University Students' Perceptions towards the Effects of Technology-Enhanced Language Learning on Their Learning Experiences

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ABSTRACT

Technology-Enhanced Language Learning (TELL) has become increasingly common in ESL classrooms as its benefits for language learning are evident. TELL can enhance student engagement, provide access to authentic learning materials, facilitate individualized instruction, and support collaborative learning environments. Nevertheless, some students may still perceive TELL as having negative effects due to lack of exposure or familiarity with digital tools. TELL may be considered intimidating, distracting, or even unnecessary as compared to traditional classroom instruction. Therefore, the purpose of this study is to investigate the university students' perceptions towards the effects of TELL on their learning experiences. Gender and fields of study can also be the factors that can influence students' views of TELL. This research employed a quantitative causal-comparative research design using a questionnaire to collect data. A simple random sampling technique was employed to select 400 respondents as the participants of the study. Findings revealed that undergraduate students perceived TELL as having a positive effect on their learning experiences. Gender appeared not to influence their perceptions, but fields of study did, though no interaction between the two factors was observed. Since technology in teaching and learning advances rapidly, continuous improvement in the educational landscape is paramount in ensuring students develop their technological skills. Such efforts are encouraged to prepare students to thrive in the future, which is shaped by evolving digital tools.

Keywords: TELL, perceptions, learning experiences, gender, fields of study

INTRODUCTION

Technology-Enhanced Language Learning (TELL) has become a dominant trend in language education. Traditional face-to-face instruction has slowly evolved into digitally enhanced language learning with the widespread shift to online learning, in which both students and teachers are required to use technology in their classrooms (Ironsi, 2022). Moreover, there are many new possibilities for language learning with the growing adoption of TELL, including the use of virtual classrooms, online language platforms, and learning management systems. This reflects that TELL creates multimodal and flexible learning environments that encourage pedagogical innovation. Many educational institutions, such as schools and universities, use online lessons to assist language learning, as TELL facilitates adaptable teaching and learning (Zboun & Farrah, 2021). The technology evolution has led to language curricula revamps and institutional infrastructure improvements.

Language learning materials are also updated and developed to enhance the learning experience accordingly, which will improve the students' and teachers' online and digital skills simultaneously by introducing new items and innovative ways to teach and learn (Johnson et al., 2016). This paradigm shift has compelled language educators to leverage technological resources to ensure the continuity of language education in a virtual environment.

Technology has become increasingly vital in the teaching and learning process, both in and out of the classroom. It also has advanced dramatically, affecting many aspects of education. Over the years, a wide range of institutions have seen an increase in the use of technology in language instruction due to its many advantages. Remarkably, it appears that TELL has greatly benefited the education sector (Iberahim et al., 2023). However, a few issues have been identified, such as maintaining student motivation in virtual settings has been challenging, with some learners struggling to stay engaged without face-to-face interaction; ensuring the validity and reliability of assessments in online environments, raising concerns about academic honesty; and varying technological literacy for both students and teachers have impacted the effectiveness of TELL (Huang & Kurata, 2024). According to Ironsi (2022), there may be challenges with technology-based education, which range from the technology proficiency of the students to their experiences and perceptions towards technology in language learning. Digital literacy is crucial for 21st-century education, yet many students lack these essential skills (Mangarin & Climaco, 2024). For instance, students and teachers may have issues with their respective digital literacy skills. In today's 21st-century education, digital literacy is basically a required skill to use the software, platforms, or tools effectively, which may hinder their ability to learn online, access materials, and join online classes. Students' diverse technological backgrounds may also be a hindrance, as those from different educational or social backgrounds may have varying levels of technological exposure, which may disadvantage some. Despite assumptions about digital natives, studies revealed that university students often lacked the required digital literacy skills for effective digital learning. This deficiency can negatively impact student performance. Digital literacy education has shown promise in enhancing skills, particularly for those lacking digital literacy. In higher education institutions, digital literacy is crucial for innovative teaching and learning (Anthonysamy, 2020). However, barriers such as lack of digital literacy skills, time constraints, and poor technological infrastructure prevent educators from using digital technologies effectively. It is important to address these challenges in bridging the digital divide and ensuring equitable access to digital skills for all students (Mangarin & Climaco, 2024).

