lower usage. These findings suggest that students are willing to use technology in learning English when the tools are practical, accessible, and aligned with their learning needs. This study concludes that fostering positive attitudes towards technology can enhance self-learning and effective language learning experiences.

**Keywords:** *Undergraduates, Technology, Attitudes, English Language Proficiency*

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## INTRODUCTION

English has become the dominant language for international communication, education, business, and professional development. Its widespread use extends beyond everyday communication to knowledge dissemination, skills development, social interaction, and career advancement. As highlighted by Sela and Luke (2020), English plays a central role in teaching and learning, communication, the transfer of both soft and hard skills, social status, and business interactions. Consequently, English proficiency has become an essential competency for individuals seeking greater educational and employment opportunities in an increasingly interconnected world.

The rapid advancement of digital technology has further transformed English language learning, particularly following the COVID-19 pandemic. The unprecedented disruption caused by the pandemic accelerated the adoption of technology-enhanced learning, requiring educational institutions worldwide to transition from conventional face-to-face instruction to online learning environments (Starkey et al., 2021). This transition ensured educational continuity while simultaneously exposing students and educators to various digital learning platforms and resources (Iman et al., 2023). As a result, technology has become an integral component of English language education rather than merely a supplementary learning tool.

The growing availability of educational technologies has created new opportunities for learners to improve their English proficiency. Numerous digital platforms, including language-learning applications such as Duolingo, massive open online courses (MOOCs) such as Coursera, and educational content available through social media platforms like TikTok, provide learners with flexible and interactive learning experiences. These technologies offer features such as immediate feedback, personalised learning pathways, multimedia content, and interactive exercises that accommodate diverse learning preferences and promote learner engagement (Vardhini, 2023). Such innovations have shifted English language learning towards a more learner-centred and self-directed approach.

Despite these advantages, technology adoption in English language learning remains uneven among university students. Access to digital learning resources is often influenced by socioeconomic conditions, geographical location, and digital literacy. Students from underprivileged or rural communities frequently experience unequal access to digital technologies, creating disparities in learning opportunities (Sari & Abrar, 2024). Although government initiatives have provided devices such as laptops and tablets to support digital education, inadequate internet connectivity, outdated hardware, and limited technical support continue to hinder effective use of technology. Furthermore, financial constraints may prevent students from accessing premium learning applications or acquiring the digital competencies necessary to maximise technology-enhanced learning (Sari & Abrar, 2024). These challenges contribute to the widening digital divide, limiting the potential benefits of technology for English language acquisition.

In addition to infrastructural barriers, students' attitudes towards educational technology play a critical role in determining its successful adoption. While many learners recognise the benefits of digital learning, others perceive technology-assisted learning as monotonous, exhausting, or less effective than traditional classroom instruction. Such perceptions may reduce participation in online learning activities and negatively influence learning outcomes (Widayanti & Suarnajaya, 2021). Since technology has become deeply embedded in higher education, understanding students' perceptions and experiences is essential for promoting meaningful engagement with digital learning environments.

Negative attitudes towards technology may also stem from limited digital competence, low self-confidence, insufficient motivation, or previous negative experiences with technology-based learning (Khasawneh, 2022). Consequently, some students continue to prefer conventional face-to-face instructional approaches despite the increasing availability of digital learning resources. Although traditional teaching methods remain valuable, they may not fully equip learners with the digital competencies and autonomous learning skills required in today's technology-driven educational landscape.

Given the increasing reliance on technology in higher education, it is important to understand how university students perceive the use of technology in learning English. Existing challenges related to digital access, technological competence, and learner attitudes suggest that technology alone does not guarantee effective learning outcomes. Instead, students' acceptance and perceptions of educational technology significantly influence its effectiveness. Understanding these attitudes

can assist educators, curriculum developers, and policymakers in designing more inclusive, engaging, and technology-supported English language learning environments. Therefore, this study aims to examine the types of technology preferred by undergraduate students for learning English and to investigate their attitudes towards the use of technology in English language learning.

