Exploring Self-Learning of Nursing Students at VNUHCM through Camera-Integrated Translation Technology: Perceptions and Insights

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　https://doi.org/10.54855/979-8-9870112-8-7_3

ABSTRACT

	This study examined the relationship between camera-integrated translation technology and self-directed learning, and explored differences in perceptions across gender groups. A survey with 66 participants and 18 questions provided data for analysis using ANOVA and multiple linear regression analyzes. The results showed a strong connection between translation technology and self-directed learning, which means the integrated camera translation application has a positive impact on autonomy. Moreover, as expected, there are no differences in perception between genders regarding function, which is in line with previous studies. Last but not least, the research highlights the most affecting factor, which underscores the importance of focus and contextual relevance in improving translation-assisted learning. This study offers a valuable in-depth analysis of the perceptions and attitudes of both learners and instructors. Based on the mentioned perception, the writer offers implications for a pedagogical approach, including suitable classroom activities and the enhancement of supportive tools. Other suggestions, due to limitations including scale, plot survey, and descriptive data, are also mentioned for further research.
Keywords: integrated camera, translation, TESOL, nursing, ESP	

Introduction

In recent years, translation technology has played an increasingly significant role in language learning (Le, 2021; Lai et al., 2022), particularly among self-directed learners. Bin Dahmash (2020) indicated that the emergence of machine translation is evident from the number of users worldwide and the results it produces daily. In other words, the method of teaching so-called grammatical translation has been utilized for years before the invention of machinery for transforming documents from the original language to the target language (Elmayantie, 2015). While the traditional translation focuses on writing version, people enjoy the translation machine for some advantages such as improvement in translation quality (Kol et al., 2018) and real time assistance for accessing the translation which speeds up the pace of the classroom, leading to the shorter time of language learning as students construct their vocabulary bank and

apply lexical resources to their productive study with speaking and writing tasks (Senior, 2019). The mentioned process is advocated as being aligned with language acquisition, from input to output. The world is currently undergoing rapid change due to the development of Artificial Intelligence (AI), which is being integrated into various applications and even hardware. Both independent and guided students today can easily translate materials and practice for language reinforcement; yet, with the benefits of translation, technology, and self-directed learning, they may have advanced in overcoming the challenges. Thus, the increasing role of translation technology in language learning is gradually experienced by learners, especially by those who are independent learners.

Specifically, Google lens, Chat GPT, and other applications and machines are currently becoming part of language learning practice (Ha, 2024; Duong & Nguyen, 2024) as they are now integrated into mobile phones with optical character recognition (OCR) and data from large language model (LLM) which enable users to scan a wide range of documents to create the picture and access the translation in fast speed. The process consists of two stages: taking images with the mobile phone's camera and using applications such as Google Lens (Shapovalov et al., 2018), integrated into the camera, or uploading the photo to various platforms (Chat GPT, Grok, Copilot, etc.) and receiving the results. The second stage may require the user to provide the prompt (the order or sentences required for the AI to generate the intended responses). As mentioned earlier, the advances in translation machines are supportive for learners by reducing time and facilitating input vocabulary, which is considered a cognitive process in language learning (Wahyudin et al., 2021). According to Park et al. (2021), users of integrated camera translation are more effective at concentrating on the context and meaning than those using traditional translation methods, as noted by Bahri (2016). Furthermore, the enhancement of learner autonomy regarding reading also appeared as stated in the work of Alzubi and Singh (2017). As translation becomes more embedded in daily life, these tools are not only transforming learning strategies but also shaping how learners perceive language barriers and cross-cultural interaction.

As presented, the advancement in translation technology, which directly leads to the increasing use of real-time instant translating machines in the classroom, has led the author to observe a phenomenon in which Nursing students use smartphones to access materials from their mother tongue with less effort or without effort. This situation omitted the process of absorbing language elements, or in other words, the language acquisition and cognitive stages were completely skipped. At the same time, the benefits of using applications such as Google Lens and Microsoft Translator, particularly in terms of their impact on learners' autonomy and self-directed learning, remain unclear. Moreover, other studies have advocated that there is no difference between genders in perception and attitude towards studying languages at the tertiary level; however, this remains a complex issue to state.

