The acceptance of tablet for note-taking in consecutive interpreting in a classroom context: The students' perspectives

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ABSTRACT: This study aims to examine interpreting students' perceptions of using tablets for interpreting note-taking (INT). A mixed-method approach was adopted, including quantitative methods based on Gile's two-phase effort model of consecutive interpreting (CI) to investigate respondents' experiences and perceptions, as well as qualitative methods to explore differences between professionals and beginners regarding their preferences and user experiences with note-taking tools. Additionally, factors within the Technology Acceptance Model (TAM) framework that significantly impacted the acceptance of tablet-based interpreting were analyzed. Our research findings reveal valuable insights into students' attitudes towards integrating technology into interpreter training programs while highlighting key factors influencing tablet-based note-taking adoption or rejection among participants. Moreover, this study emphasizes the importance of developing an application specifically designed for INT to meet the unique needs of interpreters and stresses that training plays an essential role in facilitating the adoption of tablet-based INT. Teachers are suggested to take the initiative to try tablet-based INT themselves before they make their decisions on whether to introduce the technology to their students.

KEYWORDS: interpreting note-taking; consecutive interpreting; tablet; qualitative research; Technology Acceptance Model; beginners

1. Introduction

When tablets became one of the most popular devices on the market, professional interpreters were among those who first incorporated it into their working process. The European Commission Directorate-General Interpretation (SCIC, 2015), which is the world's largest interpreting service, has published technical support on how to use tablets in interpreter training. Additionally, the American Translators Association (ATA, 2017) recommended the use of tablet in interpreting on its website.

Tablets have become an integral part of student learning, and many interpreting students use them in the classroom for various purposes, such as taking notes. Despite this trend, pen-and-paper note-taking remains a common practice today. Moreover, current textbooks on interpreting only teach pen-and-paper note-taking skills. It is essential for interpreting teachers to understand how students are using tablets for interpreting note-taking (INT) so that we can adapt our teaching methods accordingly and cater to the needs of the "iPad Kids" generation.

The main objective of this study is to investigate the user experience of tablet interpreting among students and provide evidence for our peers to make informed choices regarding teaching strategies by addressing the following research questions:

1) What are interpreting students' perceptions and experiences when using tablets for INT?

2) In what ways do interpreting students' perceptions regarding the use of tablets for INT differ from those of professional interpreters?

3) What factors influence interpreting students' decisions on which tools to use for note-taking?

To achieve this goal, qualitative research methods were used as the main approach, and face-to-face interviews were the specific qualitative method primarily employed. We interviewed 28 participants who had practiced tablet interpreting for a certain period to examine their perceptions and experiences as beginners in interpreting using tablets. The analysis of the interview results revealed that most interpreting students preferred pen-and-paper note-taking over using tablets, which contrasts with professional interpreters' preferences (Goldsmith, 2018). Factors affecting respondents' decision-making were analyzed within the framework of the Technology Acceptance Model. This article concludes by providing suggestions for interpreting teachers and highlighting possible avenues for future research.

2. Literature review

2.1. Tablet interpreting and tablet-based INT

Since early 2010, tablets have become more prevalent, and interpreters have begun to use them as their "boothmate" (Hof, 2012). Rosado (2013) and Behl (2013a, 2013b) described their experiences using tablets for note-taking. Costa et al. (2014) reported on note-taking applications for interpreting and suggested a few applications for improving the performance of note-taking. Rosado (2013) and Goldsmith and Drechsel (2016) made some concrete recommendations regarding the choice of applications, styluses, and tablets.

In Goldsmith and Holley's study (2015), six in-depth interviews were conducted with professional interpreters who used tablets regularly for CI tasks. The results showed that most respondents believed tablet interpreting far outstripped traditional pen-and-paper methods in terms of functionality. In a subsequent study by Goldsmith in 2018, an instrument was developed for carrying out a comparative user evaluation of different tablet interpreting tools available on the market.

As tablets have become an essential tool for interpreters, a webinar on their use jointly organized by the European Commission and European Parliament was held on 22 October 2015 with participation from thirteen individuals around the world (Drechsel et al., 2018). This webinar reflects how tablet use has evolved beyond individual behavior to collective behavior among interpreters.

Oceguera López (2017) conducted research among eight interpreting students to assess the advantages and disadvantages of using tablets for INT. Both qualitative methods (Think-Aloud Protocols) and quantitative methods (surveys) were used to collect data about students' experiences in tablet note-taking, as well as evaluate their interpretation performance. There are limitations to this research that could have been addressed more effectively. These include issues related to sample size and generalizability of conclusions drawn from such a small sample size; lack of detailed information about participants' interpreting experience levels; and no constructive suggestions or new insights being offered by way of conclusion.

2.2. Technology Acceptance Model (TAM)

There is a wide body of research about the adoption of technology at the individual, community and state level. The TAM developed by Davis (1989) is the most commonly used theory in providing explanations of the reasons for user's adoption of certain technologies. According to the TAM (**Figure 1**), there are two basic determinants that impact the acceptance of information technology, namely Perceived Usefulness (PU) and Perceived Ease of Use (PEU). Later, the TAM has been further extended to the Extended Technology Acceptance Model (TAM2) (Venkatesh and Davis, 2000) by taking into consideration social and organizational factors, TAM3 (Venkatesh and Bala, 2008) by incorporating the concept of "perceived enjoyment" as a key factor, and the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) by proposing four key factors that influence users' intentions to use technology.
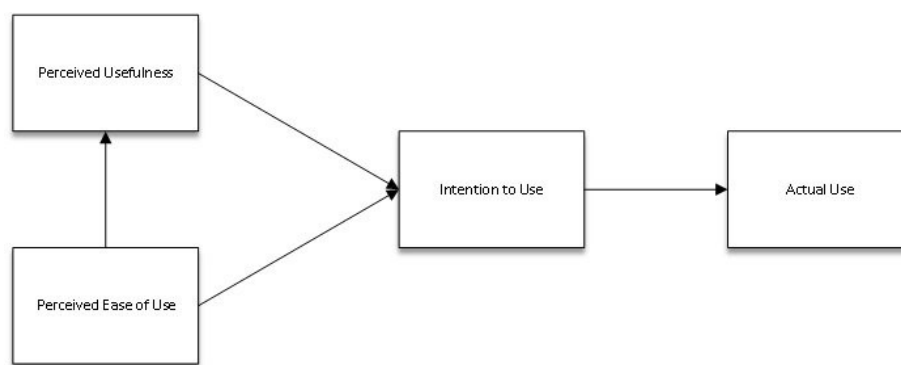

Figure 1. Technology Acceptance Model by Davis (1989).