### **Research Objectives**

This study aims to:

1. Identify the types of technology that are most suitable for undergraduate students in learning English.
2. Investigate undergraduate students' attitudes towards the use of technology in learning English.

### **Research Questions**

The study addresses the following research questions:

1. What types of technology are most suitable for undergraduate students in learning English?
2. What are undergraduate students' attitudes towards using technology in learning English?

## **LITERATURE REVIEW**

### **English as a Second Language (ESL)**

English serves its function as the medium of communication and instruction, whether for education, business and personal daily talks. Today, English has become one of the official language subjects that is compulsory to teach and learn in school. Starting from the pre-school, primary, secondary and tertiary education levels (Abu Bakar et al., 2021). Furthermore, the widespread use of English has several benefits for society, including opening up more career opportunities, providing access to global knowledge for personal input, and enabling cross-cultural communication across diverse cultures and races (Akther, 2022; Brooker, 2018; Zhang, 2024).

In today's era, English plays a crucial role in tertiary-level education in Malaysia. English has been the medium of instruction in many universities, particularly for science, technology, engineering, mathematics, business, and medicine programmes (Rao, 2019). In the learning process, materials related to the programmes are most likely to be written in English, such as academic textbooks, research papers, and journal articles. This issue demonstrates that it is essential for students to have the proficiency and skills needed to understand and absorb the information provided by their educators' materials and instructions (Zhou & Thompson, 2023). English and tertiary education need to be integrated, as they may help students develop critical thinking skills, global perspectives, and broader career opportunities. Many multinational companies and industries prioritise employees with strong English communication skills (Ting et al., 2017).

### **The Role of Technology in Learning English**

The use of technology in learning English has been widely adopted, offering innovative applications of methods, tools, materials, devices, systems, and strategies that are considered relevant to achieving the desired aims and objectives of learning English (Shahid et al., 2023). According to Baretto (2018), students are more likely to become motivated to learn English when technology is used.

Technology offers several options for efficient academic advancement (Patel, 2013). Therefore, technology plays a crucial role in learning English by acting as a medium of instruction (Ghafar & Mohamedamin, 2022). It offers students a more structured and interactive learning environment through digital platforms such as e-learning websites, mobile applications, and online learning (Basak et al., 2018). Furthermore, technology may act as a tool for communication and interaction (Akyürek, 2019). Constant interaction with these students may build their confidence to use English in real-life situations (Tabasi et al., 2024). In addition, technology provides resources for language exposure (Tabasi et al., 2024). Moreover, technology has several digital platforms that improve server quality year by year. According to Albinson et al. (2020), these digital platforms can serve as assessment and feedback tools, offering immediate and detailed evaluations of students' progress. It also works as a personalised learning server for students (Binhammad et al., 2024).

## **Types of Technology in Learning English**

According to Al-Sharqi & Abbasi (2020), technology offers various ways to learn English through digital tools and platforms that are rapidly growing in today's era. Many aspects of language acquisition, such as vocabulary building, communication, listening comprehension, writing, and collaboration, are areas that these digital tools and platforms may support (Vardhini, 2023). Below are some of the main types of technology used in learning English, to help readers understand what they are and how they support students. Each of them plays a unique role in helping students improve and learn English by providing accessible, interactive, and efficient learning experiences (Porcel et al., 2024).

Using computer software to learn English is a common practice among students, especially at the tertiary education level (Kim & Bae, 2020). Several software programmes are widely available, such as Merriam-Webster, Grammarly, Google Translate, and ChatGPT. These support language learning by offering grammar correction, vocabulary expansion, and accurate translations (Kim & Bae, 2020; Farhan, 2025).