The incorporation of TELL in language classrooms at tertiary institutions has been increasing; however, there is still a significant gap in understanding how students perceive its impacts on their language learning experiences. Most literature examined the effectiveness of TELL in improving language proficiency and using innovative pedagogical methods (Hasumia & Chiu, 2024; Zainuddin, 2022). However, fewer studies have examined students' perceptions and lived experiences with these technologies. The limited emphasis on students' perspectives prevents the development of inclusive and learner-centered TELL initiatives.

Moreover, the demographic factors such as gender and fields of study seem to significantly affect students' interactions with technology. Studies indicated that male and female students utilized digital tools distinctively, leading to differences in proficiency, confidence, and perceived effectiveness (Hou, 2019; Hilao & Wichadee, 2017). Emelogu et al. (2022) emphasized that English language teachers exhibited notable gender-based differences in technological proficiency, indicating that similar differences may exist among students. Previous studies, including Hulleman and Harackiewicz (2021), Kunze and Rutherford (2019), and Saifuddin et al. (2021), have identified significant differences in various academic backgrounds that affected students' perceptions and their benefits from TELL, particularly regarding engagement, motivation, and academic performance. from TELL,

particularly in areas such as engagement, motivation, and academic performance. Yet, comprehensive quantitative studies that systematically address these variations remain scarce.

This lack of clarity on the role of TELL in language learning hinders the comprehensive and effective TELL approaches and development. Learning institutions, without a deeper understanding of how students from diverse backgrounds perceive and experience TELL, risk encouraging inequities rather than optimizing language acquisition for all students, which could lead to discrepancies in educational outcomes and limit opportunities for marginalized groups. Therefore, this study is to investigate university students' perceptions of TELL and the influence of gender and fields of study on their perceptions so that the design of inclusive and responsive language learning initiatives can be made. Thus, the objectives of the present study are to:

1. examine the university students' perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences.

2. investigate the influence of gender on the university students' perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences.

3. discover the influence of fields of study on the university students' perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences, and

4. determine the interaction between gender and fields of study based on the perceptions of university students towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences.

LITERATURE REVIEW

Theoretical Framework

Kolb's Experiential Learning Theory was introduced by David Kolb, who presented a holistic model that explained the process of knowledge acquisition and skill development through experiences (Schenck & Cruickshank, 2014). It is a psychological theory that describes how individuals learn through experiences. Kolb (2015) described it as a specific type of experiential learning that often contrasts with classroom and lecture-style instruction. There are four stages of learning, namely concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Kolb's Experiential Learning Theory (ELT) outlines a cyclical process of learning through experience and provides a useful framework for understanding university students' perceptions of Technology-Enhanced Language Learning (TELL). There are four keys that can be applied to examine how students engage with, reflect on, and adapt to technology in their language learning experiences. In the context of this study, students' engagement with TELL can be seen through the concrete experience phase, where they interact with various online platforms and digital tools for language learning. The reflective observation stage will allow students to assess the effectiveness and challenges of these technologies in shaping their learning experiences. Abstract conceptualization will enable students to form opinions on the broader implications of technology in language acquisition, while active experimentation will reveal how they plan to apply and experiment with new learning strategies in future contexts (Kolb, 1984).