Since the introduction of the TAM, there have appeared many studies that provide insights into the factors that influence technology acceptance in education within the framework. For example, Teo (2011) developed and tested a model of factors that influence teachers' intention to use technology. His study found that PU, PEU, and subjective norm were significant predictors of teachers' intention to use technology, and teachers' technology self-efficacy moderated the relationship between PEU and intention to use technology. Kose et al. (2021) applied the TAM to investigate the correlation between the variables of the TAM on using Zoom application in language learning, in addition to examining how gender and experience influence the use of technology. The results of the study reveal a strong positive correlation between the actual use of Zoom and the students' attitudes and behavioral intention.

3. Methodology

This study aimed to explore students' perceptions of using tablets for INT. It utilized a qualitative approach with supplementary quantitative methods and involved conducting semi-structured interviews with students who had experience in both traditional pen-and-paper note-taking and tablet note-taking.

3.1. Participants

This study included 28 participants who were all students of the Faculty of Languages and Translation at Macao Polytechnic University, Macao Special Administrative Region, China. The participants ranged in age from 20 to 35 years old; four were male. Of these, 18 were enrolled in the third year of the Bachelor's Program in Chinese-English Translation and Interpretation (BA in CE), while ten were enrolled in the first year of the Master's Program in Chinese-Portuguese Translation and

Interpreting (MA in CP). Participants with different language combinations have been selected to eliminate as much bias related to language choice on note-taking experience.

18 students from BA in CE had already taken an introductory course on interpreting during their second year but did not receive formal training for note-taking. During the semester when this study was conducted, they took a course called "Consecutive Interpreting (E to C)" where formal instruction on note-taking skills was provided. Ten students from MA in CP took "Interpretation Techniques and Practices" during that same period which also included lessons about note-taking. As these students started learning Portuguese from scratch during their undergraduate years, they only took an introductory module on interpreting skills. Therefore, we consider their interpreting level similar to that of other BA program students.

For the purpose of maintaining participants' anonymity, a random number (1–28) was assigned to each participant.

3.2. Data collection

The current study consisted of three steps to answer research questions and achieve objectives effectively. In the first step, a pre-practice briefing session was conducted for all participants as preparation for interpreting practice. The briefing included information about the project's purpose and procedure, an introduction to Notability (one of the most popular note-taking applications), as well as basic interpreting note-taking skills.

In the second step, participants were required to engage in intensive note-taking practice for 20–30 min every day at least five days a week over four consecutive weeks. Audio materials from the EU Speech Repository at Basic and Beginner levels were used for this exercise. Each day, participants selected one passage in Chinese and one in English/Portuguese to listen to while taking notes before recording their interpretation. To track progress, each participant uploaded their daily recording onto WeChat mini programme called Clock-in (小打卡) so that researchers could check on their development.

In step three, face-to-face interviews with each participant were conducted individually in December 2022 in a language lab located at Macao Polytechnic University where they attended their interpreting classes. A researcher posed questions during these sessions while capturing answers provided by respondents through audio recorders intended for data analysis purposes. Each interview lasted approximately 20 min and was followed by a tablet note-taking demonstration. The interview questions were designed to gather evidence in order to address the research questions. In total, there were 18 questions divided into three sections: user experience, training and practice, and preferences.

To best reflect the real situation of classroom tablet-based INT and to answer research questions, this study mainly utilized a qualitative research method—interviews. Quantitative methods were used only as supplementary tools, consistent with previous approaches adopted by researchers in this field, such as Goldsmith (2018) and Oceguera López (2017). Qualitative research is most suitable for the preliminary exploration of fields without established measures, instruments or frameworks, or theories. Through the interpretation of participants' experiences, new dimensions of phenomena can be observed which may help develop future instruments.

Since tablet interpreting is an emerging trend that has not yet been included in formal training programs for interpreting students, the sample size in this study was relatively small. Therefore, it may not fully represent the target population nor have sufficient statistical power to answer all relevant research questions. Nevertheless, qualitative methods are more suited to understanding how people

interpret their experiences; construct their worlds; and attribute meaning to those experiences (Merriam and Tisdell, 2015).

3.3. Data analysis

Following the interviews, a qualitative content analysis was conducted on audio transcripts to extract relevant information. NVivo (Version 11.0), a computer-assisted software program, was used for further coding and theme development. The process began with descriptive coding followed by labelling phrases, words and sentences from transcript data using keywords (codes) related to the research questions. Then, the codes were merged and removed in order to generate categories and subcategories that were relevant to factors affecting iPad use or disuse. Overall, this approach enabled us to gain deeper understanding into participant experiences while interpreting their perspectives on tablet note-taking as well as identifying potential challenges they encountered during the process.

In qualitative studies, category construction is a crucial aspect of data analysis. It is essential to construct categories that can capture recurring patterns across the data and lead to persuasive and strong conclusions. We sought answers regarding how beginners differed from professionals using Goldsmith's model as well as factors leading to their choice of note-taking tool within the TAM (Technology Acceptance Model) framework. Therefore, categories were created based on collected data with reference to the above two models corresponding to Research Question 2 and Research Question 3. The procedure for creating these categories is illustrated in **Figure 2** below.
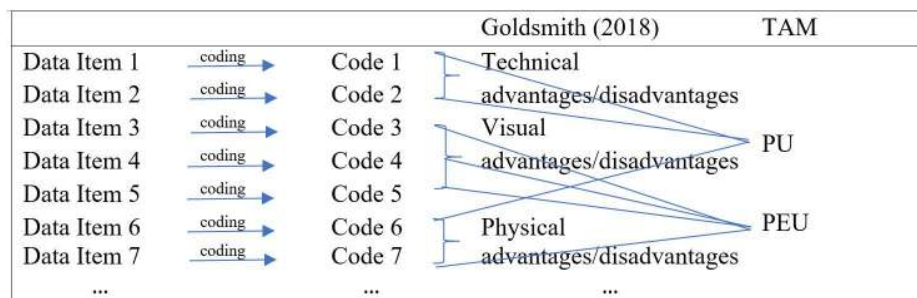

Figure 2. Procedure for categories creating.

Categories for qualitative studies on tablet interpreting are rare in previous literature. The first categorization was proposed by Goldsmith and Holley (2015) and later reintroduced by Goldsmith (2018), who conducted a survey of practicing interpreters. In these studies, three sets of categories were identified: tablets, applications, and styluses. These categories covered the functionalities of existing tablet gadgets including pros and cons of tablet interpreting to allow for comparison between professional interpreters and beginners based on specific dimensions (**Table 1**).