Communication and interaction are equally important in improving English usage. Therefore, social networking sites such as Discord, WhatsApp, X (Twitter), and Instagram have a crucial role in social connections. These platforms allow students to practice English naturally and collaboratively by offering real-time communication and exposure to informal English usage (Jannah & Hentasmaka, 2021; Ahchutan, 2021).

For auditory and visual learners, online audio and video tools like YouTube, TikTok, Podcasts, and Spotify may provide a preferred learning environment for engaging, immersive English learning experiences. YouTube and TikTok are widely used for pronunciation and grammar tutorials, as well as educational entertainment. Podcasts and Spotify improve listening skills and exposure to authentic English speech (Rufino, 2024; Paulinsyah et al., 2024).

Smartphone and tablet applications such as Busuu, Hello English, Duolingo, and BBC Learning English are designed to provide engaging and personalised lessons tailored to individual needs and preferences. They offer structured and gamified lessons that enhance students' motivation and support personalised learning (Amin, 2021; Bharathi, 2023).

Finally, word processing programmes such as Google Docs, Microsoft Word, Apple Pages, and WPS Office Writer are crucial, as they facilitate collaborative writing and grammar correction, thereby enhancing students' academic writing skills (Philo & Angstadt, 2020; Ningsih, 2023).

## **Attitudes Towards Technology in Learning English**

Abdul Rauf & Swanto (2020) stated that attitudes are an individual's point of view, either positive or negative. Attitudes can be seen as three elements: affective, cognitive, and behavioural (Haddock & Maio, n.d.). There is a term called computer attitude, which has been defined to be a person's general attitude or evaluation of favour or animosity towards computer technology or specific computer-related activities (Smith et al., 2000). Computer attitude evaluation typically

involves statements that assess an individual's interactions with computer hardware, software, and other individuals involved in computer activities (Palaigeorgiou et al., 2005).

### ***Positive Attitudes Towards Technology in Learning English***

Nowadays, most students show positive attitudes towards technology, which can be divided into three major aspects: affective, cognitive, and behavioural. In the affective domain, those who enjoy utilising technology in their learning are more likely to feel motivated and confident to learn English (Negoescu & Mitulescu, 2023). In the cognitive domain, students with positive attitudes are more likely to recognise technology's effectiveness in learning (Carmi, 2024). Lastly, from a behavioural perspective, students with positive attitudes towards technology tend to be more active in using digital platforms for learning English (Mohd Sulaiman & Wan Ibrahim, 2024). Students may demonstrate their willingness and openness to adapt to new learning methods by using technology and fully shifting from traditional methods to maximise their learning experiences.

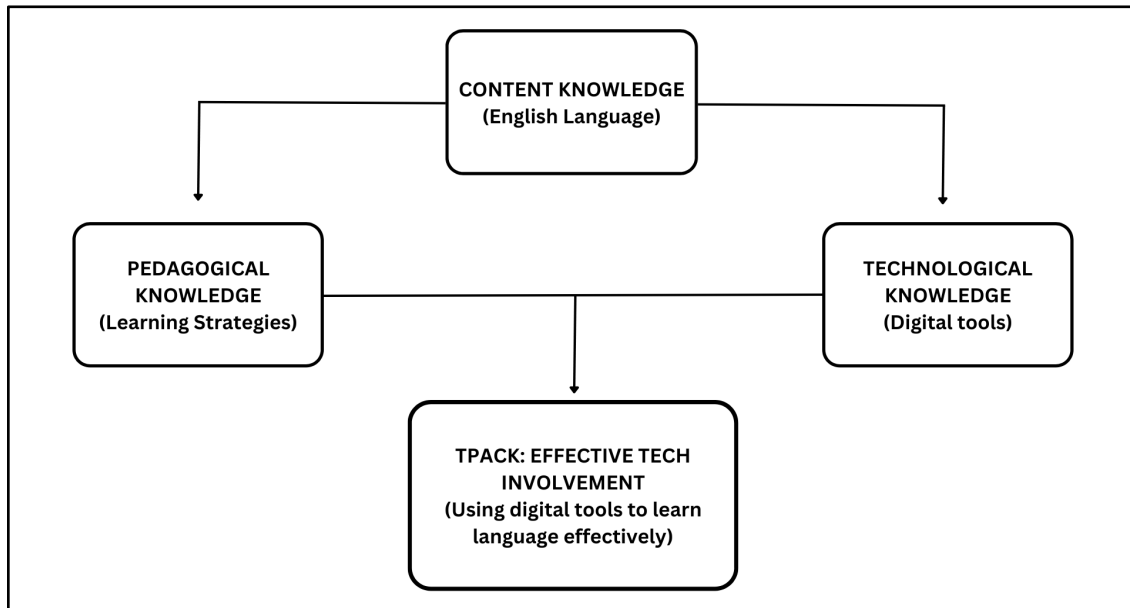
### ***Negative Attitudes Towards Technology in Learning English***