Objectives

As mentioned above, the big picture behind the situation of accessing instant translation, which offers a myriad of benefits for urgent cases such as understanding main ideas and knowing vocabulary, remains unclear, with an impact on autonomy and gender perception. This study aims to investigate the impact of camera-integrated translation technology on English self-learning capabilities. Secondly, the differences in perception across three gender groups will be examined, and last but not least, the factors having the greatest influence on learning outcomes will also be revealed. As translation tools become increasingly integrated into daily mobile applications, their educational value, particularly autonomy, has expanded. The function of translating using OCR and LLM forms neural machine translation (NMT), offering users the

opportunity to shorten the study process by recognizing characters and then translating them into the target language with improved performance compared to traditional methods. This research also provides an insight into the nature of learners' autonomy by surveying how students engage with the tool. Moreover, the sociolinguistic aspect of gender perception toward this technology also reveals how diverse learners interact with this machine of translation, suggesting pedagogical recommendations. Identifying the key factors that most significantly have an impact on learning outcomes will contribute to the broader discourse on how digital tools can be optimized to foster effective and personalized language learning experiences.

Research Questions

To fulfill the purpose of the study, the survey sought to answer the following research questions:

1. How does the use of camera-integrated translation technology affect the self-learning capabilities of nursing students?

2. Are there significant differences in perceptions of translation technology among male, female, and non-binary/unspecified gender groups?

3. Which factors have the strongest impact on self-learning dynamics?

Literature review

Framework

The development of digital technology has brought profound changes to the field of language learning, especially in the context of autonomous language learning. Among these technologies, online translation tools based on AI, such as Google Translate (GT), have emerged as an important resource, attracting the attention of many researchers. Scientific works have explored the role of these tools from various perspectives, including pedagogical effectiveness, impact on learners, and challenges and potentials in different educational contexts.

To truly understand the interplay between translation technology and self-directed language learning, this study is grounded in two key theories. First is Bandura's theory of self-efficacy (Bandura, 1982; Pajares, 1997), which posits that three key factors —motivation, persistence, and performance —impact a learner's success. For language learning students, this means that their level of self-belief influences how they utilize tools such as machine translation. Consequently, learners who are confident in their ability to study independently are more likely to proactively use technology to overcome challenges. The other theory is cognitive load theory, suggested by Sweller (as cited in Paas et al., 2010). According to Kirschner et al. (2018) and Sweller (2023), people need to reduce unnecessary mental strain since there is limited space in the brain for information processing. Therefore, translation machines such as Google Translate or other tools are considered supportive, providing instant responses by shortening the translation time without the effort of looking up words in both electronic and traditional dictionaries. Specifically, processing the language and understanding its meaning, rather than just decoding words, will save the resources of learners. In combination, these frameworks provide this research a deep perspective for examining both the mental and emotional factors when someone uses camera-based translation. The key variables are confidence (as a measure of self-efficacy), focus (reflecting cognitive engagement), and translation quality (an external factor that can influence learning). In short, this approach provides an in-depth analysis of how a learner's individual interaction with the technology's capabilities either supports or hinders the learner's autonomy.

Translation Technology and Self-Directed Learning

The rise of translation technology has basically altered self-directed language acquisition. Since Self-directed learning (SDL) is characterized by certain features, such as individual engagement with control for self-management and a relationship with lifelong learning, in which personalizing the learning process is a key sign (Boyer et al., 2014). Other studies have mentioned appropriate strategies to enhance studying, including setting a realistic goal and specific actions to achieve the purpose (Fang et al., 2010). Therefore, when the advantages of translation technology have been recorded, we have witnessed an increasing use of this tool in language learning and teaching. While in the traditional method of translation, students must rely on dictionaries and spend much time analyzing and transferring language, leading directly to tiredness and boredom, AI-powered tools now provide near-instantaneous, context-sensitive support, fostering significant learner autonomy (Fontich Vicens, 2013; Shapovalov et al., 2018; Bilyk et al., 2022). Moreover, AI-driven translation enhances learning by integrating language exposure into daily routines, thereby bridging the gap between formal study and real-world applications. This shift aligns well with a modern, learner-centered approach. Based on the presented points, it is evident that learners' behaviors have been altered in terms of autonomy from the perspective of SDL. However, the translation technology also brings possible risks. The upward trend of overreliance on technology can lead to a reduction in critical thinking. Uncritical use may reduce cognitive processing, as learners might passively accept translations rather than actively construct meaning (Iftianti et al., 2023). Consequently, effective integration demands not only motivation and digital literacy but also a keen awareness of the technology's limitations. Building on this discourse, our study examines how learners utilize camera-integrated translation tools to enhance their learning autonomy and efficiency, contributing to a deeper understanding of this state-of-the-art application.