Table 1. Pros and cons of tablet interpreting (Goldsmith, 2018).

Technical advantages/disadvantages
Visual advantages/disadvantages
Physical advantages/disadvantages
Client relations (advantages/disadvantages)
Other (advantages/disadvantages)

The TAM was adopted in this study to provide an integrated theoretical framework to examine the factors that have an impact on the use or disuse of iPad in note-taking due to the following reasons.

First, the TAM has been widely recognized as an effective theoretical framework for understanding technology adoption and use, particularly in the field of education. While it has not been previously applied to the study of technology adoption in interpreting, its successful application in other fields provides ample potential for effectively conducting this research.

Secondly, the TAM offers a structured approach to studying factors that influence technology adoption and use. By classifying codes and categories created for this study, a more comprehensive understanding of the phenomenon can be developed.

Thirdly, the TAM allows analyzing both acceptance and rejection of tablets within one framework. In the original model of the TAM, PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance", while PEU is defined as "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989). The term "degree" mentioned above could have either positive or negative values based on users' perceptions (**Table 2**):

Table 2. Degree in TAM.

Determiner in TAM	Degree	Representation
PU	Positive	Usefulness
	Negative	Uselessness
PEU	Positive	Easy to use
	Negative	Difficult to use

Furthermore, Davis (1989), the developer of the TAM, included initial scale items in the Perceived Ease-of-Use pool such as "I often become confused when I use the electronic mail system" and "Interacting with the electronic mail system is often frustrating". These words express negative perceptions and were designed to measure ease-of-use aspects that may potentially hinder technology adoption. Given our preliminary research results showing beginner preference for pen-and-paper over tablet note-taking, the TAM can serve well to explore factors contributing to rejection.

Fourth, numerous empirical studies have validated the TAM which increases both validity and reliability of research findings.

3.4. Validity and reliability

Ensuring validity and reliability of research studies is crucial for researchers. In this study, we employed several methods to enhance both the validity and reliability of our findings.

To ensure accuracy and comprehensiveness in our results, we utilized multiple sources of data including interviews with students, pre-interview surveys, and observations of student note-taking. Additionally, participants reviewed transcriptions of their own interviews to verify data accuracy.

For enhancing reliability during data collection in this study, we followed consistent procedures such as using standardized questions while recording similar types of data for each interview. Furthermore, three independent coders analyzed the data separately throughout all stages from initial coding until final analysis to promote reliable results.

These measures helped ensure accurate and reliable findings, providing valuable insights into tablet note-taking adoption for beginners in educational settings.

4. Results and analysis

4.1. Beginners' perception of tablet-based INT

To answer the question of beginners' perceptions on tablet-based INT, three aspects were considered: user experience, preferences, and training and practice.

To investigate the user experience of tablets, we designed the questions based on the effort model of CI proposed by Gile (1995), which include two phrases: Note-taking (in Phase One) and Note-reading (in Phase Two):

Phase One = Listening and Analysis + Note-taking + Short-term Memory + Coordination

Phase Two = Remembering + Note-reading + Production

According to the interview results, 37.5% of the respondents found using tablet for note-taking more convenient than traditional pen and paper methods during Phase One (**Figure 3**). When compared to writing notes by hand on paper, 35.7% reported that tablet note-taking was faster, while 57.1% felt it was more effortless to turn pages. Additionally, around 28.6% of the respondents claimed that they found it simpler to highlight content and mark pauses in speech when using tablets, while another similar percentage (28.6%) mentioned feeling equally confident with both approaches.
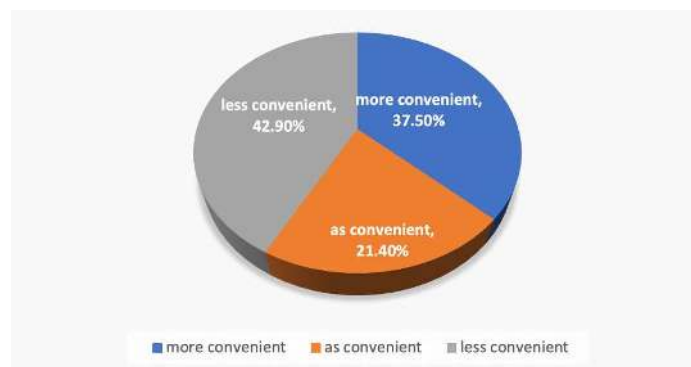

Figure 3. Note-taking experience of respondents.

When participants were asked about note-reading experience during Phrase Two of CI, 42.9% reported finding it easier to read their notes on iPads rather than traditional paper-based methods (**Figure 4**). Additionally, 28.6% claimed that turning digital pages was faster, while another similar percentage (28.6%) felt it was simpler to find the beginning of a speech after a pause using an iPad compared to writing by hand on paper.
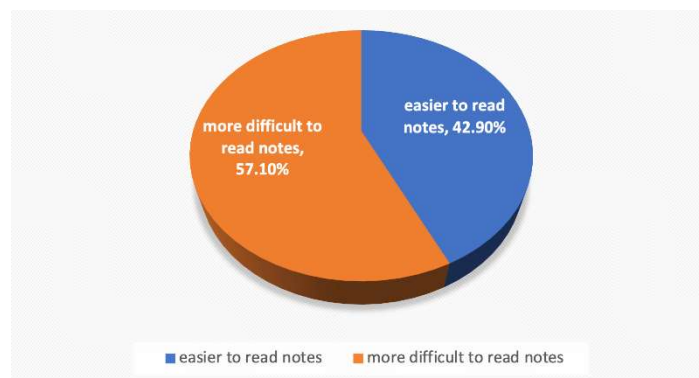

Figure 4. Note-reading experience of respondents.

Throughout both phases of CI, it was found that participants perceived certain advantages to using tablets for note-taking over traditional pen and paper methods. However, the percentage of users who reported benefiting from these features was generally low, typically ranging between 28.6% and 35.7%. This could be attributed to insufficient knowledge regarding hardware or software functions or simply a reluctance to adopt new technology.

The only feature that was found to exceed 50% in popularity among participants was the ease of turning pages, which reached 57.1%. It is worth noting that several popular note-taking applications such as Notability and GoodNotes support infinite scrolling functionality—a feature that provides users with endless digital pages without running out vertically like physical notebooks. As this feature is either default or easy to set up on most applications, it proved more popular among our respondents than other advanced features.

The purpose of incorporating technology into education is not solely to use it as a tool, but also to personalize the learning experience for each student and capture their attention, thereby motivating them towards active participation and knowledge acquisition. In line with this objective, we included questions about students' motivation to practice note-taking during the interviews.