In contrast to positive attitudes, some students may show negative attitudes towards technology in English learning, as they may encounter several barriers and limitations. In the affective domain, some students may feel burdened, anxious, or overwhelmed when technology is integrated into new learning methods, a phenomenon known as technostress (Saleem et al., 2024). Furthermore, from a cognitive perspective, technology may seem ineffective or useless, as they believe traditional learning methods offer better learning outcomes (Masalimova et al., 2024). In terms of behaviour, some students avoid using technology completely (Mohamad et al., 2022). Negative attitudes towards technology can create barriers to fully optimising students' potential in learning English through technology.

## **Theoretical Framework: Technological Pedagogical Content Knowledge (TPACK)**

### **Figure 2.0**

Theoretical Framework: Technological Pedagogical Content Knowledge (TPACK)



The Technological Pedagogical Content Knowledge (TPACK) framework was introduced by Mishra and Koehler (2005) (Schmidt et al., 2009). Shulman’s (1986) concept of Pedagogical Content Knowledge (PCK) gave rise to TPACK, which he combined with Technological Knowledge (TK) (Schmidt et al., 2009). According to Schmidt et al. (2009), this theory comprises three main factors: first, Content Knowledge (CK) refers to the subject matter, like the English language. Second, Pedagogical Knowledge (PK) refers to the approaches of teaching. Third, Technological Knowledge (TK) refers to the ability to utilise digital tools effectively.

Therefore, based on this study, TPACK is considered the most suitable theory to explain how students use technology in their English learning process. In summary, TPACK can help readers understand how students’ attitudes towards technology most logically enhance their English learning experience.

## METHODOLOGY

This study employs a quantitative research design by distributing structured questionnaires adapted from prior research examining the effects of technology on learning English as a Foreign Language among female EFL students at Effat College (Alsulami, 2016). The population comprises 100 final-year students from 10 non-English major programmes across three faculties at UPTM. Non-probability convenience sampling is used when it involves non-random sampling based on purposive or other criteria, which may allow easy access for the researcher to collect data (McCombes, 2019). The questionnaire consists of three sections: demographic information, types of technology used, and attitudes toward technology in English learning. The three sections are asked using two types of questions: Multiple-Choice and Likert Scale. All collected data were analysed descriptively using IBM SPSS Statistics 29.0.2 to determine frequencies and percentages.

**Table 3.1**  
Data Analysis

Section	Details	Types of questions	Proposed Data Analysis

Section A	<b>Question 1–8</b> (Gender, Age, Primary language, Faculty, Course, Technology definition, Do participants use technology in learning English, and How often participants use technology in learning English)	Multiple-Choice	Descriptive Analysis
Section B	<b>Questions 9-13</b> (Types of technology used in learning English)	Multiple-Choice	Descriptive Analysis
Section C	<b>Questions 14-23</b> (Attitudes towards using technology in learning English)	Likert Scale	Descriptive Analysis