Mobile and Camera-Based Translation Tools

The rise of camera-integrated translation tools, powered by Optical Character Recognition (OCR), has transformed the way learners interact with materials they have. Such tools enhance students' motivation and engagement with specialized vocabulary (Shapovalov et al., 2018) and effectively support learners in overcoming challenges related to grammar and vocabulary (Groves & Mundt, 2015). Furthermore, they facilitate vocabulary acquisition and improve reading skills by clarifying unfamiliar terms in context (Nguyen & Ngo, 2021), facilitating active engagement with input text through contextual support. Despite these possibilities, there remains a load of certain and possible risks for users. Over-reliance on these tools may lead to a decrease in learners' cognitive processing and autonomy (Nguyen & Ngo, 2021; Le, 2025). Furthermore, persistent inaccuracies in machine translation results pose concerns about comprehensibility and quality according to Mokhtar et al. (2018). This study addresses this gap by investigating how learners perceive and use these tools not only as translators but also as active facilitators of language acquisition.

Investigating Gender Differences in Perception and Use of Translation Technology

From a sociolinguistic perspective, technology use is not a neutral act but a social practice through which identity is performed. In general, previous research has indicated that students have a positive perception of technology in translation, such as Google Translate and other applications (Khotimah et al., 2021; Tumbal et al., 2022), as these applications provide speedy and easy access to translation results, thereby reducing task time. Besides, according to Sujarwo (2020), machine translation could be considered an e-dictionary by learners. Similarly, participants or students in Sagita and Balqis (2021) study agreed that the Google translation tool is useful in providing support with synonyms and antonyms. Nevertheless, other scholars

also argued that there are numerous drawbacks to Machine Translation, as their students had difficulties making decisions. Gender, as a key social element at the tertiary level, shapes individuals' linguistic practices and attitudes, which logically extends to their engagement with language technologies (Hoang, 2021; Wahyudin et al., 2021). However, Bui and Le (2023) reviewed a wide range of studies and concluded that there is no significant difference in gender aspects affecting the process of language acquisition. This study, therefore, investigates how gender identity—including masculine, feminine, and unknown views—mediates learners' perceptions and uses of these tools. Specifically, Mahmud and Nur (2018) concluded that male and female students employed different strategies when learning English, including cognitive processes such as comparison, memory, and social strategies. Previously, Yeung et al. (2011) argued that the scores of male students might be lower than those of female students, and that the motivation of female students is higher compared to that of males. This study was also aligned with Abu-Rabia's (2004) findings, which showed that female students' results were higher compared to those of males. Accordingly, the author had a desire to explore whether there is a significant difference among gender groups in perception of this application. With two hypotheses, including H0 and H1, in which H0 indicates there is no significant difference among the genders, while H1 states the opposite. By examining technology use as a form of identity expression, the author aims to inform the creation of more equitable and linguistically inclusive learning technologies.

Methodology

Research Design

This study employed a quantitative research design, utilizing a survey instrument to systematically investigate the relationships between the use of camera-integrated translation technology and self-directed learning outcomes. This approach was chosen to effectively measure learner perceptions and test hypotheses statistically. From the framework, the combination of Bandura's (1982) Self-efficacy and Sweller's (2011) Cognitive Load Theory offers a perspective for analyzing both psychological and cognitive factors of learners.

The primary data collection instrument was a structured survey comprising 18 items, which were logically grouped into four core variables to address the research objectives:

Reliance on Camera-Integrated Translation (Items 1-4): This variable measured the frequency and nature of participants' use of the technology, including their confidence and dependence on it for understanding specialized terminology and general information.

Perceived Translation Quality (Items 5-9): This variable assessed learners' perceptions of the tool's output, focusing on key attributes such as accuracy, clarity, contextual relevance, and terminological correctness, particularly within their ESP context.

Perceived Impact on Self-Directed Learning (Items 10-14): Aligned with theories of self-efficacy and cognitive load, this variable measured the technology's perceived effect on core components of learner autonomy, including focus, effort (persistence), proactivity, and creativity.