Based on our findings, 78.6% of participants used tablet for at least 63.2% of their instructional activities—indicating high levels of usage among users. Furthermore, approximately 28.6% expressed willingness to invest more time practicing their skills while another significant percentage (64.3%) reported visible progress in their note-taking ability using tablets.

While the percentages of tablet note-taking by respondents and those who believed had made progress were relatively high, only a few expressed interests in dedicating more time to practice outside the research period. This could be attributed primarily to requirements imposed during the study period itself.

The respondents of this study consisted of students majoring in translation and interpreting. Half of the group had started learning less than two months prior to the project start, and only two out of 28 had experience interning as interpreters at international trade fairs.

While all respondents attended the pre-practice training session, 71.4% found it helpful (**Figure 5**). Most of them was already using tablets for note-taking before participating in this study. Specifically, 64.3% used them for general class notes. As a result, they were familiar with note-taking applications and had already obtained most of their note-taking knowledge from their interpreting classes.
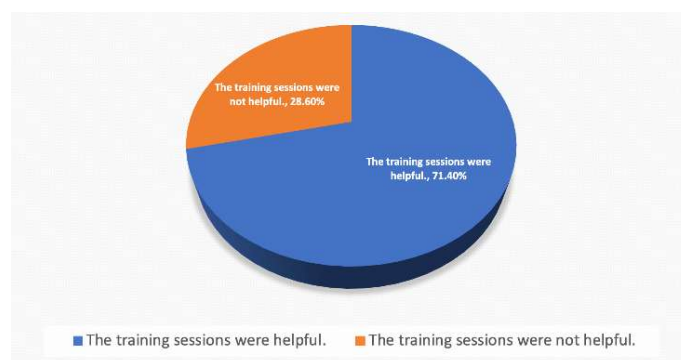

Figure 5. Helpfulness of pre-practice training session.

All participants practiced for more than 20 days during the research period, with a maximum number of practice days being 29, and minimum being 24. They also attended four hours per week worth of interpreting classes during that semester.

Despite having previous experience with tablet note-taking and INT skills learned in class, participants still found it beneficial to attend the training session as it helped explore advanced features and techniques that may have been unfamiliar to beginners. This highlights the importance of providing guidance not just to beginners but also to those who may be unaware or inexperienced with how technology can be applied within a new skillset such as interpreting.

In classroom settings, 35.7% preferred using a tablet over traditional pen and paper method for CI (**Figure 6**). Although only 28.6% of the respondents favored tablet use specifically for interpreting purposes, a majority (64.3%) preferred utilizing their tablets for note-taking in all other situations rather than using pen and paper options.
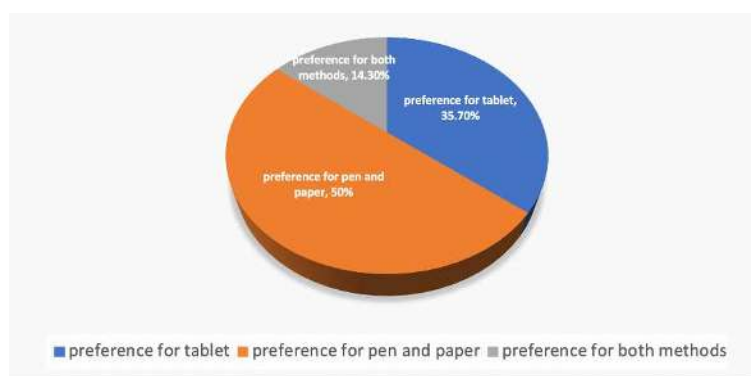

Figure 6. Preferences of respondents on note-taking tools in classroom settings.

The above statistics indicate that the majority of the respondents would not take an initiative to do tablet interpreting unless it was required. Moreover, there is an interesting contrast: While students preferred using tablets for note-taking in other situations, only a few expressed a preference for using them specifically for INT purposes.

4.2. Beginners vs professionals

Goldsmith (2018) collected both qualitative and quantitative data concurrently, analyzed them separately, and then merged data sets in order to have a greater understanding of the research questions. Seven professional interpreters were interviewed between January and March 2015. Snowball sampling was used to reach potential respondents. The population was defined as all interpreters worldwide belonging to a professional interpreting association. Data were collected using standardized semi-structured interviews. The interviews included specific, open-ended questions with neutral wording. Follow-up questions elaborated on specific issues, clarified concepts, and steered the conversation; where appropriate, researchers also reframed questions and summarized key ideas (Brinkmann, 2013).

The results of Goldsmith's (2018) study among professional interpreters indicated that all the respondents either believed that tablets were just as effective as pen and paper or believed that tablets are more effective than pen and paper (33%). However, our study yielded contrasting findings with only 28.6% of the participants expressing a preference for tablet use in interpreting tasks (**Figure 7**).

The difference in preference between professional interpreters and beginners highlights the need for further investigation into factors influencing technology adoption in interpreting settings. Therefore, we

aim to conduct a comparative analysis between Goldsmith's study categories and variables, and those generalized in our own research to better understand how different preferences influence perceptions of tablet note-taking during interpreting tasks.
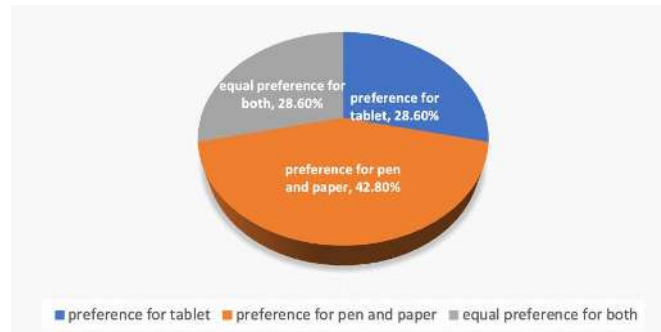

Figure 7. Preferences of respondents on note-taking tools in general.

To achieve this goal, we organized data items based on Goldsmith's summarization of pros and cons of tablet interpreting into corresponding categories. However, during this process, some codes or categories from the current study were found which either did not fit within the structure provided by Goldsmith or were missing altogether. Conversely, there were also categories from Goldsmith that did not exist within our research framework (**Table 3**).

Table 3. Comparison of categories and codes between Goldsmith's (2018) study and this research.