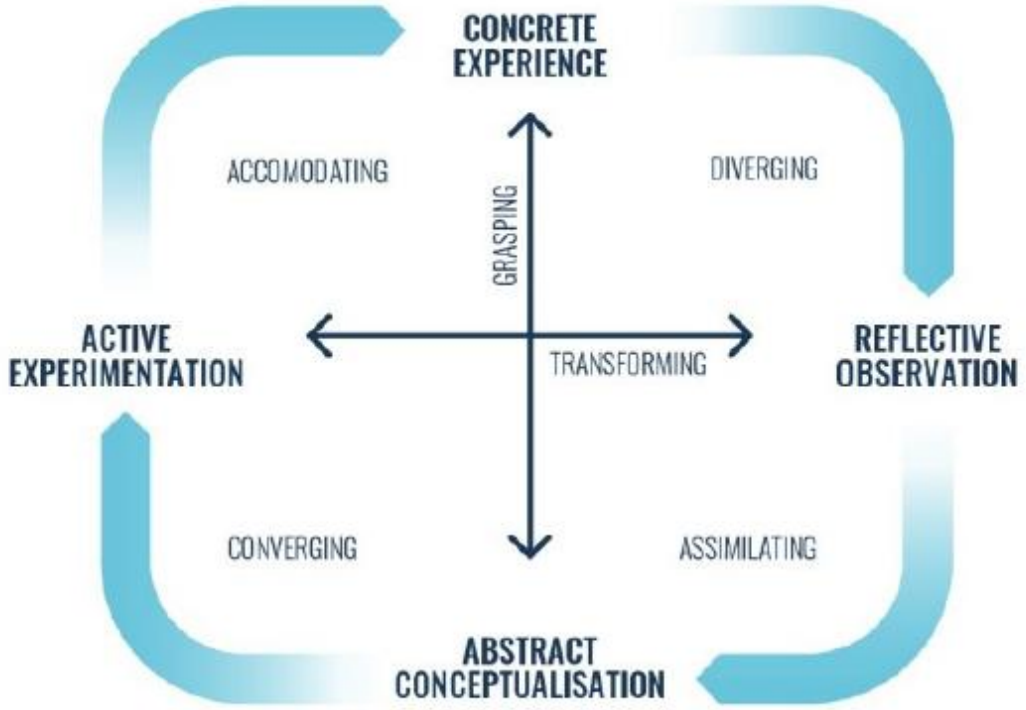
These stages form a cyclical process, in which individuals move through them in a specific order, taking in new

information and applying it to their experiences. According to Mcleod (2024), the crust of this complex framework is a four-phase learning cycle. Concrete experience is the first activity in which students interact directly with real-world scenarios. The next step is reflective observation, which invites students to reflect and consider the event from many angles. Students move on to abstract conceptualization based on this introspection, where they develop hypotheses and draw generalizations to make sense of the things they have seen. Active experimentation, the final stage of the learning cycle, involves students applying their newly developed concepts to unexpected situations, testing theories, and actively interacting with their surroundings. Kolb's theory identifies four distinct learning styles: converging, diverging, assimilating, and accommodating, each associated with specific phases of the learning cycle.

The theory, which is widely used in teaching and learning, promotes a balanced approach to learning by acknowledging the dynamic interaction between practical experience and reflective thought, leading to a more thorough and efficient learning process where this dynamic interaction fosters deeper understanding and skill acquisition (Shi et al., 2020). Kolb (2015) stated that individuals learn best when they are able to engage in all four stages of the cycle. It is based on the idea that learning is an active process that involves both cognitive and affective elements. He believed that the most effective learning happens when individuals can engage in all four stages of the cycle. This allows them to combine their cognitive and emotional knowledge of the event, leading to deeper learning. This theory is also helpful for understanding how individuals learn and grow in various settings, such as the workplace and academic institutions, based on Kolb's (2015) assertion that learning is a lifelong process built on experience, which has significant educational consequences (McLeod, 2024). In other words, it suggests that all learning involves relearning. The figure below shows Kolb's Cycle of Experiential Learning.

Figure 1

Kolb's experiential learning cycle (Kolb, 2015)



Kolb's Experiential Learning Theory and Technology

Kolb's theory is extensively utilized as a foundation for creating online or digital educational and training programs based on the experiential learning framework. For instance, an experiment on power factor correction was restructured into smaller tasks, including pre-lab activities, simulations, presentations, and remote lab work, enabling students to engage in experiential learning despite physical restrictions (Kularatne et al., 2021). It is also helpful in understanding how individuals learn and grow in various settings, like the workplace and academic institutions, virtually. Mcloughlin and Luca (2002) stated that technology acts as a scaffold at each stage of the process, and the entire cycle is learner-centered in computer-supported collaborative learning (CSCL) environments, in which the technology architecture supports group work and cooperation. This theory was also applied to online distance learning.

According to Richmond and Cummings (2005), effective online distance education courses should be built around instructional design decisions that have the greatest influence on student learning, which can be pointed to in Kolb's experiential learning theory, such as incorporating hands-on activities and reflective practices that enhance the learning experience. Using the theory aids technology-assisted learning and technology-enabled collaboration by helping instructors recognize individual student concerns in the learning process. Online teachers typically do not communicate with students face-to-face; instead, they interact online and place greater emphasis on planning the course delivery rather than addressing the specific issues of each student (Richmond & Cummings, 2005).

