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DIGITAL LITERACY OF ENGLISH AS A FOREIGN LANGUAGE

STUDENTS AND TEACHERS IN THE CONTEXT OF VIETNAMESE UNIVERSITIES

PHD DISSERTATION

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DISSERTATION SUMMARY

The proliferation of novel technologies has facilitated the contribution of information and communications technology (ICT) to education, revolutionizing the education system and equipping students with necessary skills for the digital era (Aydin, 2021). Technology creates demand and opportunities for students and teachers at all levels of education, including tertiary education. To meet the international and global trends of learners' foreign language proficiency and digital competence, the Vietnamese Ministry of Education and Training (MOET) has initiated national projects on English as a foreign language (EFL) learning and instruction with the integration of technology. Consequently, Vietnamese higher educational institutions have invested in and provided more facilities for students to participate in e-learning, blended learning, or flipped learning, as well as to collaborate and interact with one another on digital platforms while creating additional resources. However, the digital literacy (DL) of students and teachers is a major concern because the investment in technologies in education is only effective if they are digitally competent to integrate technology into the teaching and learning process. In the Vietnamese educational context, few studies have attempted to evaluate student and teacher DL levels, even though DL significantly affects the application of digital technologies in the EFL context (Alavi et al., 2016). Accordingly, the current research, comprising four cross-sectional sub-studies, examines Vietnamese student and teacher DL in an EFL educational context. The results should provide insights into the direction of ICT integration. The first study aims to validate a computer-assisted language learning (CALL) attitude-adapted questionnaire, which is one part of the DL questionnaire, and to differentiate between online and paper administration modes. Exploratory factor analysis, confirmatory factor analysis, measurement invariance analysis, and Rasch analysis were conducted to explore and assess the factor structure of the CALL instrument and to specify the equivalence between two versions of the questionnaire. The construct and item levels of the questionnaire did not differ significantly between the two administration modes. Thus, the instrument can be used with online and paper questionnaires to measure Vietnamese tertiary students' attitudes toward technology integration. The second study investigates the DL levels of non-English majors at Vietnamese universities. An adapted questionnaire is used to assess students' digital knowledge and their perceived skills, their attitudes toward the use of digital technologies, and the frequency of use of technology applications in English learning. The reliability of other parts of the DL questionnaire was confirmed in this study. According to the findings, most Vietnamese students can access digital technologies at home and at school. Students achieve an

adequate level of DL, and their technological skills range from low to average. Male students tend to use technologies more extensively than female students, despite the fact that females are more aware of the benefits of digital integration in learning. Discrepancies also exist among different year groups. Freshmen possess the highest levels of technical skill, while seniors have the best digital knowledge. Despite their positive attitudes toward technology, students do not use it extensively when learning English. The third study aims to measure DL among English majors at Vietnamese universities using self-developed subjective and objective instruments. There is a positive level of DL achievement according to the subjective assessment and a moderate level of DL achievement. However, the gap between the results of the two types of assessment is not significant despite participants' estimates that their DL is higher than their actual achievement. In addition, despite the low path coefficient value, the appraisal evaluations of participants have a positive effect on their achievement. The fourth study is conducted to evaluate the DL of EFL teachers in Vietnamese universities using an adapted questionnaire and in-depth interviews. The study found that most of the teachers assess themselves as having a good level of DL. The qualitative data from in-depth- interviews partly contribute to the quantitative data because they strengthen the result from the questionnaire and provide a more comprehensive understanding of teacher DL in their teaching context. In the case of gender difference in DL level, male teachers' DL is better than their female colleagues' though the difference is not significant. Furthermore, the study indicates that age, gender, and experiences of using digital technologies do not significantly impact teacher DL, but teachers' working environment and their digital technology usage have an impact on their level of DL. The research suggests certain implications for English teaching and learning with technology and provides suggestions for future research.

LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
AMOS	Analysis of a Moment Structures
AVE	Average Variance Extracted
CALL	Computer Assisted Language Learning
CEFR	Common European Framework for Reference
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CKI	Cohen's Kappa Index
CR	Composite Reliability
CVI	Content Validity Index
DigComp	the Digital Competence framework
DigCompEdu	the European Framework for the Digital Competence of Educators
DL	Digital Literacy
EAP	English for Academic Purpose
EFA	Exploratory Factor Analysis
GFRDL	the Global Framework of Reference on Digital Literacy
HTMT	Heterotrait–Monotrait
ICILS	the International Computer and Information Literacy Study
ICT	Information and Communication Technology
ICT-CFT	the ICT Competency Framework for Teachers
ISTE	the International Society for Technology in Education
MOOCs	Massive Open Online Courses
MOET	Ministry of Education
OECD	the Organization for Economic Co-operation and Development
RMSEA	Root-Mean-Square Error of Approximation
SEAMEO	Southeast Asian Ministers of Education Organization
SEM	Structural Equation Modeling
SRMR	Standardized Root Mean Square Residual
SPSS	Statistical Package for Social Sciences
TALIS	Teaching and Learning International Survey

TAM	the Technology Acceptance Model
TPACK	Technological Pedagogical Content Knowledge
TPB	the Theory of Planned Behavior
TRA	Theory of Reasoned Action
UNESCO	United Nations Educational Scientific and Cultural Organization
VNDLF	the Vietnamese Digital Literacy framework

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CHAPTER 1. INTRODUCTION

The introductory chapter begins with an introduction to the research topic, highlighting the significance of student and teacher digital literacy in the information age, as well as providing the research background within the context of higher education in Vietnam where the study is conducted. Following this, the problem statement addresses the status of technology integration in the Vietnamese educational system and the research gap, comprehensively presented before outlining the structure of the dissertation.

1.1 Introduction

There has been a great deal of effort to provide technology in schools since the 1980s because educational computing has long been considered to prepare learners with essential digital skills for their future careers. However, the issue of integrating technology into an educational context to positively facilitate the outcome of teaching and learning has been controversial because there has been a lack of evidence for the effectiveness of using technologies in education (Elstad, 2016). The concern here is that businesspeople, the technology industry, and policymakers may merely use the inclusion of digital technology as rhetoric to gain access to lucrative markets (Lindh & Nolin, 2016), while students, teachers, and teacher education are often overlooked (Nivala, 2009). Specifically, in recent years, globalization and the expansion of information and communication technology (ICT) have been used to augment the importance and urgency of implementing ICT in education. To avoid being left behind and keep up with the times, multiple governments have invested in reformulating the education system to align it with the global information society discourse because education is understood as one of the most influential strategies to facilitate national development in the digital age (Haugsbakk, 2013). Accordingly, the development of digital literacy (DL) is considered an instrument to improve educational standards, address economic problems, and build the information society (Hanell, 2018). The ubiquitous involvement of technology in all aspects of education and changes in ICT policies have been demonstrated by the fact that a series of education systems have required digital educational platforms or assessment tools for learning and teaching (Porat et al., 2018). Therefore, at a high-stakes level, DL development is considered one of the strongest potential solutions to the multifaceted problems of involving ICT in society, since it can become an instrument for better educational attainment and societal development (Hanell, 2018; Nguyen & Habók, 2021; Nguyen & Habók, 2022a). At a low-stakes level, DL is also becoming a major concern for school stakeholders because investing in

digital facilities to support a hybrid teaching and learning system would only be valuable if teachers and students possessed sufficient DL to use technology in education effectively. In the current educational environment, teachers' mission is to support students in mastering the knowledge and skills required in the 21st century. Moreover, DL is considered one of the key competencies as well as an essential factor in learning (Knutsson et al., 2012) for students to be able to cope with the demands of globalization. Additionally, scholars predict that DL will be indispensable in all kinds of achievement during the Fourth Industrial Revolution (Williamson et al., 2019). Educational technologies, the task of being digital role models, and providing appropriate education for students as future citizens are crucial. Thus, teachers are required to achieve high levels of qualified DL or possess sufficient technical, cognitive, and socioemotional skills (Güneş & Bahçivan, 2018). Teachers can thus successfully align technologies, pedagogies, and content knowledge in a digitally rich media environment. Additionally, in coping with the digitization of education, teachers are urged to update, enhance, and emulate well-honed skills in front of students as a demonstration (Priestley, 2011). The reason for this notion is that teachers play a decisive role in learner DL. Moreover, teachers are considered a primary factor in the success of placing and innovating technology in schools (European Union, 2013). Similarly, student DL is very important as it serves as an accelerator for their learning and facilitates the teaching process. Furthermore, the significance of DL for both teachers and students became more pronounced due to the sudden onset of the Covid-19 pandemic in 2020 and 2021. This prompted educational institutions across continents to swiftly implement emergency teaching and learning strategies aligned with lockdown measures, with the goal of curbing the transmission of the virus (Ngo, 2022). The transition from traditional in-person instruction to remote teaching and learning posed challenges for various stakeholders, especially students and teachers. The shift to digital education necessitated a rapid adoption of new tools and platforms, prompting a substantial reevaluation of the learning process (Gonzalez et al., 2020). Despite these challenges, remote teaching facilitated the continuity of education, contributing to the containment of the virus. Moreover, online teaching provided new opportunities for both students and teachers to integrate technology into their coursework. Throughout the pandemic, the increased reliance on technology in learning and teaching may have influenced students' and teachers' perceptions and usage of ICT, fostering a desire to enhance DL among students and teachers to better navigate contemporary environmental challenges (Barnes, 2020). Consequently, the levels of DL for both students and teachers in terms of integrating technology into education have become global concerns.

1.2 Research background

The study is carried out in the Vietnamese higher education context. Vietnam, a developing country in Southeast Asia, underwent thousands of years of invasions by other countries. The country gained independence in 1975 after long wars fought to protect the people and the land. Although Vietnamese people were the winners, and they could regain their belongings, it cannot be denied that the heavy losses in wars had adverse effects on all sectors of the country, especially education. The government then initiated the reconstruction of the country with a focus on the development of education, implementing various policies to catch up with other countries worldwide and establish broader and deeper connections with global economies, especially those from the Western World. Education is considered the foremost national policy, and it is also reported that the budget spent on pedagogical activities is more than 5 times higher than that on other key sections in Vietnam. English as a foreign language (EFL) has gained immense significance in Vietnam's development, becoming a mandatory subject in the country's education system. This shift occurred with the declaration of Doi Moi (Renovation) when English became the official and commercial working language for international organizations of which Vietnam is a member. Consequently, to foster Vietnam's international integration, proficiency in English is crucial for the Vietnamese workforce alongside their specialized knowledge and skills. In the evolving job market, candidates must possess fundamental communication skills in English to stay competitive. Moreover, there is a need for individuals to strive for a grasp of professional English, enabling them to access the latest knowledge. This responsibility falls on all levels of the education system, particularly in higher education. To align with international and global trends, the MOET has implemented national projects on the learning and instruction of EFL. The most recent national initiative is Decision No. 1400/QD-TTg, which endorsed the 10-year national plan for 'Teaching and Learning Foreign Languages in the National Formal Education System between 2008 – 2020.' This decision was issued on September 30th, 2008 (Vietnamese Government, 2008). The project makes an effort to train teachers to be qualified in English proficiency and pedagogy to meet the needs of the context of the globalized world. This national project also aims to enhance students' English language proficiency upon completion of their training. Along with the required English proficiency level of educators at various levels of education based on the Common European Framework of Reference (CEFR), grammar-translation method and teacher-centered approach in teaching and learning, which were commonly used in English classrooms, were called to move away to a more practical orientation so that learning contexts provide authentic experiences for students and bring the real

life context for language utilization, and the expectation is to integrate ICT in English teaching and learning as part of the practical orientation. It was recently announced that the Vietnamese Prime Minister approved the National Digital Transformation Program through 2025, along with the 2030 Strategic Vision (Vietnamese Government, 2020). Afterward, the MOET expressed awareness of the significance of technology in all levels of education, especially in higher education and in teaching and learning EFL. This is because technology and English, a global language, are considered as important tools for Vietnamese students and teachers to thrive and contribute effectively in the digital era, ultimately becoming valuable members of society.