Goldsmith		Current study	
Categories	**Pros and cons**	**Categories**	**Codes**
Technical advantages/disadvantages	Pros and cons	+ Out of date (device)	√
Visual advantages/disadvantages	Pros and cons	√	√
Physical advantages/disadvantages	Pros and cons	√	√
Client relations—advantages/disadvantages	Pros and cons	×	×
×	×	Teachers' attitude	Pros and cons
×	×	Training	Pros and cons
Other advantages/disadvantages	Pros and cons	√	+ Tablets as an alternative

In **Table 3**, we use √ to denote items that are similar between Goldsmith's (2018) study and our research, × for missing ones, and + for additional categories identified in our study. It is worth noting that identical advantages and disadvantages reported by both studies are not repeated here.

Interestingly, professionals and beginners share similar perceptions concerning technical, visual, and physical aspects of tablet note-taking. The only notable difference was observed in the technical aspect where one respondent complained about her out-of-date tablet leading to inefficiencies while taking notes:

"I think it may be my tablet. It is a bit old, so maybe there is some delay." (Student 12)

Taking the iPad as an example, the products launched between 2010 and 2014 were not very diverse. The standard iPad and iPad Mini models dominated this period until Apple released the larger-screened iPad Pro model in 2015, followed by the fifth-generation standard iPad release in 2017—a gap of three years since its previous model (the fourth-generation) (**Figure 8**). In contrast, there have been several new models of iPads released into the market each year since then, with upgraded hardware and software features. However, applications including those for note-taking purposes are generally upward compatible which may lead to poor performance on older devices or make them incompatible altogether. It should be emphasized that Goldsmith conducted interviews between January and March of 2015 when there were no complaints about out-of-date devices at that time.
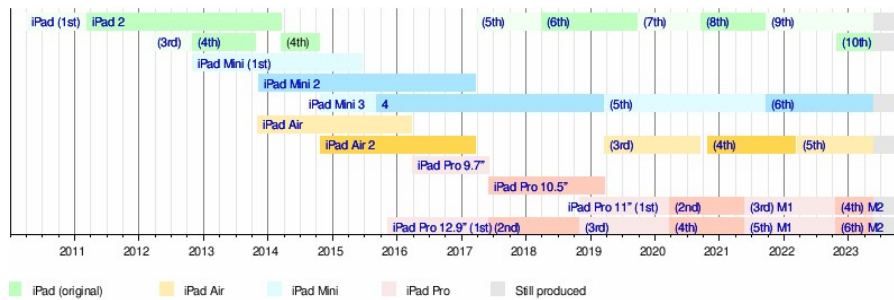
Figure 8. Timeline of iPad models (Wikipedia, 2023).

The respondents did not mention client relations since their experience was mainly in the classroom or language lab. However, they discussed their teachers' attitudes toward their use of tablets in interpreting:

"Since we often need to enter the booth, our teacher doesn't recommend it since the space is quite narrow." (Student 2)

"The teacher did not express support because from the beginning, they taught us to use pen and paper for note-taking." (Student 16)

We consider the teachers' attitude towards tablet-based INT to be an independent category. A growing body of research has examined the critical role that teachers play in promoting student engagement with technology. Teachers have been identified as key drivers of successful implementation, and their attitudes and behaviors can significantly influence student acceptance (Hoi and Mu, 2021; Teo and Zhou, 2017). As beginners are new to INT skills, instructions from teachers will be crucial in shaping students' note-taking habits for future use.

One category that was missing from Goldsmith's research is "Training". In fact, in his interview, one participant complained about the lack of training courses which was included in the category of "Other Advantages and Disadvantages" while several stressed the need for initial and ongoing training on tablet use both in universities and professional development contexts (Goldsmith, 2018).

Great importance has been placed on training in this study. Pre-practice training was identified as a critical step in the research process to help students adapt to the new model of INT. Training and practice were found to be among three aspects affecting beginners' perception of tablet note-taking. This is consistent with previous studies which emphasize that providing adequate training is essential for promoting user engagement and acceptance of new technologies, especially among individuals who are unfamiliar with them (Torkzadeh and Van Dyke, 2002; Venkatesh et al., 2003).

Most of the respondents found the training helpful:

"The teacher at the training talked about what is most important to take note of when taking notes. This helped me avoid writing down unimportant content. Before, I used to write down every detail, but after she explained it, I started writing down only key words and prioritizing important details." (Student 24)

"The training session helped me better apply this program and understand how to take notes." (Student 8)

They observed progress after a period of intensive practice:

"I feel that my note-taking ability has improved compared to before, and I no longer have the feeling of being at a loss for where to start." (Student 9)

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It is not surprising that professional interpreters and beginners have different preferences when it comes to choosing note-taking tools, given their varying levels of experience and expertise. Beginners are in the process of learning the fundamentals of interpreting and may heavily rely on their teachers' guidance to make informed decisions. Conversely, professionals have already established themselves within the field and prioritize building positive relationships with clients as a crucial factor in selecting note-taking tools.

It is important to note that both beginners and professionals recognize the significance of training in developing tablet interpreting skills. However, while beginners consider training as an essential step towards acquiring new skills, professionals express regret over not having had sufficient access to such resources. This emphasizes the necessity for continuous education programs customized to varying skill levels within interpreting communities so that all practitioners can continually enhance their abilities.

4.3. Factors influencing beginners' preferences

The TAM was utilized to identify factors that influence beginners' preferences for INT tools. In the context of this study, PU refers to the extent to which beginners believe using a tablet will facilitate their INT in an efficient and productive manner. It encompasses factors connecting the tablet, application, and stylus with note-taking performance and results. PEU is defined as how easy or comfortable users feel when using and managing the tool. It encapsulates hardware- and software-related influences on user experience. Additionally, external variables (EVs), such as facilitating conditions, subjective norms, and self-efficacy may also affect PU and PEU. These EVs include factors that can impact users' experiences from outside sources.

Through an examination of PU, PEU, and external variables, we can gain a more comprehensive understanding of the factors that may influence instructors' decisions on whether to adopt tablets for INT.

PU of technology in INT can be broken down into three aspects: (1) improving note-taking experience, (2) enhancing interpreting performance, and (3) motivating students to practice CI. Codes related to PU have been identified and classified into these three subcategories (**Table 4**).

Table 4. Subcategories and codes developed under PU from interview data.

Category	Subcategory	Code
PU	Improving note-taking experience	Flexible page size
		Insert page
		Letter size
		Note-taking speed
		Copy and paste
		Store and organize documents
		Multicolor
		Handwriting recognition
		Easy to highlight key points
		Smoothness of writing
	Enhancing interpreting performance	Easy to locate the beginning of a speech
		Endless digital pages
		Page layout
	Motivating students to practice CI	Screen recording
		Revisiting old notes
		More fun (increase interest)
		Progress

Digital note-taking has a relatively brief history, which can be traced to the emergence of personal computers in the 1980s. Subsequently, the proliferation of smartphones and mobile devices in the late

2000s propelled the field of digital note-taking forward. Significant strides have been made in handwriting recognition and digital pen technology, enabling users to take handwritten notes on digital devices with greater precision and ease.