Perceived Impact on Linguistic Competence (Items 15-18): This variable evaluated how learners believe the tool influences their deeper understanding of English, specifically in relation to grammar, vocabulary, sentence structure, and contextual usage.

To analyze the collected data and address the research questions, two primary statistical

methods were employed, consistent with the study's abstract. Multiple regression analysis was used to address the first and third research questions by examining the predictive relationships between variables. Subsequently, an Analysis of Variance (ANOVA) was conducted to address the second research question. This test was used to compare the mean perception scores across the three self-identified gender groups (male, female, and unspecified) to determine if any statistically significant differences existed.

Participants and data collection

At the time of the study, 166 nursing students were enrolled in the first English for Nursing module, and 155 in the second. The author taught two sections of these modules, with class sizes of 84 and 75 students, respectively. A sample of 66 students voluntarily participated in the study, representing approximately half of the total population. This sample size is considered acceptable for generalization within the context of this specific program. Furthermore, Little (2013) emphasizes that appropriate sample size considerations and variance ensure the validity of findings in educational studies. All participants were first-year nursing students with predominantly pre-intermediate English proficiency. Most scored 3.0 or below on the university's IELTS-based placement test, with only a small number achieving scores of 4.0–4.5 or higher. Some participants had not received secondary-level English education due to their schooling in continuing education centers. Demographic data revealed a predominantly female population (as illustrated in Figure 1, adapted from Le (2025)), consistent with typical enrolment trends in the nursing field. Regarding age, students ranged from 18 to 28 years old, shared similar English proficiency levels, and had prior experience using translation applications for medical English learning. These shared characteristics suggest that the broader social aspects have a minimal impact on the learning process.

Figure 1.

Demographic pattern of Gender (adapted from Le, 2025)

Gender

- Female
- Male
- Unknown
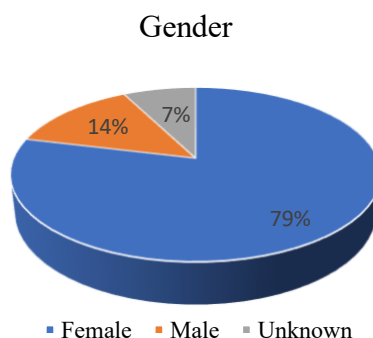
Data analysis

The study's reliability was confirmed through Cronbach's Alpha analysis, which was conducted using SPSS. This approach was taken due to the absence of a pilot study. A Cronbach's Alpha value of 0.969 was obtained for the 18 Likert items, indicating positive internal consistency. This finding aligns with the criteria set forth by Cronbach (1951). Furthermore, the use of SPSS for educational research, especially when such a high value of internal consistency is achieved, is supported by other researchers such as Brosius (2008) and Gerald (2018), who emphasize its appropriateness for further statistical analysis.

To address the research questions, the data collected from the 18-item survey were analyzed using SPSS (Statistical Package for the Social Sciences). The information process involved two

primary statistical methods. Firstly, to answer the second research question regarding differences in perceptions across gender groups, a one-way Analysis of Variance (ANOVA) was conducted. This test was used to compare the mean scores for each of the 18 survey items among the three self-identified gender groups (male, female, and unknown). A significance level (alpha) of .05 was set as the threshold for determining statistical significance. Where appropriate, a Tukey HSD post-hoc test was planned to identify specific pairwise differences. Secondly, to address the first and third research questions concerning the technology's effect on self-learning and the identification of key predictive factors, a series of multiple linear regression analyses was performed. These models were designed to examine the predictive power of various independent variables on dependent variables related to self-directed learning and linguistic competence.