1.3 Problem statement

In the Vietnamese educational context, as mentioned earlier, the MOET has recognized the effects of digital technologies on education, particularly English teaching and learning in higher education. It has devoted considerable effort to reforming education by implementing technology at all levels, particularly in higher education, as technology can bring about significant changes in teaching and learning methods. Likewise, technology will affect education management, and integrating technology into schools will positively affect the quality of education and the development of the country (Peeraer et al., 2009). Despite the national emphasis on technology integration in teaching and learning, various challenges, including the DL of both students and teachers, impact the pace of integration (Dashtestani & Hojatpanah, 2020). The report on the status of ICT integration in education in Southeast Asian countries in 2010 listed a four-stage model of UNESCO ICT development including (1) emerging, which means becoming conscious of ICT, (2) applying, which refers to learning how to use ICT, (3) infusing, which involves firmly grasping how and when to use ICT, and (4) transforming, which comprises specializing in the use of ICT. According to the report, Vietnam is in the third stage of its National ICT in Education Vision and the fourth stage in Education Plans & Policies, Complementary National ICT & Education Policies, ICT Infrastructure & Resources in Schools, and Teaching & Learning Pedagogies (SEAMEO (Southeast Asian Ministers of Education Organization) 2010). However, some previous studies have reported limitations in the use of ICT applications in English teaching and learning in Vietnam (Peeraer & Van Petegem, 2011). This limitation is cited as one of the reasons why the latest national project on English language did not achieve its target objectives in the first phase, leading to its extension until 2025 (Vietnamese Government, 2017). While there are few studies that specifically focus on measuring the levels of DL among students or teachers (e.g., Pham &

Nguyen, 2022), unfortunately, there has been no research conducted in the Vietnamese higher education context revealing EFL student and teacher DL. Meanwhile, DL is known to significantly affect the application of digital technologies in the EFL context (Alavi et al., 2016). Consequently, the current research aims to examine Vietnamese student and teacher DL in EFL educational context, and the results of the research should provide implications regarding the direction of ICT integration in EFL learning and instruction.

1.4 Structure of the dissertation

The dissertation is organized into five chapters.

The first introductory chapter introduces the significance of student and teacher DL in the ICT age and the background of the Vietnamese higher education context where the research is conducted. Additionally, the research practitioner highlights the research problem and research gap lying in the current status of the Vietnamese education system in terms of technology integration and the scarce case of measurement of Vietnamese teacher and student DL in EFL teaching and learning in higher education. Then, the structure of the dissertation is well-presented in the final part.

The second chapter is dedicated to providing essential details about the research context, covering extensive geographical information and highlighting the importance of education. It also provides an overview of the education system in Vietnam. Following this, the chapter explores the English language's role and its instruction as a foreign language in higher education in Vietnam. Additionally, it discusses the importance of incorporating technology, evident in national projects concentrating on English teaching and learning, as well as policies propelling technological transformation in education. The chapter also incorporates details concerning the assessment of DL in higher education.

The third chapter, dedicated to the literature review, is bifurcated into two primary sections subsequent to offering a broad comprehension of DL and related concepts, alongside exploring dimensions of DL from diverse viewpoints: student DL and teacher DL. Within the student DL segment, the literature review establishes a theoretical foundation concerning the conceptualization of student DL, various aspects of student DL within frameworks, attitudes (an integral facet of DL), and the evaluation of attitudes towards digital technology usage in language learning. Additionally, it delves into the evaluation of student DL using both objective and subjective tools, encompassing both paper-based and technology-based administration modes. Furthermore, the review

incorporates insights from pertinent past studies on student DL, including considerations of gender and grade-level variations. In a parallel manner, the section on teacher DL undergoes an exhaustive review by introducing teacher DL definitions, models/frameworks for assessing teacher DL in the educational context, various approaches, types of instruments for measuring DL, and factors influencing teacher DL. Ultimately, the chapter wraps up with a summary and offers suggestions for future research.

The methodology chapter describes the aim of the research, as well as the objectives, research questions, and hypotheses of the four sub-studies concerning student and teacher DL. Additionally, the main types of data analysis are depicted to achieve the research aims and address answers for research questions.

In the fifth chapter, the empirical studies that comprehensively discuss the four sub-studies of DL assessment are presented. Each study is detailed with an introductory section, methodology, data analysis and results, discussion, conclusion, and implications for teaching and learning.

The last chapter presents the overall conclusion of the entire research. In addition, it discusses the implications for teaching and learning, outlines the contributions to student and teacher DL research, highlights the limitations of the study, and provides recommendations for future research.

CHAPTER 2. RESEARCH CONTEXT

A comprehension of the research context holds significance in the examination of student and teacher DL in Vietnamese higher education, particularly as the overarching research methodology is ethnography, requiring an in-depth understanding of the people, organization, and context. This chapter is dedicated to providing foundational information about the research context, including general geographic details and the importance of education, and an overview of the education system in Vietnam. Subsequently, it delves into the role of the English language, English as a foreign language education in higher education in Vietnam, and the significance of technology integration, as manifested in national projects focused on English teaching and learning and policies driving technological transformation in education. The chapter also encompasses information regarding digital literacy assessment in higher education.

2.1 Basic geographic information and the significance of education in Vietnam

Vietnam, situated in Southeast Asia, shares borders with the Gulf of Thailand, the Gulf of Tonkin, and the South China Sea, neighboring Cambodia, China, and Laos. The country features a topography characterized by hills and densely forested mountains in the northwest. In its role as a communist state, Vietnam has a political structure in which the president serves as the chief of state, and the prime minister acts as the head of government. Operating with a mixed economy, Vietnam experiences limited private freedom alongside significant government control. The nation is a member of various international organizations, including the Association of Southeast Asian Nations (ASEAN), the Trans-Pacific Partnership (TPP), World Health Organization (WTO), and others.

Since the reunification of the country in 1975 as the Socialist Republic of Vietnam, education has been a focal point in national priorities, strategies, and policies. This emphasis on education is rooted in the belief that it plays a pivotal role in reducing poverty and improving people's livelihoods (London, 2011). Furthermore, education is seen as a means to enhance global integration. The advancement of education is considered a crucial force in propelling the country toward industrialization and modernization, serving as a prerequisite for developing human resources and a fundamental factor for both social progress and economic growth.

2.2 The education system in Vietnam

The education system in Vietnam is clearly outlined in Decision No. 1981/QD-TTg, issued in October 2016 by the Prime Minister (Vietnamese Government, 2016), delineating the structural

framework of the national education system. In accordance with this decision, the system covers various educational and training levels with corresponding tuition fees, as outlined below:

Preschool education, the initial tier of the national education system, comprises nurseries and kindergarten education. Preschool education aims to foster the physical, emotional, intellectual, and aesthetic development of children aged three to six. Its objectives include shaping the first elements of personality, preparing children for the first grade, and establishing a foundation for further learning throughout their lives.

General education spans 12 years and is categorized into three levels: primary school, lower secondary school, and upper secondary school. The primary school phase commences at age 6 and concludes at age 10. The lower secondary level, encompassing five grades (1 to 5), starts at age 11 and concludes at age 14, incorporating the lower secondary system in secondary schools and continuing education centers. This phase is universally mandated, serving as a prerequisite for citizens to pursue specific careers; graduates can opt for vocational or professional secondary school without proceeding to upper secondary school. To fulfill this educational tier, students must enroll for graduation from secondary school.

The upper secondary school level consists of three stages, spanning grades 10 to 12 and ages 15 to 17. It includes the upper secondary system in upper secondary schools and continuing education centers. Graduating from upper secondary school necessitates students to undergo the upper secondary school graduation exam, conducted by the MOET of Vietnam. Those aspiring to attend public upper secondary schools must register for an entrance exam upon completing the lower secondary level. This annual exam is administered by the local department of education and training.

Vocational education entails training at primary, intermediate, and college levels (excluding pedagogical colleges), overseen by the Ministry of Labor, War Invalids, and Social Affairs. Students must graduate from lower secondary school, upper secondary school, or an equivalent to pursue vocational or intermediate school. Similarly, to enroll in or transfer to the college level, an upper secondary school diploma, professional secondary school completion, vocational training, or an equivalent qualification is required. A standard college program spans three years.

Higher education represents the pinnacle of the Vietnamese education system, offering undergraduate, master's, and doctoral levels. University-level programs admit upper secondary school graduates, individuals with intermediate-level qualifications who pass a prescribed exam, and those who have graduated from college. Master's degree programs accept university graduates,

with the duration ranging from 1 to 2 years based on the specific field's requirements. After completing a master's program, learners can pursue a doctorate in a relevant professional field or be admitted to other professional directions if they satisfy the program's conditions. Doctoral programs accept master's degree graduates or university graduates who meet the program's requirements. The national education system framework of Vietnam is described in Figure 2.1.
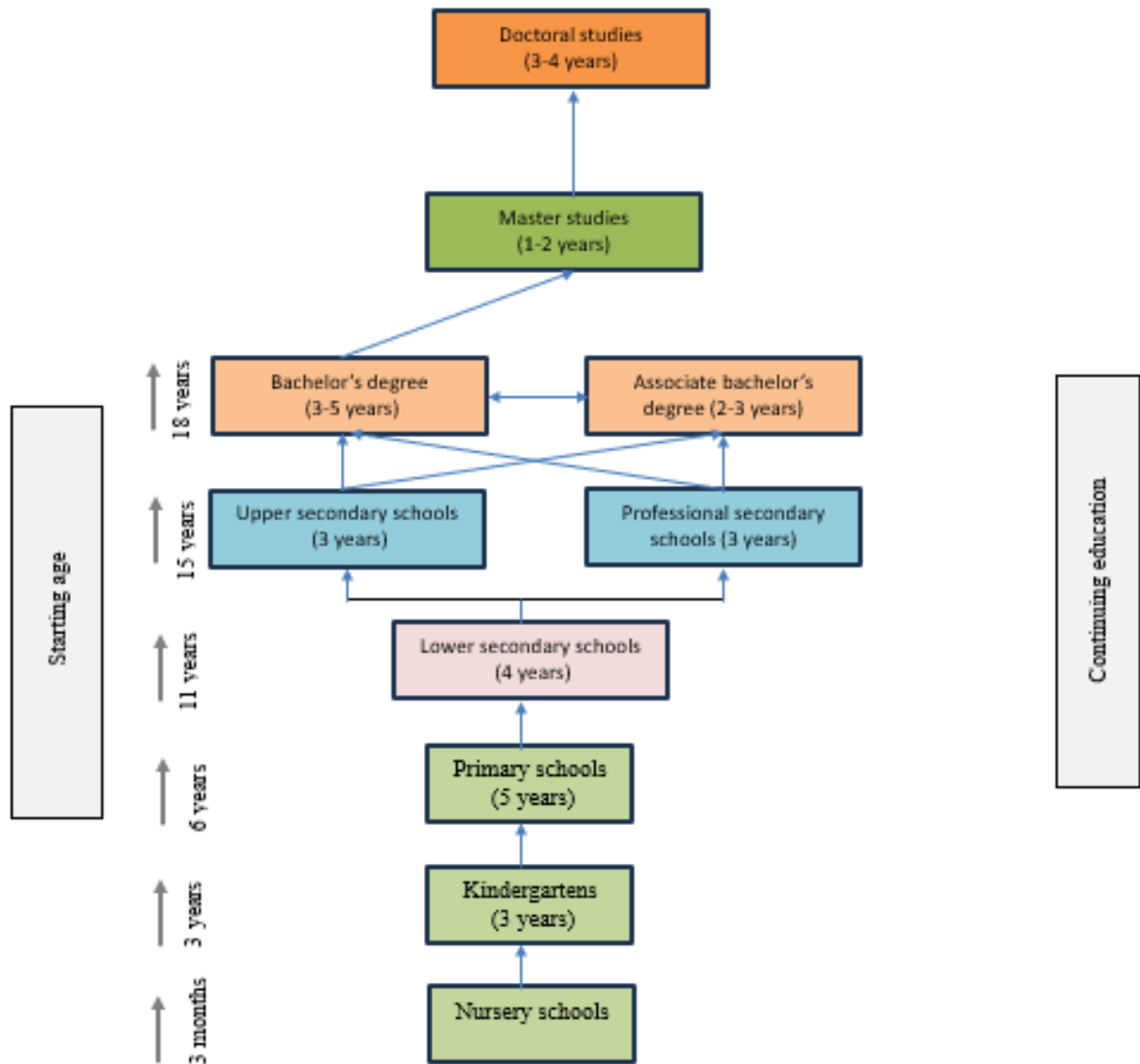
Figure 2.1 *National education system framework of Vietnam*

2.3 The role of English in global integration and education system in Vietnam

After centuries of striving for the nation's independence and freedom, the Vietnamese economy underwent a substantial transformation known as Doi Moi, representing the shift from a centrally

planned economy to a socialist-oriented market economy (Dang & Foster, 2015). While Doi Moi primarily emphasizes economic development, education played a crucial role in the reform initiative. Recognizing education as the cornerstone for establishing profound ties with other economies, particularly those in the Western world, it has become instrumental in enhancing global integration (Hang, 2009). The transformation was characterized by Vietnam's involvement in numerous international organizations, such as the WTO and the ASEAN, among others. The country's global integration necessitated a skilled labor force to align with global workforce trends. Therefore, it is crucial for education at all levels, especially in higher education, to provide students with the necessary knowledge and skills to become highly qualified professionals. Except for the specialized knowledge and skills, foreign languages are barriers in the process of global integration. While English is perceived as a universal language of business, diplomacy and education; it is also the key to the success of science, technology and commerce (Denham, 1992). This language is also the commercial language of major organizations in the world such as the WHO, the United Nations, ASEAN, etc. Therefore, to promote the process of international integration of Vietnam, English is an important foreign language that Vietnamese labor force needs to be proficient beside their specialized knowledge and skills because to compete in the increasingly open labor market, candidates need to possess basic communication skills in English. Simultaneously, they should strive to understand professional English to gain access to up-to-date knowledge.