However, INT is a specialized skill used by interpreters during live events such as conferences or meetings, where they listen to speakers in one language and then interpret what was said into another language. In this context, note-taking is not simply recording information for later use but rather serves as an aid to memory. Interpreters rely on their notes to help them recall important details while interpreting from one language to another. Consequently, note-taking skills required for CI are more complex compared with general note taking skills because they are also linked to memory, analysis, effort management and presentation. Moreover, when looking at the note-taking process alone, it involves using abbreviations, symbols, verticality, links and identifying varying levels of importance of different parts of the speech (Gillies, 2017).

Statistically speaking only eight participants preferred using tablets specifically for INT whereas 18 participants preferred using tablets for other types of notes suggesting that INT requires special considerations beyond typical note-taking needs. These specific requirements include functions such as marking pauses in speech which enables interpreters to identify where interpretation must resume following a speaker's pause; providing endless digital pages that guarantee interpreters do not run out of paper mid-job; choosing page layout templates tailored towards meeting diverse individual preferences amongst interpreting students who require efficient yet personalized solutions.

Moreover, since there is no dedicated application available on the market designed especially for INT purposes at present time—current applications cannot possibly meet all demands put forth by interpreters.

However, despite these limitations, beginners may still benefit greatly from using tablets when learning about effective note-taking practices due to its ability to provide a digital canvas for practice and experimentation. Two participants even explained why they enjoyed using tablets for practicing INT:

"I think it's more convenient to organize and classify for future reference or deletion. Compared to paper, you may end up with too many paper notes that take up space and you may not want to look at them later. With a tablet, you don't have these problems." (Student 11)

"After every class or practice session in the dormitory, I always review the notes I took to check for any omissions or excessive note-taking. If they are stored on a tablet, it is easy to save them and review them at any time." (Student 12)

Screen recording in Notability is a popular function among respondents. One respondent noted:

"The screen recording feature is very interesting. It allows me to record the process of taking notes, and when I review the playback, I can identify the parts where I had difficulty taking notes. This is helpful for targeted practice." (Student 9)

Overall, these findings suggest that while tablets may not currently meet all demands during live events, they have significant potential as an instructional tool for beginner interpreters learning how to take notes effectively in CI. Features like these attract students to practice more which could lead to improved note-taking skills over time.

In the context of tablet INT, perceived ease of use (PEU) combines ease of operation and flexibility (**Table 5**).

Table 5. Subcategories and codes developed under PEU from interview data.

Category	Subcategory	Code
PEU	Ease of operation	Application interface
		Stylus noise
		Stylus connection
		Stylus weight
		Tablet response time
	Flexibility	Portable
		Tablet battery life
		Backup device

In this study, most participants expressed satisfaction with the interface of their note-taking application, as one participant noted:

"The interface of Notability is very clear and simple, and it is easy to find the necessary functions when taking notes." (Student 6)

However, they also described mostly unpleasant experiences with stylus usage in interpreting contexts due to its weight and lack of tactile sensation compared to traditional pen-and-paper methods:

"It's just that for interpreting, I need to take notes very quickly, and that capacitive pen is really heavy." (Student 21)

"My stylus has a pen tip cover, so it is relatively smooth but blunt, without the normal pen's scratchiness. It has a certain amount of damping which is stronger than that of a regular pen." (Student 11)

"It doesn't have the same tactile sensation as writing with a pen on paper." (Student 3)

"When the stylus tip touches the screen, it makes a loud noise that can sometimes interfere with the audio playback." (Student 4)

Another aspect of PEU is flexibility, which, for students who are still learning interpreting skills refers mainly to convenience during classroom settings where tablets were described as portable by some participants:

"There is one thing I find very convenient, and that is with the tablet, you can take notes whenever you want while carrying it around." (Student 14)

Yet there were also complaints about battery life limitations on some styluses along with a lack of backup options available:

"But if we consider the battery life of the pen, it is not very suitable for interpreting in practical situations." (Student 25)

Furthermore, another pointed out how ballpoint pens can easily be replaced when ink runs out unlike styluses which are less replaceable, making backups more difficult or expensive.

To summarize, this part examined PEU in tablet-based INT. While participants were satisfied with the interface of their note-taking application, they experienced challenges with stylus usage due to its weight and lack of tactile sensation. Flexibility was important for students, but battery life limitations on some styluses and lack of backup options posed challenges.

4.4. External variables

The interview results revealed several external variables that influence a beginner's choice of note-taking tools, including facilitating conditions, subjective norm, and self-efficacy. The codes and

subcategories developed in NVivo were organized based on these factors (see **Table 6**).

Table 6. Subcategories and codes developed under EV from interview data.

Category	Subcategory	Code
EV	Facilitating conditions	Training
	Subjective norm	Peer and teacher influences
		School regulations
	Self-efficacy	Technology self-efficacy
		INT experience
	Anxiety	Pressure
	Prior experience	Note-taking habit
		Experience of using tablet

Access to training was the most frequently mentioned facilitating condition in this study. Although a pre-practice training session was held, respondents still believed they needed more resources to adopt tablet interpreting.

Opinions from classmates and teachers also had an impact on beginners' intention to use tablets for INT. Some teachers preferred students not to use iPads or other electronic devices for fear that they may be used for non-academic purposes; others adopted a laissez-faire attitude toward device usage. Very few teachers encouraged students to do tablet interpreting or guided them.

An important factor related to both teacher and student attitudes toward tablet interpreting is school policies and regulations regarding technology usage during final exams. For example, at Macao Polytechnic University where this research took place, students are not allowed to use electronic devices such as smartphones or tablets during final exams which can discourage students from adopting tablet-based INT practices.

"Since tablets are allowed to be used during interpreting final exams, I have been practicing note-taking with pen and paper as much as possible in my daily practice in order to perform well on the exam. As a result, I rarely use the tablet for this purpose." (Student 10)

Regarding self-efficacy, it refers to beginners' belief in their ability to use both tablets and INT effectively. Previous studies have suggested that higher e-learning (tablet) self-efficacy is associated with increased e-learning (tablet) adoption rates (Hsia and Tseng, 2008; Lee, 2006; Moghadam and Bairamzadeh, 2009; Yuen and Ma, 2008). We believe perceived note-taking skill is another part of self-efficacy which can influence beginners' decision-making process when choosing between traditional pen-and-paper methods and using tablets for INT. When asked about how they think about their note-taking abilities, all the participants lacked confidence in the skill and regarded it as the most difficult part in CI. Moreover, the percentage of those who prefer to use tablets for note-taking in other contexts was higher than those who preferred tablet-based INT practices which indirectly demonstrates a correlation between perceived note-taking self-efficacy and intention to adopt technology in INT practice.