Results/Findings and Discussion

Predictors of Self-learning

To address the first and third research questions concerning the technology's effects and key influencing factors, a series of regression analyses was performed. According to Humpage (2000), regression analysis is used to investigate the relationship between variables, examining the cause-and-effect relationship between one variable and another. The analyses revealed several significant predictive relationships, identifying the factors with the strongest impact on self-learning dynamics. A summary of the most influential predictors for key dependent variables is presented in Table 1. Overall, focus, contextual relevance, and translation checking emerged as the most significant factors. All the identified predictive relationships were highly statistically significant ($p < .001$). Specifically, focus (Q12) was the top predictor of aspects of self-regulation. In detail, it had a strong effect on self-directed learning support (Q10) ($\beta = 0.766$) and increased effort (Q11) ($\beta = 0.807$). Therefore, Focus was also the main factor that increased initiative (Q14) ($\beta=.664$). Meanwhile, Contextual relevance (Q8) strongly predicted the development of creativity (Q13) ($\beta = .612$), as well as grammar comprehension (Q15) ($\beta = .796$) and contextual usage comprehension (Q18) ($\beta = .556$). Additionally, Translation checking (Q6) was a significant predictor of language proficiency, including vocabulary comprehension (Q16) ($\beta = .627$), sentence structure comprehension (Q17) ($\beta = .362$), and contextual usage comprehension (Q18) ($\beta = .352$). These findings underscore the importance of attention and context awareness in enhancing translation-assisted learning. Simultaneously, the figures also confirmed that translation checking and criticism are extremely important for the development of language proficiency.

Table 1.

Summary of Significant Predictors from Multiple-Times Regression Analysis

Dependent Variable (Outcome)	Significant Predictor(s)	Standardized Beta (β)	p-value	Model R^2	Model F-statistic
Q10: Support for Self-Learning	Q12: Focus	.766	<.001	.586	F(1, 64) = 90.673
Q11: Increased Effort	Q12: Focus	.807	<.001	.651	F(1, 64) = 119.501
Q13: Increased Creativity	Q8: Contextual Relevance	.612	<.001	.375	F(1, 64) = 38.366
Q14: Increased Proactivity	Q12: Focus Q13: Creativity Q2: Confidence(-)	.664 .383 -.142	<.001 <.001 .058	.825	F(3, 62) = 97.121
Q15: Understanding Grammar	Q8: Contextual Relevance	.796	<.001	.634	F(1, 64) = 110.706
Q16: Understanding Vocabulary	Q6: Checking Translations	.627	<.001	.393	F(1, 64) = 41.388
Q17: Understanding Sentence Structure	Q7: Clarity Q6: Checking Translations	.482 .362	<.001 <.001	.530	F(2, 63) = 35.535
Q18: Understanding Contextual Usage	Q8: Contextual Relevance Q6: Checking Translations	.556 .352	<.001 <.001	.647	F(2, 63) = 57.714

Perceptions Across Gender Groups

As the Vietnamese have had the mindset of Confucianism (Ly, 2015), there are still stereotypes about the genders' ability to study and work, marking the inequity in not only work but also other environments. In addition, from a sociolinguistic perspective, scholars and researchers maintain distinct viewpoints regarding the gender factor (Hoang, 2021), which influences the outcomes of learning. Therefore, a one-way ANOVA test was conducted to answer the second research question, as this test provides an opportunity to compare a variable across different groups. Specifically, in this research, the authors aimed to highlight the perceptions of the three groups regarding gender. The results, as presented in Table 2, did not reveal any statistically significant differences in perceptions, attitudes, or usage patterns across the three gender groups (male, female, and unspecified) for all 18 survey items, which were coded with 'Q' indicating the question from the questionnaire. Regarding the significance of the model for analyzing differences among groups, the F value and Sig. are the figures used to indicate whether there are any differences among all the groups for a certain variable (Alkarkhi & Alqaraghuli, 2020). For all variables, the significance value was greater than the established alpha level of 0.05 (all $p > 0.05$). For instance, comparing perceptions of confidence (Q2), the result was $F(2, 63) = 0.969$, $p = 0.385$. Similarly, for the perceived support for self-learning (Q10), the result was $F(2, 63) = .690$, $p = .505$. Specifically, all F values range from 0.170 to 1.884, indicating a small

distance and negligible variance across the surveyed gender groups. Moreover, this demonstrates a consistent lack of variance in perception attributable to gender within the study's sample, thereby supporting the H0, which states that there are no differences in perception among the genders regarding the use of translation technology in a classroom setting and self-directed learning.

Table 2.