Technology-Enhanced Language Learning

In today's advanced era, the technology in TELL can be in the form of applications, websites, software, and online learning platforms. According to Ghanizadeh et al. (2015), TELL has been shown to positively impact students' language learning across multiple domains, including cognitive, metacognitive, and affective aspects. They stated that technology-based instruction is as equally effective as teacher-delivered instruction, in which listening, writing, speaking, and reading, as well as sub-skills like grammar and vocabulary, can be enhanced. In their comprehensive review, Ghanizadeh et al. (2015) found that besides language skills, Technology-Enhanced Language Learning (TELL) also positively enhanced cognitive engagement through quality input, authentic communication, and timely feedback; fostered metacognitive skills by encouraging self-regulation and strategic learning; and improved affective aspects by creating enjoyable, motivating environments that reduced anxiety and boosted confidence. Mobile learning and ICT tools were also found effective in providing accessible and efficient learning environments (Nurmala et al., 2023). The effectiveness of various technological tools in English language teaching, emphasizing the significant benefits of mobile learning and ICT in creating accessible and flexible learning environments. However, proper teacher training and support are essential for successful implementation of TELL to ensure effective integration of technology into teaching practices. Overall, TELL has the potential to enhance language learning by supporting cognitive, metacognitive, and affective domains while promoting skill development, learner autonomy, and motivation. However, its effectiveness depends on factors such as teacher preparedness through proper training; resource availability, including access to technology and reliable internet; and curriculum design that aligns with learning objectives, emphasizing strategic implementation, ongoing educator support, and equitable access to resources. This indicates that TELL has demonstrated potential in creating enjoyable and effective language learning experiences for students (Ghanizadeh et al., 2015).

Collaborative learning approaches, together with technology, enabled students to work together as a learning

community where they engaged in problem-solving tasks and information sharing (Li & Zhou, 2026). A case study in Taiwan involving high school students showed that Internet-based language learning activities, like e-mailing and videoconferencing, increased learning possibilities and provided enjoyable experiences (Yang & Chen, 2007). TELL has also been found to create an engaging environment for language learning, with benefits spanning cognitive, metacognitive, and affective domains across various age and gender groups (Ramadan & Jember, 2024). Technology-Enhanced Language Learning (TELL) has shown promising effects on engagement enhancement, language skills improvement, and flexible learning opportunities (Almohideb, 2025). In bilingual education, TELL has demonstrated potential to enhance language proficiency and cultural understanding through various technologies like computer-assisted language learning, mobile apps, and virtual reality (Perez Peguero, 2024). However, researchers must consider the novelty effect when designing TELL studies, as initial motivation boosts from new technology may influence results. Teachers can leverage this effect as a motivational affordance to promote positive learning outcomes (Marek & Wu, 2021).

METHODOLOGY

Research Design

In conducting this study, a quantitative research design using a survey approach was employed. This design is deemed appropriate as it is used to determine relationships and draw conclusions from numerical values. Quantitative research is a systematic framework for investigating certain phenomena by identifying numerical patterns and trends and statistically analyzing the data gathered within a large population to support hypothesis testing, if any, and to enable generalization of findings (Ahmad et al., 2019; Dehalwar & Sharma, 2024). In this present study, the survey was designed to collect data from students who enrolled in a public university in Malaysia regarding their perceptions of the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences. The study specifically employed a causal-comparative research design, which involved comparing groups to identify differences that may explain variations in the dependent variable (Azalea, 2022). This approach was well-suited for the present research, as it aimed to examine differences in students' perceptions of TELL based on gender and fields of study.

Research Setting and Sample

The setting for the study took place in a public university in Malaysia. Students in various fields of study (Social Sciences & Humanities, Business & Administration, and Science & Technology) were the targeted respondents to participate in this research. Simple random sampling was used for the sample process, as this technique reduces selection bias and ensures every individual in the population has an equal chance to be selected. This technique is also the strongest foundation for generalizing study findings to the broader target population (Zrineh et al., 2026).