5. Discussion and implications

Despite the limited literature on tablet-based INT, this study aimed to examine interpreting students' perceptions of using tablets for INT. We employed a mixed-method approach, starting with quantitative methods to investigate respondents' experiences and perceptions in line with Gile's (1995) two-phase effort model of CI. Next, we compared Goldsmith's (2018) summary of pros and cons for tablet-based interpreting against codes and categories collected through qualitative methods in our study to explore differences between professionals and beginners regarding their preferences and user experiences with

note-taking tools. Finally, we analyzed factors within the TAM framework that significantly impacted acceptance of tablet-based interpreting among participants. By adopting the methodology outlined above, we came to the following research findings.

First, the present study considers three aspects, namely user experience, preferences, and training and practice when exploring the beginners' perceptions. Based on interviews with participants, it was found that tablet-based note-taking had some advantages over traditional pen and paper methods during both phases of CI. However, only a relatively small percentage of users reported benefiting from these features, highlighting the importance of guiding beginners or those who may be unaware or inexperienced in applying technology within a new skillset such as interpreting. Although students generally preferred using their tablets for other situations besides INTs such as general class note-taking, when it came specifically to INT purposes, only around one-third expressed a preference for digital devices over traditional ones.

Second, the study found that while professional interpreters showed a higher preference for tablets, only 28.6% of participants expressed a preference for them. A comparative analysis was conducted between categories in this study and those used by Goldsmith, revealing similar perceptions concerning technical, visual, and physical aspects but varying attitudes towards training and student-teacher relations. The findings emphasize the importance of training to promote user engagement with new technologies like tablet-based note-taking among beginners while highlighting the influence of teachers' attitudes on their choices.

Third, the TAM was used to identify PU, PEU, and EVs as key factors affecting these preferences (**Figure 9**). PU can be broken down into improving note-taking experience, enhancing interpreting performance, and motivating students to practice CI. PEU combines ease of operation and flexibility, while EVs include facilitating conditions, subjective norms, self-efficacy, anxiety, prior experience with note-taking or using tablets. Access to training was identified as a major factor in promoting tablet adoption among beginners. However, student-teacher relations and school policies also play significant roles in shaping attitudes towards technology use. Overall, the findings suggest that while tablets may not currently meet all demands for live events in INT settings, it still has the potential as an instructional tool for beginner interpreters learning how to take notes effectively in CI.
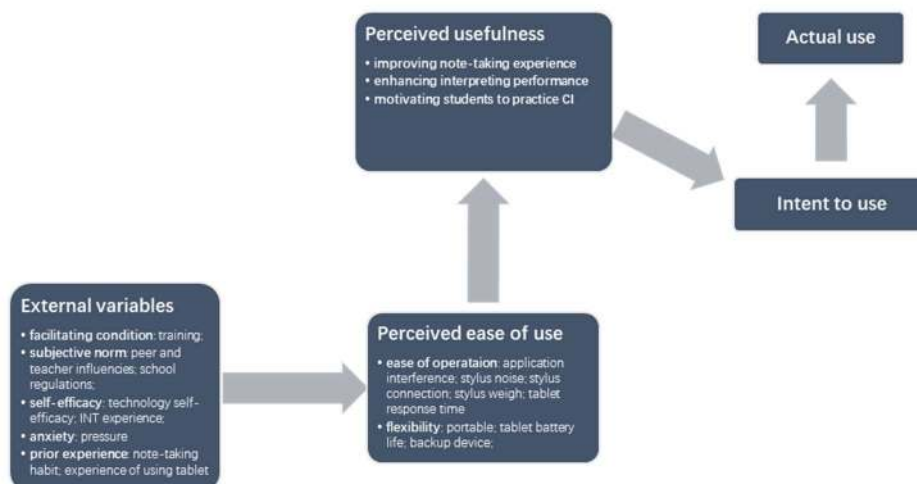

Figure 9. TAM description for 'beginners' tablet-based INT.

This study makes a significant contribution to deepen the understanding of beginner's use of tablets

for INT and has important practical implications.

First, it is essential to develop an application specifically designed for INT to meet the unique needs of interpreters. Currently available note-taking applications on the market do not take into consideration the special requirements of INT, such as speech logic, abbreviations, and acronyms commonly used in different fields. Therefore, developing an application that can address these difficulties has great potential to upgrade note-taking efficiency and improve overall interpreting performance.

Such an application could provide features like automatic abbreviation expansion or customizable shortcuts for frequently used terms. It could also incorporate real-time background knowledge pop-up hints to reduce cognitive load on interpreters. To meet the training needs of students, it could include a comparative function that allows users to compare their notes with reference notes generated by machine learning algorithms. Creating a specialized note-taking app that caters specifically to INT would be immensely beneficial for both professionals and beginners and encourage beginners to adopt tablet for INT.

Secondly, training plays an essential role in facilitating the adoption of tablet-based INT. The training should consist of two parts: application and INT-specific skill development. While teaching students how to use basic functions, special emphasis should be placed on features required for INT such as marking pauses in speech and setting page layout. This will help students realize that the application is not just another tool for note-taking but a suitable and convenient alternative to traditional pen-and-paper methods.

Unlike using tablets for other purposes, such as searching online resources or attending classes, INT is a skill that requires time and effort to master. Therefore, teachers are advised to introduce tablet-based note-taking after students have acquired basic note-taking skills so they do not feel anxious or lack confidence when adopting this technology.

Third, as a major influencer in the learning process, teachers shall take the initiative to try tablet-based INT themselves before they make their decisions on whether or not to introduce the technology to the students. Some teachers reject the use of tablet simply because they are afraid that the students might get distracted during class. However, as tablet interpreting has become an inevitable trend among professional interpreters, teachers of interpreting shall not turn a deaf ear to the trend in the industry and leave the students unprepared. They shall understand the advantages and disadvantages of tablet-based INT, and when they decide that it's suitable for their students, they shall design a systematic plan to help student adapt to the new model of note-taking and provide any necessary guidance and support.

6. Conclusion, limitations, and future research

This study contributed to a deeper understanding of beginners' perceptions of tablet-based INT by identifying factors that influence their choice of note-taking tools. It helped fill a gap in the field by shifting research focus from professionals to beginners. A comparison was made between these two groups, and influencing factors were identified within the framework of TAM. Based on our data analysis, practical implications have been suggested that can facilitate technology integration into CI teaching while better preparing students for real-life interpreting situations.