## FINDINGS AND DISCUSSION

### Findings of Section A: Demographic Questions

The demographic analysis of the 100 respondents revealed several key characteristics. In terms of gender, 55% of participants were female and 45% were male. The majority of respondents were between 21 and 23, which aligns with the typical age range of final-year undergraduates. Regarding primary language, a large portion of the students (86%) reported Malay as their first language, followed by English (12%) and Tamil (2%). Students came from three faculties: 40% were from the Faculty of Business and Accountancy (FABA), another 40% from the Faculty of Computing and Multimedia (FCOM), and the remaining 20% from the Faculty of Education, Social Sciences and Humanities (FESSH). Each faculty was represented by specific non-English major programmes, with 10 students from each programme. When asked about their familiarity with the term “technology,” the majority demonstrated an accurate understanding. Most respondents also reported using technology to learn English and indicated frequent usage, suggesting that digital tools have become an integral part of their academic routines. This demographic profile provided a diverse yet relevant sample for investigating students' attitudes toward using technology in English language learning.

### Findings of Section B: Research Question 1: Types of Technology Used in Learning English

**Table 4.0**

Findings of Section B: Research Question 1: Types of Technology Used in Learning English

No.	Types of Technology Used in Learning English	Findings

1.	Computer software for the learning English category	For the category "computer software for learning English," Merriam-Webster Dictionary had the lowest score among all answer choices, with only 6 respondents (6.0%). In contrast, Grammarly starts with a progressive score of 48 (48.0%) respondents. Followed by ChatGPT with 89 (89.0%) respondents and Google Translate with a slightly higher score of 91 (91.0%) respondents.
2.	Social networking sites category	WhatsApp has the highest score among all social networking sites, with 95 respondents (95.0%). Followed by Instagram and X (Twitter), with slight differences between the two, where Instagram has 48 (48.0%) respondents and X (Twitter) has 43 (43.0%) respondents. The lowest score here is Discord, with only 33 (33.0%) respondents.
3.	Online audio and visual tools category	The findings from this questionnaire indicate that the majority of respondents chose TikTok as their preferred online audio-visual tool, with TikTok receiving the highest score (93.0%). Second place is YouTube, with 89 respondents (89.0%). The third place is Spotify, with 33 (33.0%) respondents. The least preferred among these online audio and visual tools is Podcasts, with only 24 (24.0%).
4.	Smartphone or tablet apps category	According to the data gathered, a significant number of respondents, totalling 79 (79.0%), chose Duolingo as their smartphone and tablet app. This is the highest score, as the second choice shows a large difference in votes, with only 25 (25.0%) respondents choosing Busuu. While BBC Learning English has only 16 (16.0%) respondents, and Hello English has only 13 (13.0%) respondents.
5.	Word processing category	The findings of the questionnaire indicate that 98 (98.0%) of the respondents picked Google Docs as the highest-scoring word processing tool, receiving 98 (98.0%) of the votes. Followed by Microsoft Word with 40 (40.0%) respondents. Starting with WPS Office Writer, a significant difference from Google Docs is evident: WPS Office Writer collected only 24 (24.0%) respondents. Lastly, only 11 (11.0%) respondents chose Apple Pages as their preferred word-processing tool.

### Discussion of Research Question 1: Types of Technology Used in Learning English

The findings show that students are not only familiar with technology but also comfortable navigating digital tools as they learn English and advance academically. In this case, the findings showed that students widely use technology, aligning with a previous study's argument that the availability and accessibility of digital tools may provide students with better opportunities for diverse and flexible English learning (Al-Sharqi & Abbasi, 2020).