A total of 400 respondents took part and answered the survey for the research. The total number of respondents targeted before the form was closed for participation was decided by looking at the published sample size table by Israel (1992), as shown in Figure 2. Hence, it was determined that the respondents should be approximately around 400 to achieve a margin of error or precision levels of ±5% for the size of a population more than 100,000. Since the selected public university had around 180,000 enrollments of undergraduates nationwide, 400 respondents were adequate to achieve ±5% precision levels for the size of the population (>100,000).

Figure 2 Sample Size Table (Israel, 1992)

Size of Population	Sample Size (n) for Precision (e) of:			
	±3%	±5%	±7%	±10%
500	a	222	145	83
600	a	240	152	86
700	a	255	158	88
800	a	267	163	89
900	a	277	166	90
1,000	a	286	169	91
2,000	714	333	185	95
3,000	811	353	191	97
4,000	870	364	194	98
5,000	909	370	196	98
6,000	938	375	197	98
7,000	959	378	198	99
8,000	976	381	199	99
9,000	989	383	200	99
10,000	1,000	385	200	99
15,000	1,034	390	201	99
20,000	1,053	392	204	100
25,000	1,064	394	204	100
50,000	1,087	397	204	100
100,000	1,099	398	204	100
>100,000	1,111	400	204	100

Research Instrument

The instrument for this research was a survey in the form of a 14-item questionnaire adapted from Almohidep (2025) distributed online. Andrade (2020) stated that free platforms like Google Forms make online surveys simple to conduct, and they can easily develop and distribute them globally. The questionnaire was divided into two sections: Section A had three questions for the demographic profile section, which were on gender, age, and fields of study. Meanwhile, Section B covered fourteen questions to gather the university students' perceptions towards the effect of Technology-Enhanced Language Learning (TELL) on their learning experiences. The responses to demographic profile items were in the form of multiple-choice questions, whereas the items on perceptions included a 5-point Likert scale ranging from 1= strongly disagree, 2= disagree, 3= neutral, 4= agree, and 5= strongly agree. Sullivan and Artino (2013) mentioned that it is typical for researchers and educators to build multiple Likert-type items. This scale is usually recommended, particularly when researchers tend to gauge abstract ideas like perceptions, attitudes, and motivation (Nimmo, 2024). The reliability of the questionnaire items was analyzed using Cronbach's alpha, and its value was 0.845. According to Ahmad et al. (2024), this value reflects a strong internal consistency of the questionnaire items.

Research Procedures and Data Analysis

The data collection procedures for this quantitative research began with the researchers creating the questionnaire using Google Forms. After the questionnaire was constructed, the link to the questionnaire was shared and distributed via various platforms such as emails, WhatsApp, Twitter, and Instagram to the students in the selected public university in Malaysia. The link redirecting to the questionnaire was disabled after reaching 400 participants, which took two months to reach the targeted number of respondents. The results from the

questionnaire were then downloaded, imported to an Excel sheet, and analyzed using IBM SPSS Statistics (Statistical Package for the Social Sciences) version 29. The analysis was done by finding the means for the descriptive analysis and T-test, one-way ANOVA, and two-way ANOVA for the inferential analysis. The significance level was set at 0.05.

FINDINGS AND DISCUSSIONS

Research Objective 1: The University Students' Perceptions Towards the Effects of Technology-Enhanced Language Learning (TELL) on Their Learning Experiences

Table 1 below shows the mean of each questionnaire item gathered from 400 respondents.

Table 1

The mean of items on the university students' perceptions

Item No.	Item	Mean
P3	Technology-Enhanced Language Learning platforms are user-friendly.	3.530
P5	I find Technology-Enhanced Language Learning to be helpful in improving my language concepts (e.g., grammar, vocabulary, pronunciation).	3.520
P1	I use Technology-Enhanced Language Learning platforms frequently.	3.500
P2	Technology-Enhanced Language Learning makes it easy to learn.	3.480
P10	Technology-Enhanced Language Learning promotes independent learning and collaboration.	3.470
P12	I am likely to continue using technology-enhanced tools for language learning.	3.470
P14	I will most likely recommend using Technology-Enhanced Language Learning to my peers.	3.460
P4	Optimal use of Technology-Enhanced Language Learning leads to enjoyable language lessons.	3.420
P6	The enhancement of technology in language learning leads to good lesson delivery.	3.410
P9	I believe that technology positively affects my ability to retain and recall language knowledge.	3.410
P13	I frequently apply Technology-Enhanced Language Learning strategies for my learning	3.380

	outside of class (self-study, online exercises, etc.)	
P8	My overall experience with Technology-Enhanced Language Learning is positive.	3.370
P11	Technology-Enhanced Language Learning is important in shaping the future of language learning.	3.350
P7	I feel more engaged and motivated to learn when using Technology-Enhanced Language Learning tools compared to traditional classroom methods.	3.330