However, this study favored qualitative over quantitative approaches which may limit result generalizability. Additionally, due to sample constraints and being limited to one university in the Macao Special Administrative Region, it cannot account for more comprehensive factors influencing beginner's

use of tablets for INT. Furthermore, this study focused only on students without considering an important element in the teacher-learner process: teachers—making it difficult to provide a complete picture.

Given these limitations and using qualitative methodology used in this particular design, future research should consider incorporating quantitative methodologies or surveys aimed at learning more about student opinions as well as educators' views towards tablet use during INT instruction.

Ethics statement

Availability of supporting data

The data are not publicly available due to their containing information that could compromise the privacy of research participants.

Author contributions

Funding

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

References

American Translators Association (ATA, 2017). Tablets for interpreters: The device you didn't know you wanted. Available online: https://www.atanet.org/resources/tablets-for-interpreters-the-device-you-didnt-know-you-wanted/ (accessed on 19 April 2023).

Behl H (2013a). The paperless interpreter experiment: Part I. Available online: https://www.precisolanguage.com/2013/01/paperless-interpreter-part-i/ (accessed on 19 April 2023).

Behl H (2013b). The paperless interpreter experiment: Part II. Available online: https://www.precisolanguage.com/2013/05/paperless-interpreter-part-ii/ (accessed on 19 April 2023).

Brinkmann S (2013). *Qualitative Interviewing*. Oxford University Press.

Costa H, Pastor GC, Muñoz ID (2014). A comparative user evaluation of terminology management tools for interpreters. In: Proceedings of the 4th International Workshop on Computational Terminology; 23 August 2014; Dublin, Ireland. pp. 68–76.

Davis FD (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS*

Quarterly 13(3): 319–340. doi: 10.2307/249008

Drechsel A, Bouchard M, Feder M (2018). Inter-institutional training cooperation on the use of tablets in interpreting. *CLINA Revista Interdisciplinaria de Traducción Interpretación y Comunicación Intercultural* 4(1): 105–114. doi: 10.14201/clina20184199108

European Commission Directorate-General Interpretation (SCIC, 2015). Technology in interpreter training. Available online: https://ec.europa.eu/education/knowledge-centre-interpretation/en/technology-interpreter-training (accessed on 17 April 2023).

Gile D (1995). *Insights into Conference Interpreting Research* (French). Presses Universitaires du Septentrion.

Gillies A (2017). *Note-taking for Consecutive Interpreting: A Short Course*. Taylor & Francis.

Goldsmith J (2018). Tablet interpreting: Consecutive interpreting 2.0. *Translation and Interpreting Studies* 13(3): 342–365. doi: 10.1075/tis.00020.gol

Goldsmith J, Drechsel A (2016). Tablet interpreting: Tips, tools and applications to make the most of your tablet while interpreting. Presented at 2016 Virtual Conference for International Translation Day; 30 September 2016.

Goldsmith J, Holley J (2015). *Consecutive Interpreting 2.0: The Tablet Interpreting Experience* [Master's thesis]. University of Geneva.

Hof M (2012). Ipad: The ideal boothmate Available online: http://aiic.net/p/6354 (accessed on 17 April 2023).

Hoi VN, Mu GM (2020). Perceived teacher support and students' acceptance of mobile-assisted language learning: Evidence from Vietnamese higher education context. *British Journal of Educational Technology* 52(2): 879–898. doi: 10.1111/bjet.13044

Hsia JW, Tseng AH (2008). An enhanced technology acceptance model for e-learning systems in high-tech companies in Taiwan: Analyzed by structural equation modeling. In: Proceedings of the 2008 International Conference on Cyberworlds; 22–24 September 2008; Hangzhou, China. pp. 39–44. doi: 10.1109/CW.2008.46

Kose M, Isik E, Aykut A, et al. (2021). The utility of next-generation sequencing technologies in diagnosis of Mendelian mitochondrial diseases and reflections on clinical spectrum. *Journal of Pediatric Endocrinology and Metabolism* 34(4): 417–430. doi: 10.1515/jpem-2020–0410

Lee Y (2006). An empirical investigation into factors influencing the adoption of an e-learning system. *Online Information Review* 30(5): 517–541. doi: 10.1108/14684520610706406

Merriam SB, Tisdell EJ (2015). *Qualitative Research: A Guide to Design and Implementation*, 4th ed. John Wiley & Sons.

Moghadam AH, Bairamzadeh S (2009). Extending the technology acceptance model for e-learning: A case study of Iran. In: Proceedings of the Sixth International Conference on Information Technology: New Generations; 27–29 April 2009; Las Vegas, NV, USA. pp. 1659–1660. doi: 10.1109/ITNG.2009.152

Oceguera López P (2017). *The Use of Applications for Tablets in the Interpreter's Note-taking* (French) [Bachelor's thesis]. Universidad Autónoma de Baja California.

Rosado T (2013). Note-taking with iPad: Making our life easier. Available online: https://rpstranslations.wordpress.com/2013/05/28/note-taking-with-ipad-making-our-life-easier-2/ (accessed on 17 May 2023).

Teo T (2011). Factors influencing teachers' intention to use technology: Model development and test. *Computers & Education* 57(4): 2432–2440. doi: 10.1016/j.compedu.2011.06.008

Teo T, Zhou M (2017). The influence of teachers' conceptions of teaching and learning on their technology acceptance. *Interactive Learning Environments* 25(4): 513–527. doi: 10.1080/10494820.2016.1143844

Torkzadeh G, Van Dyke TP (2002). Effects of training on Internet self-efficacy and computer user attitudes. *Computers in Human Behavior* 18(5): 479–494. doi: 10.1016/S0747-5632(02)00010-9

Venkatesh V, Bala H (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences* 39(2): 273–315. doi: 10.1111/j.1540-5915.2008.00192.x

Venkatesh V, Davis FD (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science* 46(2): 186–204. doi: 10.1287/mnsc.46.2.186.11926

Venkatesh V, Morris MG, Davis GB, Davis FD (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly* 27(3): 425–478. doi: 10.2307/30036540

Wikipedia (2023). Ipad. Available online: https://en.wikipedia.org/wiki/IPad (accessed on 18 May 2023).

Yuen AH, Ma WW (2008). Exploring teacher acceptance of e-learning technology. *Asia–Pacific Journal of Teacher Education* 36(3): 229–243. doi: 10.1080/13598660802232779