In the ASEAN region, the current landscape of labor resource development underscores a shift in the role of English proficiency, transitioning from a competitive advantage to an essential skill in line with the evolving context. At a broader level, globalization propels a competitive market economy, placing a premium on diligence from workers. It becomes imperative to equip individuals with the skills, knowledge, and adaptability necessary to continuously address challenges within the work environment. Among these factors, effective communication skills emerge as one of the most crucial elements. Despite English being considered a working language among ASEAN countries (Kirkpatrick, 2008), there exists significant disparity in English language proficiency levels among member nations. According to EF (2020), which assessed English language proficiency levels worldwide using five categories: very low, low, moderate, high, and very high, Vietnam falls within the category of countries with low English proficiency levels.

Recognizing the importance of the English language in the country's development and considering the current status of English language proficiency among learners, the Vietnamese

government and the MOET have issued various policies on teaching and learning EFL at all levels of education. This is particularly emphasized in higher education, aiming to ensure that students attain proficiency in the English language alongside their specialization. This is intended to qualify them for the labor force and facilitate integration into the international development, particularly among ASEAN countries and worldwide. As English is considered a key facilitator for Vietnam's engagement in international collaboration and connections, the importance of English teaching and learning in Vietnam becomes significant. English has been mandatory in schools since the 1990s (Denham, 1992), and it has been one of the five compulsory subjects in the national upper secondary graduation exams for years. In higher education, English proficiency is also considered one of the criteria for graduation.

2.4 English as a foreign language education in higher education in Vietnam

In Vietnamese higher education, two categories of language learners exist: English majors and non-English majors (Ngo et al., 2017). English major students are required to successfully navigate university entrance exams, which include three subjects, one of them being English. During their university tenure, they specialize in various sub-fields of the English language, such as linguistics, teaching methodology, translation, literature, and others. English is expected to be used as a medium of instruction in specialized courses for English major students. Yet, similar to many universities in Japan, China, and other nations, Vietnamese universities confront challenges in implementing English as a medium of instruction (Pham & Doan, 2020). In addition to meeting requirements related to credits or graduation exams, English major students must fulfill the language proficiency criterion of at least C1 (advanced level) according to the CEFR. It's important to note that this language proficiency requirement is not uniformly applied across all universities in the country at present. In contrast, non-English major students undergo university exams without English subjects. Specialized foreign language study is obligatory for full-time university students. While most universities in Vietnam mandate English as a required foreign language, students still have the flexibility to choose French, Chinese, Japanese, or other foreign languages. Nevertheless, only a limited number of universities provide language options other than English. Consequently, English has become a compulsory subject in nearly all universities across the country. For non-English major students, it is expected that they will be provided with general English courses and English for specific purposes courses; however, not all universities can offer both courses. This limitation exists even in universities in big cities due to the shortage of specialized English teachers

in specific fields or the low English proficiency of learners. Consequently, English courses that use code switching to Vietnamese are common at Vietnamese universities for non-English major students (Li, 2013). To graduate from the university, students are expected to achieve at least level B1 (intermediate level) in CEFR and meet other credit, specialized knowledge, and skills requirements or successfully pass the graduation exam or Bachelor's thesis defense.

Theoretically, English language teaching in Vietnamese universities has undergone the utilization of diverse instructional approaches across different eras, including the grammar-translation method in the 1950s, the audio-lingual method in the 1960s, the structural approach in the 1970s, and the communicative approach from the 1980s to the present (Hoang, 2013). However, in practical application, these teaching models have proven to be ineffective. Various factors contribute to the inefficacy of English instruction in Vietnamese universities, such as the lack of a conducive environment for students to practice English. Non-English majors experience limited exposure to the language, with only about 210 contact hours over four academic years. Furthermore, many tertiary educators have not had the opportunity to study English in an English-speaking country, and their infrequent use of English hampers their ability to rely on communicative interactions for teaching. The advancement of technology offers new opportunities for both teachers and students in tertiary-level English instruction, as technology can provide personalized support and create communicative environments. Furthermore, despite the government and MOET's efforts in implementing a national project on English teaching, learning, and technology integration in education, the quality of English instruction falls below the expected standard. Numerous graduates from tertiary institutions continue to face challenges in using English proficiently. While there have been some advancements in utilizing technological resources for EFL instruction, their implementation in regular tertiary English classrooms remains restricted (Nguyen & Habók, 2021). Hence, it is essential to examine the involvement of both students and teachers in digital learning to ensure the success of national initiatives aimed at improving English teaching and learning.

2.5 National programs on the English language and expectations for EFL teachers and students

To facilitate English teaching and learning in Vietnam, the Vietnamese government and the MOET have issued multiple policies and projects aimed at supporting teachers, students, and other school stakeholders in their English teaching and learning endeavors. The latest national project is Decision No. 1400/QD-TTg, which approves the 10-year National Plan for 'Teaching and Learning

Foreign Languages in the National Formal Education System between 2008 – 2020' (Vietnamese Government, 2008). The initiative strives to equip teachers with the necessary qualifications in both English proficiency and pedagogy, addressing the requirements of the globalized world. The other main goal of the project is that by 2020, the majority of Vietnamese youth graduating from universities should possess sufficient independent foreign language skills, enabling them to communicate, study, and work confidently in an integrated, multilingual, and multicultural environment. The expectation is that transforming foreign languages into a strength for the Vietnamese people will contribute to the country's industrialization and modernization efforts. To ensure students' proficiency in the English language and create a globalized language learning environment, there is a concerted effort not only to improve teachers' English language skills but also to emphasize pedagogical advancements. Specifically, the MOET advocates a shift from grammar-translation method and teacher-centered approach in English teaching towards a more practical orientation. This transformation aims to design EFL teaching classrooms that offer authentic experiences for students (Dang et al., 2013). Consequently, universities responsible for training EFL teachers are encouraged to enhance language teaching methods in a more pragmatic manner, incorporating real-life contexts for students. One facet of the renewed pedagogical focus entails the expectation of integrating technology into English teaching, utilizing appropriate instructional approaches (Kumar, 2015), as technology integration allows learners to engage in learning with real-world contexts (Valtonen et al., 2015). The incorporation of technology also serves as a transformative element, aiding in the shift of the role of EFL teachers from knowledge providers to learning counselors and supporters. In terms of expectations for EFL students, Vietnamese universities have set language proficiency criteria for graduation. Nevertheless, it appears that the project's objective has not been attained, as only approximately half of the university graduates satisfy the English requirements in the workplace (MOET, 2016). In 2017, the government extended the timeline for the National Foreign Language Education project until 2025 while maintaining the overall goal. This extension was deemed necessary as the main objectives of the latest national project on EFL teaching and learning did not reach the target objectives in the first phase (Vietnamese Government, 2017). As part of the English language acquisition process, students are mandated to incorporate technologies into their language learning experiences (Vietnamese Government, 2008). Consequently, in alignment with the national project on English language teaching and learning, the improvement of English language proficiency, pedagogy, and the integration of technology in English language education are integral components of the

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language teaching and learning environment. Moreover, it is imperative for both teachers and students to adhere to a set of technology standards for effective teaching and learning.

2.6 National programs for strengthening digital transformation in education

It could be noticed that technology is always a vital integral part in education, and multiple policies concerning technology integration in education have been issued by the Vietnamese government and the MOET to strengthen the technology integration in education for decades. In the latest decade, various technology application policies have been issued to facilitate teachers and students, educational institutions, as well as education departments nationwide in fulfilling the requirements of national projects or education. For instance, in 2010, the MOET issued Circular No. 08/2010/TT-BGDĐT, which outlines the utilization of free and open-source software within educational institutions. This directive is applicable to educational establishments spanning from preschool to university levels, as well as educational authorities (MOET, 2010). To implement the 'Enhancing the application of ICT in managing and supporting teaching and learning activities and scientific research to contribute to improving the quality of education and training during the 2016-2020 period, with an orientation to 2025' project, Plan No. 345/KH-BGDĐT was issued on May 23, 2017 (MOET, 2017b). To ensure the synchronized implementation of information technology in higher education institutions and pedagogical colleges, the MOET released Official Letter 4966/BGDĐT-IT in 2019 (MOET, 2019), aiming to assess the conditions for ICT application in management and teaching (Pham & Nguyen, 2020). Various technology integration policies in education over the last decade are detailed in Table 2.1. It is evident that over the past decade, the MOET has been proactive in formulating policies aligned with government directives on establishing e-government and incorporating ICT in education.

Table 2.1 *Typical digital transformation policies in Vietnam*

Policies	Main content
08/2010/TT-BGDĐT (MOET, 2010)	Utilizing software that is both free and open-source within educational establishments
53/2012/TT-BGDĐT (MOET, 2012)	Rules governing the organization, functioning, and utilization of email and online portals within the Department of Education and Training, Educational Offices, and educational

	institutions
12/2016/TT-BGDĐT (MOET, 2016)	Utilization of information technology for the management and organization of online education
21/2017/TT-BGDĐT (MOET, 2017a)	Utilizing information technology for online training and educational activities designed for teachers, staff, and education administrators
345/KH-BGDĐT (MOET, 2017b)	Enhancing the integration of information technology in managing and supporting teaching-learning activities and scientific research, with a focus on the orientation towards 2025, to contribute to the improvement of education and training quality from 2016 to 2020
3946/BGDĐT-CNTT (MOET, 2018)	Instructions for carrying out ICT tasks during the school year 2019-2020.
4966/BGDĐT-CNTT (MOET, 2019)	Implementing the initiative of integrating information technology into higher education institutions, pedagogical colleges, and secondary schools with an educational focus

Despite the recognition of the significant support provided by the integration of ICT in education, particularly in terms of facilities and guidance for education, and its contribution to the previously mentioned national project focused on utilizing technology to improve English teaching and learning, a key challenge arises in assessing whether both students and teachers possess the necessary DL to effectively incorporate technology into education. This proficiency is essential to ensure that the results align with the expectations set by policies and national projects.

2.7 Digital literacy assessment in higher education

The earlier part described the significant impact of digitalization on the education system in Vietnam. Despite this influence, the MOET has not taken steps to create a dedicated national DL framework designed specifically for higher education students and teachers in Vietnam. The

assessment of student and teacher DL has been guided by existing frameworks developed by international organizations like Law et al. (2018) and Carretero et al. (2017). Recently, a team of Vietnamese researchers proposed a DL framework (VNDLF) for Vietnamese students, drawing inspiration from international frameworks. This proposed framework is applicable across various fields, although it does not specifically address EFL teaching and learning. The VNDLF, outlined by Do et al. (2021), shares components with the Global Framework of Reference on Digital Literacy Skills (GFRDL) developed by Law et al. (2018). However, the VNDLF replaces the problem-solving dimension with a subscale focusing on learning and developing digital skills. This adjustment reflects the dynamic nature of digital technology, highlighting the crucial need for students to continually update their digital knowledge and skills, as emphasized by the OECD (2015). Importantly, the framework does not eliminate the problem-solving dimension but rather integrates it into other aspects. Table 2.2 provides a description of the proposed DL framework specifically designed for higher education in Vietnam.