Gender perception

Items	F value	Sig.
Q1	1.884	0.160
Q2	0.969	0.385
Q3	1.137	0.327
Q4	0.170	0.844
Q5	1.033	0.362
Q6	0.455	0.636
Q7	0.595	0.555
Q8	1.126	0.331
Q9	0.766	0.469
Q10	0.690	0.505
Q11	0.343	0.711
Q12	1.293	0.281
Q13	0.743	0.480
Q14	0.477	0.623
Q15	1.061	0.352
Q16	0.421	0.658
Q17	0.417	0.661
Q18	0.212	0.810

Discussion

Regarding the first research question, the findings strongly suggest that camera-integrated translation technology has a positive and multifaceted effect on self-learning capabilities. The technology is not merely a passive tool but an active enabler of autonomous learning. This is evidenced by the strong predictive relationships between its use and key self-learning attributes, such as effort, focus, and proactivity. This aligns with the theoretical frameworks of this study. By providing instant translations, the tool reduces extraneous cognitive load (Sweller, 2023), allowing learners to allocate their mental resources toward higher-order tasks, such as constructing meaning and engaging in critical thinking, which in turn enhances their focus.

Furthermore, by empowering learners to independently decode authentic materials, the tool offers the opportunity to develop a sense of accomplishment and control, which directly supports and builds self-efficacy. However, notably, there was a negative correlation between Confidence (Q2) and Increased Proactivity (Q14). Specifically, the finding showed that there was a negative Beta value, indicating the opposite ward between these indicators. The theoretical framework of the study, based on Bandura's self-efficacy theory, suggested that

confident learners were more likely to use technology proactively to overcome challenges. The lack of statistical significance for self-efficacy in predicting pro-activeness showed that for this particular tool and group of learners, inherent self-efficacy, as measured, did not play a significant role in promoting more proactive interactions with technology. Instead, the main factors driving pro-activeness remained the learner's ability to maintain focus and creativity, leading to further research to reconfirm in the future.

In response to the second research question, this study found no significant differences in perceptions or usage of translation technology among male, female, and non-binary learners. This finding is particularly noteworthy. While some older literature on technology adoption suggested gendered patterns (Khamkhien, 2010), this study's result aligns with more recent research suggesting that these differences may be diminishing or non-existent in certain contexts, especially among digitally native generations (Bui & Le, 2023). The universal design of modern mobile applications and the shared academic context of the participants (nursing ESP) may have created a common ground that transcends traditional gendered patterns of technology interaction. This suggests that for this specific tool and user group, usability and function are perceived uniformly across genders.

Moreover, the analysis provides a clear answer to the third research question. The two factors with the most profound impact are the learner's ability to maintain focus and the perceived contextual relevance of the translation. The overwhelming significance of 'focus' (Q12) suggests that the primary value of these tools lies in their ability to minimize disruption and keep the learner engaged in the learning task. When the tool works effectively, it prevents the learner from breaking their concentration to look up words in a separate dictionary, thus maintaining a state of flow. More importantly, 'contextual relevance' (Q8) highlights that learners value meaning over literal translation. When a translation aligns with the context, it facilitates a deeper understanding and creativity, moving beyond simple word-for-word translation. This underscores the arguments presented in the work of Khotimah et al. (2021) regarding the importance of active meaning construction. Ultimately, the significance of 'checking translations' (Q6) for improving linguistic competence suggests that the most effective learners are not passive recipients but are critically engaged users, verifying the output and using it as a stepping stone for deeper learning. This implies that effective pedagogy should not only encourage tool use, but also foster these critical and active engagement strategies.

Conclusion

This study's aims are to investigate the relationship between the use of camera-integrated translation technology and the development of self-directed learning capabilities among first-year nursing students in an ESP context. By using a quantitative survey and subsequent statistical analysis, the researcher tries to answer three questions regarding the technology's effect on learning, the role of gender in shaping perceptions, and the specific factors that most significantly influence learning dynamics. The findings of this research offer a clear perspective on how these advanced AI tools are being integrated into the autonomous language acquisition process.

First, camera-integrated translation technology positively affects self-learning capabilities. The data demonstrated that the function is far more than a simple translation aid; it acts as a dynamic catalyst for learner autonomy. By providing immediate access to meaning, it empowers learners to increase their effort, maintain focus, and act with greater proactivity. This finding strongly supports the theoretical underpinnings of the study, suggesting that by reducing the extraneous

cognitive load associated with traditional translation methods, the tool also frees up learners' cognitive resources to engage more deeply with the material. This process, in turn, enhances learners' self-efficacy as they successfully navigate authentic language challenges independently.