As shown in the table above, the highest mean was item P3, *"Technology-Enhanced Language Learning platforms are user-friendly,"* at 3.530, followed by item P5, *"I find Technology-Enhanced Language Learning to be helpful in improving my language concepts (e.g., grammar, vocabulary, pronunciation)"* at 3.520. Item P1, *"I use Technology-Enhanced Language Learning frequently,"* came next at a mean of 3.500, followed by item P2, *"Technology-Enhanced Language Learning makes it easy to learn,"* with a mean of 3.480. Item P10, *"Technology-Enhanced Language Learning promotes independent learning and collaboration," and i*tem P12, *"I am likely to continue using technology-enhanced tools for language learning even after the pandemic,"* had the same mean at 3.470. Item P14, *"I will most likely recommend using Technology-Enhanced Language Learning to my peers,"* had a mean of 3.460, followed by item P4, *"Optimal use of Technology-Enhanced Language Learning leads to enjoyable language lessons,"* with a mean of 3.420. Item P6, *"The enhancement of technology in language learning leads to good lesson delivery,"* and item P9, *"I believe that technology positively affects your ability to retain and recall language knowledge,"* shared the same mean of 3.410, while item P13, *"I frequently apply Technology-Enhanced Language Learning strategies to my learning outside of class (self-study, online exercises, etc.),"* had a mean of 3.380. Next, item P8, *"My overall experience with Technology-Enhanced Language Learning is positive,"* had a mean of 3.370. Furthermore, item P11, *"Technology-Enhanced Language Learning is important in shaping the future of language learning,"* had a mean of 3.350. Lastly, item P7, *"I feel more engaged and motivated to learn when using Technology-Enhanced Language Learning tools compared to traditional classroom methods,"* had a mean of 3.330. To conclude, from the findings above, it is implied that university students in this particular public university have positive perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences. These findings were in line with previous studies, such as those on language skills improvements (Almohideb, 2025; Ghanizadeh et al., 2015), collaboration and engagement (Almohideb, 2025; Li & Zhou, 2026), and enjoyable experience and learning opportunities using technological tools (Perez Peguero, 2024; Yang & Chen, 2007). Gundala et al. (2019) also lamented that the use of Technology-Enhanced Language Learning (TELL) methods, such as using the internet and smartphones, led to significantly greater improvements in language competence and confidence among students from rural and semi-urban areas compared to students who used only designed software in the lab. Nevertheless, the findings of the present study also contradict some findings from previous studies. For example, Othman (2025) showed negative perceptions of the students towards Technology-Enhanced Language Learning as it highlighted challenges such as poor workarounds in coursework that were incompatible with digital platforms, poor internet connectivity, and feelings of isolation. They also noted that students struggled to connect with their peers and instructors, leading to negative perceptions of TELL. Ironsi (2022) discovered, despite learners' perceptions that technology could enhance learning, it often led to feelings of boredom when used for educational purposes and that many students perceived the learning platforms as difficult to navigate.

Research Objective 2: The Influence of Gender on the University Students' Perceptions Towards the Effects of Technology-Enhanced Language Learning on Their Learning Experiences

An independent-samples T-test was run to find if there was a significant mean difference in the university students' perceptions based on gender. Table 2 below provides the descriptive statistics for males and females, including the mean and standard deviation, while Table 3 is the independent samples test table. Table 2 indicates that the mean for males (M=3.47, SD=.747) was higher than that of the females (M=3.39, SD=.659); however, upon further analysis using the t-test, Table 3 shows that there was no significant mean difference between males and females, $t(398)=1.048$, $p>0.05$. From this, it is evident that male and female students had equal or similar experiences in Technology-Enhanced Language Learning environments.