Table 2.2 *The proposed Vietnamese digital literacy framework (Do et al., 2021)*

Component	Description
Operate equipment and software	√ Operate digital equipment √ Operate software and digital services √ Evaluate and select technology
Information and data literacy	√ Identify needs and solve problems √ Search for information √ Evaluate information and think critically √ Store and organize information √ Use and distribute information
Communication and collaboration in the digital environment	√ Digital citizenship (rights and public services in the digital environment √ Participate in and operate communities/groups/forums √ Interact and share information √ Empathy (communication, awareness of behavioral norms, understanding the public and context) √ Develop and practice codes of conduct in the digital environment

Digital content creation	√ Innovate with content and digital technology
	√ Create digital content (mastering tools and methods)
	√ Digital licenses and copyright
	√ Use programming languages
Security and safety in cyberspace	√ Understand and master digital footprint
	√ Protect digital identity and privacy
	√ Ensure digital security (maintaining digital balance, identifying risks in the digital environment)
	√ Protecting the environment during the practice of digital competency
Learning and developing digital skills	√ Grasp the trends in online training
	√ Utilize teaching and learning tools and methods in a digital environment
	√ Plan and monitor learning progress in a digital environment
	√ Evaluate the learning process in a digital environment
Career-relevant digital competencies	√ Identify job-specific tools and technology
	√ Search, evaluate, select and use job-specific content and data

CHAPTER 3. LITERATURE REVIEW

This chapter is divided into two main parts after providing a general understanding of DL and other related concepts, as well as dimensions of digital literacy from different perspectives: student DL and teacher DL. In the student DL section, the literature review provides a theoretical background regarding the conceptualization of student DL, aspects of student DL in frameworks, attitudes (an integral part of DL), and the assessment of attitudes toward digital technology usage in language learning. Additionally, it covers the assessment of student DL using both objective and subjective tools, along with paper-based and technology-based administration modes. The review also includes findings from related previous studies concerning student DL, as well as gender and grade-level differences in student DL. Similarly, the teacher DL part is comprehensively reviewed by presenting teacher DL definitions, models/frameworks of teacher DL assessment in the educational context, approaches, types of instruments to measure DL, and factors impacting teacher DL. Finally, the chapter concludes with a summary and some suggestions for future research.

3.1 Digital literacy and other related concepts

The unprecedented growth of ICT in the digital era has spawned various terms to indicate the skills, competencies, abilities, or literacies related to the use of digital technologies. Apart from DL, which was used by the European Commission (2003, 2008), various studies have coined a wide range of other similar terms. The most common ones are ICT literacy (Educational Testing Service, 2002), 21st-century skills (Partnership for 21st Century Skills, 2002), new literacies (Lankshear & Knobel, 2003), digital skills (Erstad, 2006), media literacy (Erstad, 2010), digital competence (Ferrari et al., 2013), Internet literacy (Harrison, 2017), emerging technology (Pacansky-Brock, 2017), and ICT competence (Suárez-Rodríguez et al., 2018). However, no clear-cut boundaries were established between the constructs covered by these terms in previous studies. Frequently, certain authors have used related terms to replace others (e.g., Nguyen & Habók, 2022b). Thus far, the relationship between these terms has remained controversial in the literature, with the differences possibly having originated because of the multiple academic fields represented by the authors (Bawden, 2008) or the occasional expansion of the technologies. Indeed, numerous terms were used in the digital context when technologies were not as developed as at the present time, in which the context was sometimes implicit and sometimes explicit (Ala-Mutka, 2011). This is why scholars may use the same term but with different foci or different terms with the same

focus (Bawden, 2001). Therefore, it is somewhat challenging to employ a term because the relevant concept may be too broad or narrow. If the concept is too broad, the findings of the study have no purpose. In contrast, the discovery may rule out significant components. However, it cannot be denied that the terms noted above share similarities because they focus on the use of technologies in coping with information and communication and with content creation through technologies to aid an individual in achieving targets in learning, professional development, and other activities (Hatlevik, 2015). Additionally, these terms are the links between technology domain, knowledge, competence, and ethical issues (Siddiq et al., 2016).

3.2 Dimensions of digital literacy from different perspectives

DL has been categorized into types of subcompetencies based on hierarchy. Authors and scholars continue to discuss the term, other related constructs, and the scope of these constructs. Although Law et al. (2018) categorized DL into several subcompetencies, computer, ICT, information, and media literacies, Wilson et al. (2011) classified these terms in the opposite direction. Specifically, the authors combined media and information literacies into an umbrella term that covers DL. From the same perspective, Tristán-López and Ylizaliturri-Salcedo (2014) claimed that DL and other concepts, such as information and computer literacies, are subcomponents of ICT competency, which is considered a blanket term. Alternatively, other authors have refrained from linking these associated constructs to establish a class relation, and this perception may be reasonable because the concepts above share similarities (e.g., Hatlevik, 2015), which we discussed in the previous section. However, specific sub-branches that constitute DL should be determined to capture the concept fully. DL may be assumed to comprise six branches of subcognitive literacies: photo-visual (comprehension of multimedia information), reproduction (creation of a completed product from disparate information), branching (characterization, arrangement, and engagement of available information), information (critical evaluation of information), socioemotional (adherence to digital norms), and real-time thinking (simultaneous processing of a number of stimuli) literacies. Eshet (2012) proposed this classification, whereas Ng (2012) presented three broad dimensions: technical, cognitive, and social–emotional aspects. Although the concept includes the essential skills of DL, scholars have voiced criticism that operational skills, which are related to the ability to work using different, updated hardware and software for specific purposes, should have been indicated (Zhong, 2011). Indeed, both views are persuasive, and they are impacted by the research contexts, the purposes of the research, the field represented by the authors, and so on. A few years

later, Carretero et al. (2017) promoted a European digital competence framework for citizens: DigComp 2.1. The framework specified digital literacies on five subscales: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving. The framework has become influential in the assessment of DL and has been used in multiple fields (e.g., Silva-Quiroz & Morales-Morgado, 2022). Eventually, the framework was adopted to measure digital competence among citizens across fields. Moreover, Van Laar et al. (2017) intended to assess DL in an authentic, specific context. Hence, the authors specified not only DL but also the contextual skills required to implement it. The core skills recommended by the authors cover seven core elements (technical, information management, communication, collaboration, creativity, critical thinking, and problem-solving). Apart from these seven elements, the authors also categorized contextual skills to facilitate the use of DL in various contexts: ethical awareness, cultural awareness, flexibility, self-direction, and lifelong learning. Similarly, Peromingo and Pieterson (2018) grouped DL into five components: operation, mobility, navigation, society, and creation. However, the authors added the ability to use mobile devices as a component of DL apart from computers, which are common tools, due to the current popularity of such devices in the classroom environment. Clearly, there are trends in components of digital literacy which must adapt to the development of technologies and society.

3.3 Student digital literacy

3.3.1 Student digital literacy conceptualization

In general, there are two types of DL definitions: the conceptual definition and a definition related to sets of operations (Lankshear & Knobel, 2006). DL's conceptual definition, introduced in 1997, is generally explained as "the ability to properly use and evaluate digital resources, tools, and services, and apply it to lifelong learning processes" (Gilster, 1997, 220). In Gilster's definition, the author did not list the necessary competencies for DL; however, DL's scope has been developed gradually. Different skills have been added to extend the boundaries of the original definition. There are overlaps among the perceptions, and the exact definition of DL is contentious (Ferrari et al., 2013). Different authors and practitioners have proposed various definitions since technologies influence the concept. Furthermore, the definition is broader than the capability of applying technologies - it is a particular type of mindset (Eshet, 2002). Eshet-Alkalai (2004, 102) proposed that DL was a "survival skill in the digital era" and that it is mainly applied in formal education. The author also thought that DL was based on the integration of multiple literacies, including

photo-visual literacy, reproduction literacy, information literacy, branching literacy, and social-emotional literacy. Similarly, Martin and Madigan (2006) defined DL as the competence to successfully engage with electronic infrastructure and devices that empower the digital century. However, they extend DL's scope by relating it to other areas such as ICT literacy, information literacy, media literacy, and visual literacy. Erstad (2006) added attitudes to the definition of DL when referring to the skills, knowledge, and attitudes in technology adoption to overcome learning challenges. With the sheer growth of digital technologies and new media, Ng (2012) describes DL as the variety of literacies accompanied by technology transfer and utilization. The author added modern technologies, including hardware and software, to clarify and extend the definition of terms such as desktops, mobiles, interactive whiteboards, Web 2.0 technologies, and other online resources.

Another group of authors focuses on operations when describing the specificities of DL. DL is a set of ICT skills and tool usage for retrieving, assessing, storing, generating, conveying, and transferring information and connecting and engaging in collaborative networks (Ferrari et al., 2013). Son (2015, par. 1) emphasizes the reasons for DL. He claims that it is "the ability to use digital technologies at an adequate level for creation, communication, collaboration, and information search and evaluation in a digital society" for specific purposes. Similarly, Roche (2017) highlights DL as the ability to evaluate, utilize, and generate information through digital media and to engage with individuals and society. Law et al. (2018) also divided DL into different levels of operations such as accessing, managing, understanding, integrating, communicating, evaluating, and creating safe and appropriate information via technology securely and suitably for different purposes in different fields. The authors also talk about DL when referring to other ICT competency areas like computer literacy, ICT literacy, information literacy, and media literacy. Although the definitions vary and the scope of the concept has been extended gradually due to the expansion of digital technologies, the main point of DL is to summarize, synthesize, and integrate information from varied sources (Gardner, 2006). By connecting the above definitions, DL can be understood as the knowledge, skills, and attitude needed when handling technological devices to create, communicate, collaborate, search, and evaluate the information for specific purposes in the digital era.

3.3.2 Aspects of student digital literacy in frameworks and empirical studies

Many frameworks reflect multiple dimensions of DL (Table 3.1). At the international level, the Digital Competence Framework (DigComp) is one of the most influential frameworks that address DL in European educational programs. Although DigComp was designed for European countries, this framework was adapted in many countries. In addition, many empirical studies use DigComp to develop instruments to measure DL. DigComp was first published in 2013 (Ferrari et al., 2013) and includes five components - information, communication, content creation, safety, and problem-solving. Siddiq et al. (2016) modified these components to six sub-scales (information, communication, content creation, safety, problem-solving, and technical operational skills) to rescale the dimensions of the components of DL in various studies when conducting a systematic literature review of DL studies. Notably, Siddiq et al. (2016) reconciled these two definitions of DL by revising the components. DigComp (Ferrari et al., 2013) has since been updated as DigComp 2.0 (Vuorikari et al., 2016), DigComp 2.1 (Carretero et al., 2017), and DigComp 2.2 (Vuorikari et al., 2022). The updated versions focus on a conceptual reference model, new vocabulary and streamlined descriptors, and consider the knowledge, skills, and attitudes needed as emerging technologies continue to develop. The five aspects of the updated versions of the DigComp are, namely, literacy in information and data, ability to communicate and collaborate, creation of digital content, remaining safe in the online environment, and problem-solving skills.

Recently, the UNESCO published a Global Framework of Reference on Digital Literacy (GFRDL; Law et al., 2018) which is based on the DL aspects of DigComp. Apart from the five dimensions, the GFRDL added three competencies, namely, operating devices and software, solving problems, and pursuing careers. Thus, a possibility exists that these new aspects of DL may contribute to engagement with DL in specific educational areas, because they guide students in applying DL to specific career fields. Another well-known DL framework is the International Computer and Information Literacy Study (Fraillon et al., 2019), which was used as the criteria for the assessment of DL in the educational context. The framework is composed of four strands, namely, computer using understanding, information gathering, information producing, and digital communication. Each strand includes two aspects that specify the content of each strand, which are similar to those of DigComp and GFRDL. For example, digital communication can be indicated by the competence of using and sharing information responsibly and safely. A few international organizations also exert efforts to develop specific evaluation frameworks based on these international frameworks, which can be used in specific digital technology environments (e.g.,

Organization for Economic Co-operation and Development [OECD], 2015). Although the adapted frameworks do not aim to directly evaluate DL, they can indirectly measure technology skills of students through the target competency.