In exploring the types of technology used for learning English, students demonstrated varying levels of engagement across the five main categories. For the computer software category, Google Translate and ChatGPT were among the most frequently used digital tools. This is due to their user-friendliness, immediate response, and accessibility. This is supported by a previous study that found students are more likely to use tools that provide ease of use and immediate help (Al-Sharqi & Abbasi, 2020). In theoretical terms, the TPACK framework proposed by Mishra and Koehler (2005) aligns well with these findings. It emphasises the importance of mixing content knowledge, pedagogical approaches, and technological skills to create effective learning experiences (Schmidt et al., 2009). Students are not using digital tools unintentionally; they serve their own purposes, such as enhancing English skills. This demonstrates the synergistic advantage of content (English), pedagogy (learning approaches), and technology (digital tools) (Schmidt et al., 2009). The students' attitudes provide evidence that technology can have a significant impact when it aligns with students' needs and objectives, as the TPACK

framework suggests. In contrast, the Merriam-Webster Dictionary software was used less frequently. It might be because students prefer using faster tools with AI-based features. It can be concluded that traditional digital dictionaries are shifting to smart tools like ChatGPT.

In addition, the findings show that, across social networking sites, WhatsApp has the highest usage, which aligns with a past study mentioned in Chapter 2: Literature Review. According to Porcel et al. (2024), WhatsApp is among the most effective ways to facilitate indirect English learning and informal communication. Conversely, X (Twitter) was the least-used social networking site for English learning. Students may prefer more active interaction to passive content and communication.

For online audio and visual tools, TikTok and YouTube were the most preferred platforms, strongly following past studies conducted by previous researchers, where they emphasised the role of audio and video content in improving the four main skills in English language learning, which are listening, speaking, reading, and writing, as well as overall comprehension (Rufino, 2024; Alvarez et al., 2024). Meanwhile, Podcasts and Spotify received the lowest responses. This might be due to students' preference for visual content and materials over audio content for English learning. This difference suggests that visual materials, such as videos and pictures, can be more effective and engaging for students.

Besides, in the next category, smartphone and tablet apps, tools like Duolingo showed that gamified tools received the most votes, as they are more fun due to their structure. Findings like these are consistent with a previous study that found mobile apps support engaging self-learning by personalising learning patterns (Paulinsyah et al., 2024). However, the Busuu application received the fewest votes among the applications provided. This is possibly due to lower visibility or fewer localised features, as discussed in a previous study analysing students' preferences (Amin, 2021).

Last but not least, in the word-processing category, Google Docs received the highest engagement from students. This is very likely due to its accessibility, real-time sharing features, and auto-save-to-drive capabilities, which enable smooth project writing and editing. This supports a finding from a previous study by an author who argued that effective learning tools should not only be educationally advantageous but also accessible and convenient for students (Basak et al., 2018). To show differences, Apple Pages had the lowest engagement rate among the students. Apple Pages is exclusively available for Apple device owners, specifically the MacBook or the iMac (computer). This is a limitation: it cannot reach other users without Apple devices. Gottschalk et al. (2023) emphasised that accessibility, including barriers, can influence engagement with digital tools and students' use.

In other words, students' attitudes towards technology in learning English are determined not only by how informative the tools are, but also by accessibility, availability, and relevance. The digital tools selected by the students are mostly popular, user-friendly, and suitable for use in their English revision routines.

## Findings of Section C: Research Question 2: Attitudes Towards Using Technology in Learning English

**Table 4.1**

Findings of Section C: Research Question 2: Attitudes Towards Using Technology in Learning English

No.	Attitudes Towards Using Technology in Learning English	Findings
1	I enjoy using technology while learning English.	The data reveal that a significant majority of respondents chose "strongly agree," with 74 (74.0%) selecting this option. The second-highest is the agree option, with 25 respondents (25.0%). Lastly, only 1 (1.0%) respondent disagreed with the statement.
2	I know that technology can help me improve my English.	The majority of the respondents agree and strongly agree with the statement. 67 (67.0%) of the respondents strongly agree, while the remaining 33 (33.0%) agree with the statement.
3	I prefer using technology to enhance my speaking, reading, writing, and listening skills.	According to the questionnaire, three opinions emerge. 71 (71.0%) of the respondents strongly agree with the attached statement, while 28 (28.0%) agree. However, 1 respondent (1.0%) disagreed with the statement.
4	I think using technology in mastering the English language is necessary.	The findings show that 66 (66.0%) of the respondents strongly agree, while the other 34 (34.0%) agree with the statement.
5	I believe that technology tools are more effective in improving my language skills.	The data collected from the findings are as follows: 68 (68.0%) of the respondents strongly agree, 31 (31.0%) agree, and only 1 (1.0%) disagrees with the statement in this question.