Table 2

Descriptive statistics for gender

	Gender	N	Mean	Std. Deviation
Perceptions	Male	210	3.4701	.74793
	Female	190	3.3959	.65932

Table 3

Independent samples test for gender

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Perceptions	Equal variances assumed	4.678	.131	1.048	398	.295
	Equal variances not assumed			1.054	397.7	.292

The analysis of gender differences in the university students' perceptions revealed no significant differences between male and female students on their learning experience. This aligns with the findings of a study by Taj et al. (2017), which discovered that gender did not impact or influence the vocabulary acquisition of EFL learners. In the study, the technology-enhanced learning intervention in curricula has significantly improved vocabulary acquisition of the measured group compared to the control group. The positive improvement, however, was not influenced by gender, as both male and female participants in the study perceived and benefited equally, which shows that Technology-Enhanced Language Learning had a gender-neutral impact on vocabulary acquisition of EFL learners. Yet, these findings contradict the results of Hou (2019), who found that male students were more likely to find digital assistance technologies more engaging than female students. Meanwhile, female students were reported to have more favorable perceptions towards mobile-assisted learning tools, indicating a stronger belief in their ability to enhance learning outcomes (Raikhan et al. 2025). This difference could be attributed to the distinct cultural or educational contexts in which the studies were conducted.

Research Objective 3: The Influence of Fields of Study on the University Students' Perceptions Towards the Effects of Technology-Enhanced Language Learning on Their Learning Experiences

Table 4 below shows that there were significant mean differences in the university students' perceptions towards the effects of TELL on their learning experiences based on the fields of study, $F(2, 397) = 17.996$, $p < 0.01$.

Table 4

One-way ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.594	2	8.297	17.996	.001
Within Groups	183.028	397	.461		
Total	199.622	399			

To determine which students from which fields of study had better perceptions than their counterparts, a post hoc comparison test was run. Table 5 shows the mean differences in the university students' perceptions based on fields of study.

Table 5

Post hoc comparison

(I) Fields of Study	(J) Fields of Study	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Social Sciences & Humanities	Science & Technology	-.08299	.08676	.605	-.2871	.1211
	Business & Administration	.37140*	.08199	<.001	.1785	.5643
Science & Technology	Social Sciences & Humanities	.08299	.08676	.605	-.1211	.2871
	Business & Administration	.45439*	.08218	<.001	.2611	.6477
Business & Administration	Social Sciences & Humanities	-.37140*	.08199	<.001	-.5643	-.1785
	Science & Technology	-.45439*	.08218	<.001	-.6477	-.2611

Table 5 shows that the students in Social Sciences & Humanities had more positive perceptions as compared to students in Business & Administration (MD = .371, $p < 0.01$). Students from Science & Technology were also

found to have more positive perceptions than those in Business & Administration (MD=.454, p< 0.01). However, the perceptions of Science & Technology students were the same as those of Social Science & Humanities students (MD = .082, p >0.05). It can be concluded that students from both Social Sciences & Humanities and Science & Technology had more positive perceptions towards the effects of Technology-Enhanced Language Learning than those from the Business & Administration field. This is supported by Taj et al. (2017), who discovered that different disciplines may yield varying perceptions toward technology-based learning tools. According to Qu et al. (2024), disciplinary differences in undergraduate students' engagement with generative artificial intelligence highlight that disciplinary contexts significantly shape students' interactions and perceptions of technology-enhanced learning environments. This study also aligns with the idea that students from different fields perceived and used technology in language learning differently. STEM students, who were accustomed to using technology in their coursework, may view TELL as a natural and effective learning tool. In contrast, business students, who often rely on traditional reading and discussion methods, might find it less useful or even disruptive (Qu et al., 2024). In addition, the context of language learning may suggest that social sciences or engineering students may favor TELL because it aligns with their existing learning styles—focused on efficiency, application, and digital tools. Meanwhile, students in theoretical fields might struggle with adapting to TELL, as it differs from the deep reading and discussion-based methods they are familiar with (Kunze & Rutherford, 2019). They concluded that students in applied disciplines showed a preference for interactive, technology-enhanced learning environments, whereas students in theoretical fields often preferred more traditional learning methods.