Furthermore, various countries adapted the international DL frameworks to develop their DL in particular contexts. For example, the essential digital skills framework of the United Kingdom is composed of five components, namely, communication, handling information and content, transacting, dealing with problems, and being safe and legal in the online world (FutureDotNow, 2018). Alternatively, the International Society for Technology in Education (ISTE) National Educational Technology Standards for students in the United States categorized into creativity and innovation; communication and collaboration; fluency in research and information; the ability of thinking critically, dealing with problems, and making decisions; participation in the digital world; and concepts and operations related to technology (ISTE, 2007).

In Asia, the Media and Information Literacy Framework for Singapore was developed using a set of guidelines to support students in achieving five main learning outcomes, namely, relating to the cognition of advantages and disadvantages of technology, fundamental knowledge and skills of digital platforms, information management and responsibility, e-learning safety, and being safe and responsible when dealing with digital technologies (Government of Singapore, 2019). Although Vietnam was strongly influenced by digitalization, the MOET, thus far, has not designed a national DL framework specifically for Vietnamese students. However, it is adapting certain frameworks developed by international organizations (e.g., Law et al., 2018; Carretero et al., 2017). Notably, DL frameworks or models and digital programs and projects do not limit the scope of technological skills but are expanded with cognitive and social skills in digital competence. The most recent DL framework designed for Vietnamese students is based on the abovementioned frameworks and is applied to students in multiple fields. The Vietnamese Digital Literacy Framework (VNDLF; Do et al., 2021) includes components similar to those of the GFRDL (Law et al., 2018); however, the VNDLF replaced the problem-solving dimension with the subscale learning and developing digital skills. The reason is that digital technology is dynamic and constantly changing; thus, competency in updating their digital knowledge and skills is essential for students (OECD, 2015). Particularly, the framework does not exclude the problem-solving dimension but integrates it into other aspects. The VNDLF is adapted and developed to guide Vietnamese students in achieving DL in learning; however, all aspects of DL in the framework should be applied to specific contexts in education (e.g., EFL education).

Table 3.1 *Dimensions of student digital literacy by typical frameworks*

Framework	Authors	Dimensions
The Digital Competence Framework	Ferrari et al., 2013	information, communication, content creation, safety, problem solving
The Digital Competence Framework (revised)	Siddiq et al. (2016)	information, communication, content creation, safety, problem solving, and technical operational skills
The Digital Competence Framework 2.0	Vuorikari et al., (2016)	
The Digital Competence Framework 2.1	Carretero et al., (2017)	information and data literacy, communication and collaboration, digital content creation, safety, problem solving
The Digital Competence Framework 2.2	Vuorikari et al., (2022)	
The Global Framework of Reference on Digital Literacy	Law et al. (2018)	devices and software operations, information and data literacy, communication and collaboration, digital content creation, safety, problem-solving, career related competences
The International Computer and Information Literacy Study	Fraillon et al. (2018)	computer using understanding, information gathering, information producing, and digital communication
The European Commission Joint Research Centre	Ala-Mutka (2011)	instrumental knowledge and skills, advanced knowledge and skills, attitudes
The National Educational Technology Standards for Students	The ISTE (2007)	creativity and innovation; communication and collaboration; fluency in research and information; the ability of thinking critically, dealing with problems, and making decisions; participation in the

		digital world; and concepts and operations related to technology
The United Kingdom's Essential Digital Skills framework	The futuredotnow (2018)	communicating, handling information and content, transacting, problem solving, being safe and legal online
The Media and Information Literacy framework	Government of Singapore (2019)	identify the risks, advantages, and potentials of technology; be able to navigate online platforms and digital technologies; comprehend how to use information responsibly; understand how to safeguard oneself on the Internet; understand how to safely and responsibly use digital technologies.
The Vietnamese Digital Literacy Framework	Do et al., (2021)	devices & software operations, communication & collaboration, digital safety, digital content creation, learning & developing digital skills, career related competences, information & data literacy

Multidimensions of DL are also various in multiple empirical studies. Although various terms and research contexts are used to present the components of DL in empirical studies, the nature of these aspects continues to be based on the major aspects of typical DL frameworks. In addition, similar to the definitions of DL, scholars have aimed to develop a framework or model based on conceptual components and operational skills, and others combined both. The DL components proposed by Eshet-Alkalai (2012) focus on evaluating the cognitive and social-emotional skills of students through photo-visual, reproduction, information, branched, social–emotional, and real-time thinking. It can be seen that the components of DL proposed by Eshet-Alkalai (2012) include multiple literacies under DL as an umbrella term. Van Deursen and van Dijk (2008) and Van Deursen et al. (2014, 2015) developed and tested a DL framework based on a self-reported evaluation of six components, namely, operational, formal, information, strategic, communication,

and content-creation skills. Eventually, the components of the framework were revised and updated to match new skills and new technologies. Hence, the framework was modified to be composed of five components, namely, operational skill, information navigation, social networking, creativity, and mobility. The Joint Systems Information Committee (2014) developed a model that combined both sub-literacies under DL and other operational skills, including media literacy, information, ICT, communication and collaboration, digital scholarship, career and identity management, and learning skills. Son (2015) developed a model with five components of DL, which were similar to those of international frameworks (i.e., searching and evaluating information, being creative, communicating, collaborating, and being safe in the digital environment).

3.3.3 Attitudes and assessment of attitudes toward digital technology usage in language learning

As discussed above, student DL can be defined as the knowledge, skills, and attitude needed when handling technological devices to create, communicate, collaborate, search, and evaluate information for specific purposes in the digital era. With the significant growth of information and communication technology (ICT), the term Computer-Assisted Language Learning (CALL) has been extended beyond the computer to include applications ("apps") and digital devices (Tafazoli et al., 2018). In this research, we use the term CALL to encompass all computer applications and digital devices used to facilitate student language learning. Previous studies typically focused more on digital knowledge and skills when reporting student DL. Given the significance of technology usage in digital literacy (DL), this section will comprehensively examine CALL attitude.

In the literature, the term "attitude" has been defined in a number of studies. According to one school of thought, attitude refers to affective aspects of an individual (Cherry, 2019). Attitude is formed by experiences, viewpoint, cognition, and affect that drive an individual's perception of computers and other technological devices, people, or circumstances (Fishbein & Ajzen, 1975). Although attitude is considered to be latent, it can be measured (Bem, 1970) through students' responses to a specific subject (Abun et al., 2019) and ranked from negative to positive (Fiske, 2010). Attitude to CALL refers to students' or teachers' emotions tied to the use of technology (Joyce & Kirakowski, 2013) in language learning, and this has been investigated in different educational contexts (Abolghasseminits et al., 2013; Lodhi et al., 2019).

Many researchers have focused on three components to show the attitudes of EFL learners to the integration of technology into language acquisition: (1) cognitive, which refers to knowledge,

perceptions, or ideas tied to technology use; (2) affective, which relates to emotions or evaluations tied to the integration of ICT into education; and (3) behavioral, which is the expression of the intention or actions associated with teaching technology (Agyei & Voogt, 2011; Matteson et al., 2016). However, different authors have contributed to the methodology of tracking attitudes to CALL by incorporating and developing various constructs of teachers' or learners' attitudes to integrating technology into language education. Some other components have been developed as part of the construct of ICT attitude in different studies, such as enjoyment (Christensen & Knezek, 2009; Kisanga & Ireson, 2016; Teo, 2006), anxiety (Agyei & Voogt, 2011; Alothman et al., 2017; Christensen & Knezek, 2009; Teo, 2006), avoidance (Christensen & Knezek, 2009), negativity (Christensen & Knezek, 2009), productivity (Atman Uslu & Usluel, 2019; Yavuz, 2005), and internal and external factors of ICT attitudes (Nagy & Habók, 2018). Students' attitudes to CALL have tended to be positive (Abolghasseminits et al., 2013; Ahmed, 2015; Liu, 2009; Lodhi et al., 2019), becoming more so with greater integration of technology into education.

The various frameworks or models that have been developed to measure attitudes to CALL for decades fall into two groups. The first directly measures an individual's attitude to technology. Among these frameworks and models, the theory of reasoned action (TRA) is considered one of the foundational models (Fishbein & Ajzen, 1975) for explaining the behavior of an individual through their attitudes to technology and subject norms (social referents, such as teachers and family members) and the relationship between the various components. The TRA construct has been widely applied to human attitudes and behavior in multiple fields, including language education (Almekhlafi, 2006). Different models have been developed or extended from the TRA subscales, such as the theory of planned behavior (TPB) (Ajzen, 1985) and the technology acceptance model (TAM) (Davis, 1989). Unlike TRA, the TPB model does not have an action factor. Instead, it uses the perceived behavioral control factor to specify an individual behavior that is resolved for the purpose of implementing the behavior and the subject norm. Modified from TRA, TAM shows that an individual's technology usage behavior is predicted through perceived utility and ease of use, user attitudes to technology, plans, and prospective adoption behavior. TAM has been validated, used, and adapted in various studies on language learner attitudes and behaviors related to technology in language education (Rafique et al., 2020; Tan, 2019;). The tripartite model also serves as a useful theoretical framework for developing attitude measures (Rosenberg & Hovland, 1960). The model includes three measurable components noted in the previous definition of attitude: (1) affect, (2) behavior, and (3) cognition. According to the theory, attitudes are a

combination of predisposing factors (such as age and gender), affect (feelings about the object), beliefs (viewpoint of the object), and behavior (action taken involving the object). The theory proposes that the explanatory power of attitudes arises from these three constructs and is also influenced by various antecedent variables. Some other theories/models have an indirect relationship to learners' attitudes, such as the unified theory of acceptance and use of technology (Venkatesh & Davis, 2000) and the technology readiness and acceptance model (Lin et al., 2005).

Different instruments have been generated from these theories and models to analyze language learners' attitudes to technology. Researchers mainly measure learners' attitudes to CALL through Likert-scale questionnaires that have been designed on the basis of these frameworks/models (Lodhi et al., 2019). It should be noted that the three components of attitudes to CALL noted above (behavior, affect, and cognition) have been widely applied in different studies (Dara Tafazoli et al., 2019; Teo, 2008) and generally viewed as the classical structure of attitude to CALL. However, they are not universally accepted by researchers (Hogg & Vaughan, 2011). Thus, in many empirical studies, different authors have incorporated different constructs to attitudes to integrating ICT into language education, albeit they are still linked to one or more of the three basic components. The CALL attitude structure has typically been viewed as multidimensional. Kearney, Gallagher, and Tangney (2020) developed and validated a five-construct instrument to measure learners' attitude to English and technology usage in learning the language: (1) behavioral engagement, (2) confidence in technology, (3) confidence in English, (4) engagement in emotions, and (5) using technology for learning. Behavioral engagement refers to the participation of an individual in classroom activities, whereas emotional engagement refers to reactions to academic tasks. English confidence and technology confidence specified the viewpoint, capability, and beliefs of language learners as regards learning EFL and the in-class and out-of-class use of technology, respectively. The using technology for learning construct aims to evaluate learners' perceptions of the application of technology to facilitate their EFL acquisition and achievement. In the same vein, a three-component CALL attitude instrument (behavioral/affective/language skills) that seeks to measure EFL learners' attitudes in applying technology in learning EFL has been extensively developed and validated in the Iranian EFL context by Aryadoust, Mehran, and Alizadeh (2016). Of note, this instrument can also be applied in low-technology settings. Teo (2006) used an abridged version of a questionnaire on computer attitude elaborated by Knezek, Christensen, and Miyashita (1998) to evaluate Singaporean students' attitudes to computer use. The author selected three factors with 20 items (computer significance, computer interest, and

technophobia) from the original version with 65 items categorized into eight factors (the significance of computers, enjoyment, motivation, study habits, passion, ingenuity, computer phobia, and seclusion). The abridged version of the CALL instrument assessed students' attitudes toward technology in terms of cognitive and affective components of attitude. In a study by Vandewaetere and Desmet (2009), the construct of attitude to CALL comprised four components: (1) CALL's efficiency, (2) "surplus value of CALL," (3) teacher impacts, and (4) barriers to CALL. It was also possible to re-organize these four subscales into the classical structure of attitude with three components because the first two components are interrelated with cognitive and affective factors, whereas the two latter dimensions can be seen as a behavioral component. Nagy and Habók (2018) and Habók and Nagy (2017) developed and validated an eight-factor questionnaire to evaluate students' ICT attitude in the Hungarian EFL context, which consisted of internal and external components. The three-component instrument with the classical dimensions underpins different factors. Additionally, the authors also extended and linked the basic elements with other issues or digital devices in the modern language classroom, such as mobile devices, curriculum, and language learning tasks.