Second, there are no significant differences in how learners perceive or use this technology based on gender. The ANOVA results apparently showed that male, female, and third gender participants shared remarkably similar views on the tool's utility, reliability, and impact on their learning. This important finding challenges outdated notions of gendered technology adoption (Hoang, 2021) and aligns with more contemporary research suggesting that, in the context of universally designed, task-oriented mobile applications, user behavior and perception are more likely shaped by shared goals and context than by gender identity, according to Bui and Le (2023).

Last but not least, the factors with the strongest impact on self-learning dynamics are the learner's ability to maintain focus and the perceived contextual relevance of the translation. The statistic showed that the indicator of 'focus' is a predictor of lifelong learning using camera-based tools. The primary pedagogical strength lies in students' ability to keep learners within the stream of continuous learning without disruptive breaks (Nguyen & Le, 2024). Simultaneously, the importance of 'contextual relevance' reveals a sophisticated user base that prioritizes meaningful communication over literal, word-for-word accuracy. This indicates that effective, technology-assisted learning is not a passive act of consumption, but an active process of meaning construction, critically mediated by the learner.

In conclusion, this study highlights the fact that the true value of camera-integrated translation technology in self-directed learning lies in the way students utilize it. The most effective learning occurs when the tool facilitates uninterrupted focus and provides contextually appropriate output, which learners then use as a scaffold for deeper engagement.

Implications

The findings of this study strongly support a shift in how teachers and instructors approach translation technology in the classroom. Instead of considering the tool of camera-based translation as a threat to academic integrity or a cause of cognitive laziness, educators should view it as a powerful pedagogical ally, enhancing learner autonomy and ownership, which aligns with the research of Sato et al. (2015). One important direction is to promote and raise awareness among learners (Nguyen & Pham, 2024). Teachers do not necessarily have to allow the use of translation technology, but they must still guide students in using it effectively. This includes the ability to assess translation quality, identify potential errors, and, in particular, use the results from the tool as a starting point for the search process, not an end point. The finding that "checking translations" (Q6) behavior is strongly associated with deep language comprehension is strong evidence to support this approach. In addition, learners – especially in ESP courses such as English for Nursing – can design learning tasks that take full advantage of translation technology. For example, students could be asked to use the camera translation tool to process real-world texts such as medical documents in trial, patient versions of instructions, and then evaluate and critique the translation, pointing out contextual errors and suggesting better alternative texts. Such activities not only help with understanding content but also encourage critical thinking and the ability to re-interpret information – the higher-order thinking skills that higher education aims.

For self-directed learners, this research provides a suggestion for making more effective use of support tools. The view that "the more dependent, the more proactive" needs to be replaced

with the recognition that active learners are those who use tools intelligently and strategically (Akayoğlu, 2017). They should be actively involved in the process of using the tool, for example, by cross-checking translations, questioning the validity of the output, and treating it as a hypothesis to be tested for the absolute truth. In addition, paying close attention to context – for example, whether the translation is appropriate for a particular problem – will help learners develop critical thinking and strong retention learning habits. Translation tools can still be used as a means of maintaining focus. When reading complex documents, learners can use the tool to avoid interrupting the cognitive processing stages, which is in line with a study conducted by Chen and Hsieh (2008). They should also maintain the flow of reading and ensure that they do not become distracted by vocabulary finding. This is especially important in contexts that require rapid and accurate comprehension, such as learning medical English (Paas et al., 2010).

From the perspective of a lecturer who observes students' use and utilization to gain experiences, the findings in the study provide valuable feedback based on practical user experiences. Specifically, learners appreciate the "context-linked" feature and the ability to support "focused learning" of the tool. This should be used to guide future improvements to service platforms. Function developers should continue to invest in NMT models that can handle specialized contexts such as the medical English field in general and the nursery in specific. Providing notifications about the reliance of the translation and providing limitations notifications can encourage learners to proactively seek verification and regulation. The OCR should also be improved to offer better vision for recognizing characters; subsequently, the quality of translation would be higher due to more accurate recognition.

In conclusion, as the integrated camera for translation function advances with technological developments, it should be considered one of the pedagogical activities, providing numerous benefits with appropriate use. The combination of camera translation tools, OCR, and NMT will not only enhance learners' self-learning abilities but also open up opportunities to develop higher-level language skills, contributing to the formation of a generation of independent, creative, and critically thinking learners.