Cohen et al. (2022) also indicated that students who had prior exposure to digital learning tools in their field found them more effective, thus supporting the argument that students' academic backgrounds influence their acceptance of TELL. For example, those who have already incorporated digital learning in their studies (e.g., IT, engineering) might find TELL useful, while others (e.g., law, history) may struggle with its effectiveness in a language-learning context. Since TELL is a form of blended learning, Vo et al. (2020), who compared how students from different academic disciplines performed in blended learning environments, found that students in technology-heavy disciplines (e.g., IT, sciences) performed better and had higher satisfaction with blended learning, while students in traditional academic fields (e.g., arts, business) faced difficulties in adjusting to tech-based instruction. The study further supports the idea that students' fields of study impact their perceptions towards technology, as those who are used to structured, interactive, and tech-driven learning environments may find TELL more effective, while students who rely on interpretative and discussion-based learning may struggle to adapt.

Research objective 4: The Interaction Between Gender and Fields of Study Based on the University Students' Perceptions Towards the Effects of Technology-Enhanced Language Learning on Their Learning Experiences.

A 2x3 table (Table 6) between-subjects analysis of variance (ANOVA) revealed no main effect of gender, $F(1, 394) = 0.225$, $p = 0.635$. Next, the ANOVA showed a main effect of fields of study, $F(2,394) = 15.549$, $p < 0.01$. Finally, the ANOVA revealed no interaction of gender and fields of study on the perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences, $F(2, 394) = 1.365$, $p > 0.05$. To conclude, there is no sufficient evidence to conclude that gender influences the experience. Next, there is sufficient evidence to conclude that fields of study influence the perceptions towards the effects of Technology-Enhanced Language Learning (TELL) on their learning experiences. Finally, there is no sufficient evidence to show that there is an interaction between gender and fields of study in the perceptions.

Table 6

Test between-subjects effect

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	17.914a	5	3.583	7.769	<.001
Intercept	4454.063	1	4454.063	9657.819	<.001
Gender	0.104	1	0.104	0.225	0.635
Fields of Study	14.342	2	7.171	15.549	<.001
Gender * Fields of Study	1.259	2	0.630	1.365	0.257
Error	181.708	394	0.461		
Total	4918.821	400			
Corrected Total	199.622	399			

a. R Squared = .090 (Adjusted R Squared = .078)

The present study found no substantial interaction between the gender and fields of study of students, but fields of study did influence the perceptions of the undergraduates towards the effects of Technology-Enhanced Language Learning on their learning experiences. This finding does not support Lau's (2016) finding, which revealed that males and females from different fields of study used their resources differently in a technology-enhanced environment. For example, male students in Science & Technology were more comfortable with technical technology tools that dealt with hands-on and problem-solving aspects of learning, whereas female students in humanities fields engaged more in collaborative technology tools that focused on research, communication, and content creation. Similarly, Bannister and Newton (2012) also found that gender influences the use of technology, where female students in Science & Technology found difficulties in using technology in their learning as compared to males. Meanwhile, male students in Social Sciences & Humanities preferred to use technology in individual research, and female students in group tasks. The insignificant result found in this study is probably because this study investigated the use of technology specifically in the context of language learning, but the other studies primarily examined the role of gender and technology in broader learning processes.

CONCLUSION

In conclusion, the university students under study generally have positive perceptions towards the effect of Technology-Enhanced Language Learning (TELL) on their learning experiences. While gender did not significantly influence their views, differences were observed based on their fields of study. The findings were discussed in relation to existing literature, which both supported and contradicted some aspects of the research. Although existing literature highlighted that TELL posed challenges such as isolation and difficulty using digital platforms, Malaysian students found TELL to be advantageous and user-friendly. This indicates that TELL is effective with different academic backgrounds and local educational practices, which reinforce its potential as a beneficial tool for language learning when properly implemented.

SUGGESTIONS FOR FUTURE RESEARCH

The findings of this study could be expanded by future research by looking at a comparative analysis between Technology-Enhanced Language Learning (TELL) and traditional classroom-based language learning instructions. Such research would provide valuable insights into the effectiveness of different learning modes

across various contexts, language proficiency levels, and student backgrounds. In addition, researchers could investigate the long-term effects of TELL on students' language proficiency, motivation, and overall engagement, as longitudinal studies could explore how students' perceptions evolve over time. Technology in language learning continues to shape the educational landscape; therefore, better insights on the effects of TELL on students' learning experiences can be captured. The need for continuous adaptation and integration of technology in language learning is essential so as to improve students' engagement and learning outcomes.

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