3.3.4 Subjective and objective instruments for student digital literacy assessment

A number of research were conducted to assess DL using a wide range of measurements and different approaches. However, the most popular one is a category of instruments based on data collection (Carretero et al., 2017), which comprises objective (e.g., knowledge- or performance-based) and subjective (self-evaluation/self-report) assessment. Among the two types, the majority of self-appraisal instruments were designed on the basis of the digital self-efficacy of students (Aesaert et al., 2014), which indirectly measure competence. The digital self-efficacy of students is defined as one's perceived confidence about digital technology knowledge or skills to complete learning tasks or to solve problems while learning with technology (Yang & Cheng, 2009). Other authors stated that ICT self-efficacy exerts positive impacts on DL improvement or competence in applying technologies to learning among students (Devolder et al., 2012). The reason for this issue may be that students with high levels of digital self-efficacy believe or are confident about their ability; thus, they do not hesitate to address the difficulties. Instead, they study harder to achieve their goals. Moreover, Bandura (1992) noted that self-efficacious students are more likely goal-oriented, effort-regulated, and committed to acquisition and task performance, and more likely to attain competence and achievement. Therefore, digital self-efficacy measurement became a popular

instrument, because scholars proposed that if students are confident, then they can achieve their goals; thus, the possibility of success is also high.

Several studies, which depicted the positive relationship between that technology-related self-efficacy and performance or achievement, reported this issue (e.g., Wan et al., 2008). Although many studies widely used subjective assessment to evaluate the perceived DL of students (e.g., Lau & Yuen, 2014; Nguyen & Habók, 2022b), authors have criticized the use of this instrument type, because subjective reports or evaluation cannot deeply explore knowledge, skill, or attitudes. Therefore, the results of this instrument do not always represent actual digital performance or achievement (Hatlevik et al., 2018). Therefore, other researchers exerted efforts to design an authentic DL instrument (e.g., Aesaert et al., 2014). However, the result may be unreliable if the skills of the participants are insufficient for the assessment platform (Chanta, 2021). Hence, a suggestion emerged to combine subjective and objective assessments to ensure the reliability and validity of results (e.g., Porat et al., 2018). With the support of subjective and objective assessments, evaluation can become more reliable and valid (Nguyen & Habók, 2023). Nevertheless, only a few studies that aimed to contribute to DL assessment combined the two types of instruments. In these studies, the authors endeavored to compare the consistency between subjective and objective assessments, and the results were controversial. For example, Aesaert et al. (2017) claimed that learners can accurately assess their levels of DL and that the gap between self-assessment and actual performance is small. This finding contradicted that of Porat et al. (2018), which reported that the gap between the self-evaluated DL and actual performance of students was significant. Ehrlinger et al. (2008) proposed that DL assessment exhibits two opposite trends. In other words, while students with low levels of digital skill overestimate their competence, the opposite is true for students with high levels of abilities. In the field of English education, few instruments were designed to measure the DL of EFL learners. Furthermore, these studies (e.g., Son et al., 2017; Cote & Milliner, 2017, 2018; Nguyen & Habók, 2022b) cited that the DL of English learners was typically evaluated using subjective assessment.

3.3.5 Paper-based and technology-based student digital literacy instrument administration modes

Digital technologies have been integrated into the education system over the years. Numerous educational institutions have embraced technology-based administration to replace traditional paper-and-pencil methods because contemporary society faces increasing pressure to manage more

information in less time. Technology-based administration offers educators, learners, administrators, and researchers many advantages, such as enhanced standardization in test and questionnaire administration, streamlined scoring, prompt reporting and interpretation of results, and storage in individual log files within an integrated data management system (Csapó et al., 2012). Furthermore, while the use of paper-based instruments limits the incorporation of static text and graphics, technology-based administration allows for the presentation of elaborate visualizations of figures and even facilitates dynamic interactions among participants. Although technology could bring multiple benefits to school stakeholders or researchers in the data collection process, it also comes with several drawbacks, making paper and pencil forms still valid for use. Key drawbacks include diminished response rates, faculty skepticism regarding result accuracy, students neglecting to complete instruments, and inadequate support in the event of technical issues (Morrison, 2013). Accordingly, the equivalence between paper-based and technology-based administration modes has been a topic of controversy. Results regarding the equivalence between these two modes vary. For instance, Buerger et al. (2019) found that paper-based and technology-based administration modes were equivalent in terms of internal consistency and item validity. While Neumann and Neumann (2019) suggested that the construct validity of the tablet-based test version was consistent with that of the paper-based one, Bailey et al. (2018) were unable to establish measurement invariance using the structural equation modeling approach when comparing computer-based and paper-based versions of a test. Despite this, the reliability of the spatial test was found to be better in the paper-based version. In the context of higher education in Vietnam, although the government and the MOET facilitate the digital transformation in language teaching and learning activities, technology administration modes have not completely replaced paper-based administration modes. Accordingly, both types of administering modalities are officially used in educational institutions, and the choice is made by the institutions based on their current digital facilities. The sudden appearance of the COVID-19 pandemic forced the Vietnamese education system to adopt hybrid and online modes, facilitating the digital transformation due to national restrictions. Consequently, it is necessary to compare the equivalence of these two modes in the Vietnamese higher educational context, enabling school stakeholders and researchers to adjust or find solutions to enhance both types of administration.

3.3.6 Gender and grade-level differences in student digital literacy

Gender and DL have also been researched in numerous studies over the years. Some recent research reported that males tend to have higher DL than females (Alakpodia, 2014; Albirini, 2006; Calvani et al., 2012; Deursen, 2012; Gui & Argentin, 2011; Siddiq & Scherer, 2019). However, numerous papers have found that female students have higher DL than their male peers (Fraillon et al., 2014; Hatlevik et al., 2015; Kim et al., 2014; Milner et al., 2013). In other contexts, some studies have found no discrepancy in DL between the two genders (e.g., Danner & Pessu, 2013; Hargittai & Shafer, 2006).

Previous studies have not focused much on comparing the DL of students in different grades; therefore, few studies differentiate between the DL of students or evaluate the enhancement due to DL in different age cohorts. Lazonder et al. (2020) carried out a study to explore students' DL skill improvements. The research results show that children increased their skills over three years of study, and the development of students' DL is related to socio-demographic factors. Kim et al. (2019) conducted research to assess Korean primary and secondary school students' DL and found that students' DL had progressed.

3.3.7 Related research

Several previous studies investigated students' DL. Dashtestani and Hojatpanah (2020) researched the DL levels of Iranian students. The questionnaire results depict that students' DL is low, and they do not apply a broad range of computer applications and software. The study also indicates that the low DL level results from the Ministry of Education's ill-defined plans as regards improving students' levels of DL. Son et al. (2017) compared the DL of undergraduates learning English for academic purposes (EAP) and EFL in two universities in Canada and Japan. The study reported that all EAP participants taking part in the study were aware of digital technologies and were familiar with using them. In addition, most EAP students indicated that their level of DL was good or very good, while most EFL participants self-assessed their DL level as acceptable or good. Cote and Milliner (2017) surveyed first-year college students preparing for their study abroad program to find out students' specific DL levels. The results indicated that almost all students in the sample thought they had limited DL and lacked the necessary experience and skills. Mabayoje et al. (2015) explored the low DL level among rural Nigerian students. Most respondents had computer teachers and that they could operate computers. However, the lack of ICT facilities is a reason for the low DL levels among students.

Moreover, Danner and Pessu (2013) carried out a study to investigate issues among Nigerian students in Teacher Preparation Programs at the university level. The study concluded that ICT use among students was low, especially regarding using email and the Internet. The participants assessed themselves as good at word processing and file navigation, but moderate regarding Internet browsing and email. While 2% of participants thought they were proficient in using PowerPoint, 70% said they were not good at using the application. Ng (2012) measured the DL of university sophomores, and the findings indicated that students' DL levels enabled them to use unfamiliar digital tools in educational settings. Furthermore, the study also claimed that students' DL levels could be improved through explicit teaching and learning regarding ICT integrations. Kubiatko (2007) found that students' DL levels were improving, and students mainly used the Internet for information search. Furthermore, the author found that more students used the Internet at school than at home. The reason for this finding is that the cost of using the Internet in Slovakia is not cheap.

Previous studies have not focused much on comparing the DL of students in different grades; therefore, few studies differentiate between the DL of students or evaluate the enhancement due to DL in different age cohorts. Lazonder et al. (2020) carried out a study to explore students' DL skill improvements. The research results show that children increased their skills over three years of study, and the development of students' DL is related to socio-demographic factors. Kim et al. (2019) conducted research to assess Korean primary and secondary school students' DL and found that students' DL had progressed. Gender and DL have also been researched in numerous studies over the years. Some recent research reported that males tend to have higher DL than females (Gui & Argentin, 2011; Siddiq & Scherer, 2019). However, numerous papers have found that female students have higher DL than their male peers (Fraillon et al. 2014; Hatlevik et al., 2015). In other contexts, some studies have found no discrepancy in DL between the two genders (e.g., Danner & Pessu, 2013).

3.4 Teacher digital literacy

3.4.1 Conceptualization of teacher digital literacy

Similar to student DL, the concept of teacher DL can also be encapsulated using multiple means and perspectives. For example, teacher DL is defined as the proficiency in applying technology to education, accompanied by an awareness of and decisions on the implications of teaching and learning in the context of a digitized society (Krumsvik, 2012). Another illustration comes from

Hall et al. (2014), who developed the DigiLit Leicester project to facilitate progress in teacher DL. The working definition of the project emerged from various definitions presented in numerous education studies. In this project, they defined teacher DL as knowledge, skills, and attitudes toward the use of educational applications to support learners. A digitally literate teacher is expected to be capable of effectively teaching with technology, enhancing their professional development, critical thinking about technology integration, and forming their identity. The government of Catalonia also identified digitally competent educators as those who can implement educational knowledge, skills, and attitudes in concrete teaching situations on a daily basis (Generalitat de Catalunya, 2018). Teacher DL has also been a focal point in many studies on specific digital skills in specific contexts. For instance, the Assessment and Teaching of 21st Century Skills project concentrates on improving learners' consumer and producer skills and social and intellectual skills in the digitized collaborative context in relation to DL (Wilson et al., 2017). Educational researchers have adopted the concept, classifying various technical skills related to information accessibility, online involvement, computer skills, search engine skills, and information evaluation (McArthur et al., 2018). After summarizing, narrowing, and linking definitions from various perspectives, teacher DL can be understood as educators' knowledge, skills, and attitudes in dealing with technologies to facilitate teaching and learning, professional development, and other educational activities.

3.4.2 Models/frameworks of teacher digital literacy assessment in the educational context

Various empirical studies have designed and tested a number of frameworks and assessment tools that describe multiple components of DL at the international and national levels. The objective was to support the measurement of teacher DL to anticipate training needs (Redecker, 2017a) or to explore the extent to which these frameworks or measurement tools interpret teacher competence in the educational context.