Limitations and Further Research

While this study provides valuable insights, it is essential to acknowledge its limitations, which also open avenues for future research. Firstly, the sample size and composition represent a significant limitation. The study was conducted with a relatively small sample (N=66) of first-year nursing students from a single university in Vietnam. While this provided a controlled context, it limits the generalizability of the findings to other populations, such as learners in different disciplines, at different proficiency levels, or in different cultural and educational settings. Future research should aim to replicate this study with larger, more diverse samples to validate these findings on a broader scale. Secondly, the research methodology was exclusively quantitative. The survey-based approach was effective in identifying statistical relationships and patterns, but it cannot fully capture the complex and nuanced processes by which learners interact with the technology. It reveals what learners perceive, but not the detailed cognitive and metacognitive strategies they employ during use. Therefore, future research would greatly benefit from employing qualitative methods. Think-aloud protocols, screen-recording studies, and semi-structured interviews could provide rich, descriptive data on the moment-by-moment decision-making processes of learners as they use these tools. Thirdly, the data is based on self-reported perceptions. While valuable, self-reported data can be subject to biases, such as social desirability bias or a potential mismatch between a learner's perceived competence and their actual performance. A student might feel more focused, but objective measures might show otherwise. Future studies could incorporate objective performance metrics, such as pre-

test/post-test designs on vocabulary acquisition or reading comprehension tasks, to triangulate the self-reported data with tangible learning outcomes.

Ultimately, this study employed a cross-sectional design, capturing a single snapshot in time. It does not track how learners' perceptions and skills evolve over an extended period of engagement with the technology. A longitudinal study, following a cohort of learners over a semester or an academic year, would be invaluable for understanding the long-term effects of these tools on the development of learner autonomy and linguistic competence. Such a study could reveal whether initial over-reliance gives way to more critical and sophisticated use over time. By addressing these limitations, future research can build upon the foundation laid by this study to develop an even more comprehensive and holistic understanding of the role of AI-driven translation technology in the future of language education.

Acknowledgement

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Biodata

After 2 years of teaching English for medicine in University of Health Sciences- the eighth member of VNU-HCM, Trung continues his career in UMP standing for University of Medicine and Pharmacy at Ho Chi Minh city. His interests range from Natural Language Processing (NLP) to Teaching methods, especially Artificial Intelligence (AI) and Information and Communication Technology (ICT). He has been working as reviewer for International Conference of TESOL and Education (ICTE) as well as some other journals such as International Journal of TESOL and Education (i-jte) and International Journal of Language Instruction (i-jli), which both belong to ICTE Press. In addition to the experience of instructing healthcare-based English at tertiary level, Trung had had more than 10 years instructing classes ranging from in-person tutor to small groups, which offers a variety of perspectives and perception of language instruction regarding program design, psycholinguistics and second language acquisition.

Appendix

The questionnaire

Variable 1: Reliance on the integrated camera translation feature of Android and iOS phones

1. I frequently use the camera translation feature when learning English.

2. I feel more confident in learning English with the support of the camera translation feature.

3. I often rely on the camera translation feature to understand English terms (including medical and other specialized fields).

4. I often use the camera translation feature to look up information in English.

Variable 2: Translation Accuracy

5. I feel that the translations provided by the camera translation feature are accurate.

6. I often double-check the translations from the camera translation feature to improve my learning quality.

7. I feel that the translations from the camera translation feature are usually clear.

8. I feel that the translations from the camera translation feature are often contextually appropriate.

9. I feel that the translations from the camera translation feature are usually accurate for specific terms (including medical and other specialized fields).

Variable 3: Self-study Ability

10. I feel that using the camera translation feature supports my self-learning ability in English.

11. I feel that using the camera translation feature increases my effort in learning English.

12. I feel that using the camera translation feature improves my concentration when learning English.

13. I feel that using the camera translation feature enhances my creativity in learning English.

14. I feel that using the camera translation feature encourages my proactiveness when learning English.

Variable 4: Knowledge of Language

15. I feel that using the camera translation feature enhances my in-depth understanding of English grammar.

16. I feel that using the camera translation feature enhances my in-depth understanding of English vocabulary.

17. I feel that using the camera translation feature enhances my in-depth understanding of English sentence structures.

18. I feel that using the camera translation feature enhances my in-depth understanding of the context of English usage.