### Discussion of Research Question 2: Attitudes Towards Using Technology in Learning English

Based on the analysis, all students show positive attitudes towards technology in learning English overall. Statements such as "I enjoy using technology while learning English" ( $M = 4.72$ ,  $SD = 0.514$ ) from Table 5.0 and "I know that technology can help me improve my English" ( $M = 4.67$ ,  $SD = 0.473$ ) from Table 5.1 show that the majority of the students selected agree and strongly agree options. Mohd Sulaiman & Wan Ibrahim (2024) argued that behavioural attitudes are reflected in students' consistent use of technology, a finding supported by a strong willingness to use technology in their English learning activities. Not only that, but previous studies also align with these findings, showing that students motivate themselves through independent and personalised learning approaches. These students most likely choose digital tools that support vocabulary, grammar, and comprehension skills. Gamified applications and AI-assisted learning can also reflect the growing trend of self-ruling technology tools in English learning.

However, contrasts can be seen from the findings. As noted by Sari & Abrar (2024), some students may not share the same positive attitudes as the majority of students. They might face barriers such as limited internet access, limited knowledge of how to use technology, or limited access to suitable devices (Sari & Abrar, 2024). Even though this study does not highlight the barriers as superior, it is important to acknowledge that positive attitudes might be influenced by specific factors within the UPTM context. Besides, similar findings from past studies have warned that frequent use of technology does not equate to effective learning (Chan & Hu, 2023). Chan & Hu (2023) also emphasise that without proper knowledge of how to use technology, engagement with it may remain at a surface level. This highlights the importance of future studies exploring whether positive attitudes towards technology truly contribute to improvements in English language proficiency.

## **CONCLUSION**

In conclusion, this study reveals that the majority of final-year undergraduates at UPTM hold positive attitudes towards technology for learning English, based on the findings collected. The students demonstrate active engagement with various digital tools, such as computer software, social networking platforms, online audio and video tools, smartphone and tablet apps and word processing tools, in their learning routines. The consistency in technology use reflects their ongoing efforts to improve their English skills, specifically listening, speaking, reading, and writing. The blending of technology and English learning suggests that these students view these digital tools as accessible, relevant, and advantageous for their academic performance. Students who know how to maximise their use of technology are more likely to engage in activities such as vocabulary building, grammar practice, and interactive communication. This study concludes that promoting and maintaining students' positive attitudes towards technology is important in forming effective English language learning environments. Therefore, tertiary education institutions are strongly encouraged to provide continuous support to promote meaningful, independent, and technology-based language learning experiences.

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## **CONFLICT OF INTEREST**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in the paper.

## **AUTHOR CONTRIBUTION STATEMENT**

Author 1 contributed to the conceptualization, research design, and writing of the original draft.

Author 2 was responsible for data collection, analysis, and validation of the results.

Author 3 provided supervision, critical review, and editing of the final manuscript.

All authors have read and approved the final version of the manuscript.

## **ETHICS STATEMENT**

This research was conducted in accordance with the ethical standards of Universiti Poly-Tech Malaysia and in accordance with the principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the Review Board under reference number 1226. All participants were informed about the purpose of the study and provided written informed consent

prior to participation. Participants' privacy and confidentiality were strictly maintained, and the data collected were used solely for academic purposes.

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