At the international level, Martin and Grudziecki (2006) developed the DigEuLit framework and tools for European countries and proposed three levels for the enhancement of DL from the foundation to the extreme stage (digital competence, use, and transformation). The framework provided educators, learners, and learning support staff with specific guidelines on how to facilitate the recognition of digital components in teaching, learning, and support activities in line with the curriculum and with professional development. Moreover, the framework emphasized the application of technology for working and learning purposes in practice. It was further tied to

several tools for tutors, learners, and support staff to enable them to monitor, deliver, or acquire the appropriate digital elements for teaching and learning programs. Nevertheless, the focal points of the framework and tools are inadequate in terms of relevant skills outside schools. The rapid change in digital technologies in the new decade requires new competencies for educators and learners. New frameworks have thus been designed and developed to cope with the pace of society. Another framework has been published for the context of European education, the European Framework for the Digital Competence of Educators (DigCompEdu; Redecker, 2017b), which was modified from DigComp (Carretero et al., 2017). This framework is based on consultations among experts to describe the digital competencies necessary for the teaching profession and to identify the specific digital literacies required of educators. The framework has been widely recognized because it not only adopted relevant skills from valuable frameworks but also complemented the comprehensive aspects of the 21st-century competencies necessary for teachers. The framework focused on multiple aspects that educators address in their daily professional activities, such as professional engagement, digital resources, teaching and learning, assessment, learner empowerment, and facilitating digital competence among learners. The core of the framework intended to support teachers in implementing technology in teaching in a pedagogically effective manner as well as to aid learners in achieving the skills required in the digital business world. Thus, the results of this stream of research could be interpreted as follows: technology, pedagogy, and target knowledge and skills should be incorporated to promote meaningful teaching in a digitized learning environment. Additionally, the core elements of the framework are not separate but united in focusing on establishing links to apply technology and pedagogy to teaching practice in relation to problem-solving skills in the real world. Moreover, UNESCO (2013) designed the ICT Competency Framework for Teachers (ICT-CFT), which was developed on the basis of three integration levels in ICT (technology literacy, knowledge deepening, and knowledge creation) to support policy-makers in assessing ICT competency among teachers. Thus, the framework aimed to measure the competency of teachers from six aspects in relation to the education system (policy and vision, curriculum and assessment, pedagogy, ICT, organization and administration, and teacher professional development) from the perspectives of curriculum designers and policy-makers. DigCompEdu and UNESCO ICT-CFT mainly focus on teachers' application of technology to teaching activities using consistent aspects of assessment. However, UNESCO ICT-CFT is also concerned with the issue of context as regards curriculum, facilities, and policy. As such, it expects teachers to address issues associated with specific contexts to effectively integrate technology into

education and incorporate a technological approach. The International Society for Technology in Education (ISTE) developed a framework for teacher competence by focusing on students' 21st-century skills. Furthermore, it aims to aid teachers in their practice with technology, enhance collaboration among learners, innovate teaching through technology, and foster autonomy among learners (Crompton, 2017; ISTE, 2018). The ISTE standards for educators are categorized into seven types of competencies that educators are required to achieve during their career. Educators should improve their competence in evaluation, facilitation, designation, collaboration, leadership, and citizenship and in learning to work well with students and guiding them within a technological environment. The framework refers to the necessary competencies for teachers and provides teachers with examples of each competence and the focal competencies tied to the issues of teaching and learning with technology. However, the standard continues to hold certain limitations because the competencies are separate, whereas the illustrative examples for each competence are general and descriptive instead of practical. In Africa, the ICT-enhanced Teacher Standards framework (UNESCO International Institute for Capacity Building in Africa, 2012) was designed for countries on that continent. It comprises interrelated dimensions of competent, 21st-century teachers in engaging in instructional design, namely, promotion and motivation of student learning, innovation and creation, creation and management of effective learning environments, evaluation and communication, professional development and model ethical duty, and comprehensive understanding of the subject. Additionally, various studies have used the frameworks noted above to assess teacher digital competence (e.g., Quaicoe & Pata, 2020), and the comprehensive subcomponents of teacher DL and the relationship among them may be the reasons for the popularity of the framework.

Some nations adapted international frameworks to design and apply the national model to their specific educational context. For instance, the Spanish Ministry of Education, Culture and Sport designed a digital competence model in 2012 called the Common Framework for Digital Competence for Teachers (INTEF – Instituto Nacional de Tecnologías Educativas y Formación del Profesorado, 2017). It was adapted from DigComp (Carretero et al., 2017) and DigCompEdu (Redecker, 2017b) for the Spanish context. Eventually, several researchers used the framework to develop and validate instruments for measuring DL (e.g., Tourón et al., 2018). Likewise, the Education and Teaching Foundation in Britain designed the Digital Teaching Professional Framework (Education & Training Foundation, 2019) to support educators in understanding technology integration, in cultivating the practice of teaching with technology, and in

supplementing their professional development. The framework specifies teacher competence from seven aspects (planning pedagogy, approach pedagogy, student employability, specific teaching, assessment, accessibility and inclusion, and personal development). Each aspect is classified into three levels: exploration, adaptation, and leadership. As regards the seven aspects, the nature of each aspect was relatively consistent with a few international frameworks, such as DigCompEdu and UNESCO ICT-CFT. Moreover, the framework highlighted that the focal point of the competence of educators is to foster learners in using digital technology to enhance their employment and entrepreneurial prospects.

Multiple models and frameworks from various empirical studies have also contributed to the evaluation of DL in specific educational contexts (e.g., Puentedura, 2006; Mishra & Koehler, 2006). Certain models or frameworks emphasize teacher competence in incorporating technology into the teaching process to enhance learning. Mishra and Koehler (2006) have developed a technological pedagogical content knowledge (TPACK) model that aims to illustrate effective teaching using technology to incorporate technological, pedagogical, and content knowledge. Undeniably, the framework has greatly contributed to integrating technology into the classroom. However, the model is limited because it does not offer a conceptualization of DL for educators. Additionally, scholars have demonstrated the lack of discrimination between different areas of knowledge, while the boundaries of the aspects are vague (Drummond & Sweeney, 2017). Alternatively, the Substitution Augmentation Modification Redefinition (SAMR; Puentedura, 2006) model was developed as a descriptive framework with four levels of hierarchy (substitution, augmentation, modification, and redefinition). It follows the taxonomy from low to high levels and has been widely used by educational researchers and trainers as a guide for teachers in the technology integration process. At the highest level or stage (redefinition), teachers are guided to create new tasks that require abilities related to higher-order cognition, whereas at the starting stage (substitution), digital technology also functions as a guided tool that does not call for any change in the function of technology or created tasks with lower-order cognition. The two other intermediate steps, augmentation and modification, serve as bridges for transformation from the simple stage in using digital technologies to the more complex stage. These stages are intended to facilitate development and innovation in education, pedagogy, and the curriculum. Although the SAMR model provided educators with a step-by-step process for achieving the target points in applying technology to the teaching process, it drew criticism because it lacked a detailed practical

application and because it failed to specify the digital competence required of teachers for each stage and the transition from one stage to the next.

Krumsvik (2014) introduced a digital competence model for teachers, which was developed in the Scandinavian context. The model grouped teacher digital competence into four subscales, basic technological usage, pedagogical use of digital technology, learning technology, and ethical issues, to align technology with education as well as to enhance awareness of digitization. It is evident that the model focused a great deal on evaluating a teacher's competence in teaching with technology from the teacher's perspective but not in relation to learners. Fisher et al. (2012) designed the teacher-centered DECK framework, which stresses the use of digital applications in teaching practice from four main aspects, distributed cognition and knowledge, engagement and motivation, community and communication, and knowledge enhancement. Although the framework clearly refers to DL in practice, it does not provide adequate, detailed information on the competencies for each aspect. Hall et al. (2014) introduced a self-evaluation DigiLit Leicester framework that focuses on measuring DL from four aspects with four levels (entry, core, developer, and pioneer), which were critically reviewed and adapted from different frameworks: (1) finding, assessment, and organization; (2) creation and sharing; (3) communication, cooperation, and participation; and (4) online safety and e-identity.

Further, a number of frameworks concentrate on evaluating digital competence among preservice teachers, with the components of these frameworks also being similar to those designed for inservice teachers. For instance, Expertise NetWork at the Ghent University Association (ENW AUGent, 2013) for teacher training institutions developed an ICT competence framework to support teacher training programs. The framework aimed to enhance digital competence among preservice teachers in three broad dimensions: instruction and pedagogy, professional development, and the school in a broader context. Another DL framework, designed by Ng (2012), comprises three key components for pre-service teachers: technical, cognitive, and socioemotional. The technical aspect of DL encompasses the acquisition of technical and operational skills necessary for utilizing ICT in learning and daily activities. Ng's (2012) cognitive dimension is intricately linked to critical thinking in the search, evaluation, and creation cycle when managing digital information. It also involves the ability to evaluate and select suitable software programs for learning or specific tasks, necessitating an awareness of ethical, moral, and legal issues related to online activities. The socio-emotional dimension involves the responsible and safe use of the Internet for communication, socialization, and learning. Table 3.2 lists typical but impressive frameworks in

the field of educational DL. One acceptable notion is that a number of competencies referred to by different frameworks and models at the cross-national, national, and contextual levels can be mapped using DigCompEdu (Redecker, 2017b). The reason is that the framework was evaluated to cover the main digital competencies of educators in the school context. Additionally, DigCompEdu was selected because it provided general competencies needed by educators to achieve digital literacy. Six aspects of DigCompEdu were used as a template, and the aspects of each model were categorized based on that template. For example, the technical, cognitive, and socioemotional components of Ng's (2012) DL framework were examined in detail to align with components in DigCompEdu. Consequently, three DL components from Ng's (2012) model were mapped to four components in DigCompEdu, and one component from Ng's framework could correspond to one or more components in DigCompEdu. For instance, the technical component corresponds to professional development (which includes using digital technologies to enhance organizational communication with other school stakeholders) and teaching and learning (which involves using digital technologies and services to enhance interaction with learners within and outside the learning session). The cognitive aspect corresponds to the content in digital resources, involving tasks like identifying, assessing, and selecting digital resources for teaching and learning, as well as effectively safeguarding sensitive digital content. Additionally, it connects with fostering digital competence among learners, encompassing activities like comparing and critically evaluating the credibility and reliability of information and its sources. The socioemotional dimension aligns with promoting digital competence among learners, which includes assessing to ensure learners' physical, psychological, and social well-being while using digital technologies. In this scenario, a single DL dimension from this framework may be associated with one or more components of another framework, reflecting the interconnected nature of DL components. Table 3.2 collates aspects of typical frameworks according to DigCompEdu.

Table 3.2 *Teacher digital literacy frameworks*

Framework/ Model	Organization/ Author	Country	Level	Component/Aspect	PE	DR	TL	A	EL	FLC
DigCompEdu	European Commission; Redecker (2017b)	International	Six levels: awareness, exploration, integration, expertise, leadership, and innovation	Professional engagement (PE), digital resources (DR), teaching and learning (TL), assessment (A), empowering learners (EL), and facilitating learners' digital competence (FLC)	O	O	O	O	O	O
ICT Competency Framework for Teachers	UNESCO	International	Three levels: knowledge acquisition, knowledge deepening, and knowledge creation	Policy and vision, curriculum and assessment, pedagogy, ICT, organization and administration, and teacher professional development	O	O	O	O	O	O
ISTE	Crompton (2017)	USA		Evaluation, facilitation, designation, collaboration, leadership, citizenship, and learning	O	O	O	O	O	O
The Common Framework for Digital Competence for Teachers	The Spanish Ministry of Education, Culture and Sports	Spain	Three levels: basic, medium, and advanced	Information and data literacy communication and collaboration, digital content creation, safety, problem-solving	O	O	O		O	O
The British Framework of Digital Teaching	The British Education and Teaching Foundation	Britain		Pedagogical planning, pedagogical approach, employability of students, specific teaching, evaluation, accessibility and inclusion, and self-development	O	O	O	O	O	O
Teachers' ICT Competencies	Ministry of Education, Chile; Enlances (2011)	Chile		Pedagogical, technical, management, social, ethical, legal, and professional development	O	O	O			
DigEuLit	Martin and Grudziecki (2006)	Contextual	Three levels: digital competence, digital usage,	Skills/concepts, professional application, and	O	O	O			40

Name	Author	Approach	Levels	Components					
			and digital transformation	innovation					
SARM	Puentedura (2006)	Contextual	Four levels: substitution, augmentation, modification, and redefinition	Visualization and simulation, social computing, digital storytelling, and educational gaming	○	○	○		○
TPACK	Mishra and Koehler (2006)	Contextual		Technology, pedagogy, content, and knowledge	○		○		○
Teachers' Digital Competence Model	Krumsvik (2014)	Contextual	Four levels: adoption, adaptation, appropriation, innovation	Basic digital skills, elementary skills, didactic ICT competence, learning strategies, and digital building	○	○	○	○	
DECK	Fisher et al. (2012)	Contextual		Distributed cognition and knowledge, engagement and motivation, community and communication, and knowledge building	○	○			○
DigiLit Leicester	Hall et al. (2014)	Contextual	Four levels: entry, core, developer, pioneer	Finding, evaluating, and organizing; creating and sharing; communication, collaboration, and participation; and e-safety and online identity	○	○	○		○
Digital Literacy Model	Ng (2012)	Contextual		Technical, cognitive, and socioemotional	○	○	○		○

3.4.3 Approaches and types of instruments to measure teacher digital literacy

Two approaches for measurement (pragmatic and psychometric) are common in designing tools to assess DL. Each approach has its strengths and weaknesses as regards validity. Scholars have thus advised combining the two approaches to guarantee instrument validity. Based on multiple frameworks and models, international and national organizations and researchers in specific contexts have designed and improved various tools to assess DL. Assessment tools can measure information, technology, and digital information and are thus grouped from the perspective of assessment and item design or based on their objectives (e.g., research purpose and quality insurance; Sparks et al., 2016). The most common means of classifying DL instruments is the use

of the data collection approach, which includes knowledge-based assessment (response on the manner of handling tasks), performance assessment (illustration of the manner of performing tasks), and self-assessment (self-evaluation of the competence of completing tasks; Carretero et al., 2017). Obtaining a large number of participants is seemingly difficult for performance and knowledge assessment in contrast to self-assessment. However, implementing tools for self-evaluation research may result in low reliability and validity. Also, multiple researchers have indicated that there is a low correlation between students' self-reported DL and their actual performance (Hatlevik et al., 2018), and the result of this indirect assessment only reports a belief about DL. Therefore, when designing a DL assessment tool, there has been an attempt to immerse instruments in an authentic digital environment (Reichert et al., 2020). However, there is also a concern that teachers or students may not have the necessary technical/operational competence to use the assessment tool (Chanta, 2021), and the poor result of the level of DL might not be a result of participants' actual performance but their lack of digital competence in using the assessment software. This means that there is no perfect DL assessment tool, and it is always a challenging task to measure teacher or student DL. This is why scholars need to consider a number of factors when designing an instrument, such as the research context, participants, facilities, and so on. Additionally, technologies are developing by the minute, so DL assessment instruments need updating to keep pace with the new technologies.

3.4.4 Factors impacting teacher digital literacy

In the literature, several factors enhance the development of DL in relation to the background information of teachers (e.g., age, gender, years of experience, and use of digital tools), and scholars examine school-related factors (e.g., digital infrastructure) in different research contexts and the results have been reported in previous work. In the case of gender differences in the DL of teachers, findings remain controversial. Although a few scholars report that the DL of men surpassed those of their female counterparts (e.g., Guillén-Gámez et al., 2020), other studies point to opposite findings (e.g., Siddiq & Scherer, 2019). Alternatively, the results are dependent on the type of digital competence (e.g., Lucas et al., 2021). Additionally, age, years of experience and digital tool use as variables may influence the level of DL among teachers (e.g., Krumsvik et al., 2016; Tondeur et al., 2018). Apart from factors related to personal information, school-related factors, such as organizational infrastructure, leadership support, and school digital development, may influence DL (Pettersson, 2018). Few studies involve school-related factors in the

development of the DL of teachers despite evidence of their relationship with DL (Lucas et al., 2021). Therefore, the current study verifies the potential factors related to personal information and school-related factors, which contribute to the enhancement of the DL of teachers.

3.5 Conclusion and suggestions for future research

The literature review was conducted to enhance the understanding of DL and other related concepts, exploring the dimensions of DL from various perspectives. Additionally, it delved into how researchers conceptualize and assess DL in both students and teachers within educational settings. In the case of student DL, the literature review provides a theoretical background concerning the conceptualization of student DL, aspects of student DL in frameworks and empirical studies, attitudes (an integral part of DL), and the assessment of attitudes toward digital usage in language learning. The review also covers the assessment of student DL using both objective and subjective tools, along with different modes of instrument administration. Based on the review, a suggestion emerged to combine subjective and objective assessments of student DL to ensure the reliability and validity of the results (e.g., Porat et al., 2018), as the evaluation can become more reliable and valid with the support of both subjective and objective assessments. Moreover, the equivalence between modes of instrument administration should be investigated. Additionally, previous empirical studies have examined gender and grade-level differences in student DL; however, the results varied in different contexts. Therefore, it is necessary to investigate gender and grade-level disparities in terms of DL among students in the Vietnamese educational context. Concerning teacher DL, the literature review provides an understanding of the conceptualization of teacher DL, typical frameworks used for teacher DL assessment, approaches, types of instruments to measure teacher DL, and factors impacting teacher DL. Based on the review, it is suggested that teacher DL should be assessed using various types of instruments to provide a more concise picture of teacher DL.

CHAPTER 4. RESEARCH METHODOLOGY

This chapter outlines the research aims, objectives, research questions, and hypotheses of the four cross-sectional sub-studies. Additionally, it details the primary types of data analysis used in the research.

4.1 Aims of the research and objectives of sub-studies

The main aim of the study is to investigate the DL level of EFL Vietnamese students and teachers. This objective is further subdivided into specific goals and research questions across four sub-studies. Additionally, research hypotheses have been formulated for certain of these questions as follows:

4.1.1 Sub-study one

The first study validates the computer-assisted language learning attitude questionnaire among non-English major students, which is one part of the adapted DL questionnaire. It also differentiates online and paper administration modes by using EFA, CFA, measurement invariance, and Rasch analysis. The objective of the study is addressed by finding the answers to the following research questions:

RQ1. What evidence is there for the reliability and validity of the ICT attitude questionnaire in the Vietnamese context?

RQ2. Is there equivalence in the construct of the instrument and the results based on the paper and online modes of administration?

RQ3. Is there equivalence at the item level of the instrument with respect to the dual modes of administration?

Research hypotheses (RH)

RH1: The ICT attitude questionnaire is reliable and valid in the Vietnamese context (Nagy & Habók, 2018; Nguyen & Habók, 2022a).

RH2: The constructs of the online and paper instruments are equivalent (Neumann & Neumann, 2019).

RH3: The online and paper administration modes are equivalent at the item level (Buerger et al., 2019).

4.1.2 Sub-study two

The second sub-study investigates the DL levels of non-English majors at Vietnamese universities by employing an adapted questionnaire to assess students' digital knowledge, perceived skills, attitudes toward the use of digital technologies, and the frequency of using technology applications in English learning. This study seeks answers to the following questions:

RQ1. To what extent do students use digital tools when learning English?

RQ2. Is there any discrepancy between male and female university students concerning DL?

RQ3. Is there any difference between freshmen, sophomores, juniors, and seniors regarding DL?

Research hypotheses

RH1: There is a significant difference between males and females concerning DL (Alakpodia, 2014; Nguyen & Habók, 2022b).

RH2: There is a significant difference among year groups regarding DL (Lazonder et al., 2020).

4.1.3 Sub-study three

This third study conducts a DL assessment on English majors in universities in Vietnam using two types of self-developed and correlated measurement tools, namely subjective and objective. The study addresses the research questions as follows:

RQ1. Are the author-developed instruments in the current study reliable and valid for the DL assessment of EFL students?

RQ2. What is level of DL of English majors based on subjective and objective assessments?

RQ3. Is the perceived DL of students consistent with their result; does a relationship exist between the subjective and objective assessments of students?

Research hypotheses

RH1: The author-developed instruments in the current study are reliable and valid for assessing the DL of EFL students (van Deursen et al., 2014, 2015).

RH2: The perceived DL of students aligns with their performance in the DL test; there is a positive relationship between subjective and objective assessments of students (Aesaert et al., 2017).

4.1.4 Sub-study four

This sub-study is conducted to explore the DL of EFL teachers at Vietnamese universities using an adapted questionnaire and in-depth interviews. The study aims to answer the following research questions:

RQ1. Is the questionnaire reliable and valid for assessing the DL of EFL teachers?

RQ2. What is the status quo of the DL of EFL teachers based on quantitative data?

RQ3. What is the extent of the DL of EFL teachers based on qualitative data?

RQ4. What are potential personal or school-related factors that influence the DL of EFL teachers?

Research hypotheses

RH1: The questionnaire for assessing the DL of EFL teachers is deemed reliable and valid in the Vietnamese higher educational context (Nguyen & Habók, 2022b).

RH2: A majority of EFL teachers' DL is at least at the B1 (integrator) level (Peled, 2021).

4.2 Participants

The participants in the aforementioned sub-studies include English majors, non-English majors, and EFL teachers at universities in Vietnam. Detailed information about the participants is provided in chapter five, where the sub-studies are reported.

4.3 Data analysis

4.3.1 Content validity

Content validity refers to the extent to which items in an instrument measure how comprehensive and representative the content of the instrument is (Newman et al., 2006). Scholars commonly use a content validity index, which can be calculated with several methods to prove the validity tied to the content of the instrument. Researchers calculate two types of Content Validity Index (CVIs): item-CVIs and scale-CVIs. The first type assesses the content validity of individual items, while the second evaluates the content validity of the overall scale. The computation of CVIs, a term used for clarity, is widely agreed upon. A panel of content experts is tasked with rating each scale item for its relevance to the underlying construct and determining the proportion of items considered relevant or highly relevant by the raters. The I-CVIs or S-CVIs are then computed based on the percentage of experts who scored the items. Scholars in the field recommend that the CVI of instruments should attain a minimum of 0.80 after evaluation by experts (Polit et al., 2007).

4.3.2 Exploratory factor analysis (EFA)

IBM SPSS Statistics 22.0 was used on all the data to explore the dimensions of the instrument for assessing attitude to CALL in a Vietnamese context. The Kaiser-Meyer Olkin (KMO) statistic and Bartlett's sphericity test were implemented to estimate the level of intercorrelation and appropriateness of the sampling. The KMO statistic was used to test whether the factor analysis was reliable and whether the data were sufficient for the factor analysis. KMO values range

between 0 and 1, and the index should be higher than 0.5 (Choi et al., 2011; Hair et al., 2017). According to Kaiser (1974), if a KMO value is greater than 0.90, it is highly significant; if it is between 0.80 and 0.90, it is notable; between 0.70 and 0.80, it is above average; between 0.60 and 0.70, it is mediocre; and between 0.50 and 0.60, it is merely acceptable.

4.3.3 Confirmatory factor analysis (CFA)

CFA was done with structural equation modeling in IBM SPSS AMOS 22.0/ Mplus 8 with a sample of the participants used to assess the research model. Normally, model fit indices used to check model fitness are categorized by absolute, comparative, and parsimonious fit (Schumacker & Lomax, 2004), with at least one index for each type reported (Hair et al., 2017). It is also recommended that the chi-square (χ^2) value, comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA) must have minimum indices to confirm the model fit (Kline, 2011). In the current study, the chi-square value, CFI, SRMR, and RMSEA indices were used to analyze the model fit (values to be discussed later). The main absolute fit index is χ^2, which tests the null hypothesis of the fitness of the model and demonstrates whether the model fits the data. Although a significant χ^2 shows that the model does not reproduce the data, a non-significant χ^2 marks a good fit. χ^2 statistics higher than 0.05 confirm a good relationship between the model and the data (Barrett, 2007). Nonetheless, it should be noted that χ^2 has been found to be influenced by sample size, with the value increasing if the quantity of observed variables becomes greater. Hence, RMSEA and SRMR will be considered when assessing whether the model is well fitted to the data because those indices do not depend on sample size. RMSEA value normally ranges from 0 to 1. $0.10 > RMSEA > 0.08$ marks a meager fit, $0.08 > RMSEA > 0.05$ represents an acceptable fit, and $0.05 > RMSEA$ reflects a good fit (Browne & Cudeck, 1992). As RMSEA is also used to evaluate model complexity, the value is taken as an indicator of a parsimonious fit (Teo et al., 2013). SRMR is the index that shows the extent of error from the estimation, thus reflecting the accuracy of the model, with a suggested cut-off value of 0.08 (Hu & Bentler, 1999). In the category of comparative fit, CFI is widely used to determine if the research model is superior to the null model. CFI values rank from 0 to 1, and a good value that is higher than 0.90 is related to a good model (Bentler, 1990). The convergent and discriminant validity of the measurement model is also checked to reinforce assessment of the validity of the adapted instrument. Convergent validity measures how much items interact with one another. Fornell and Larcker (1981) proposed that convergent validity should be based on (1) the internal

consistency reliability (Cronbach's alpha), (2) the average variance extracted (AVE), and (3) the composite reliability (CR, McDonald's coefficient omega; Raykov, 1997). Cronbach's alpha values should ideally be greater than 0.60 (Gliner et al., 2017) or higher than 0.70 (Hair et al., 2006). As regards CR, the CR value should exceed 0.70 (Nunnally & Bernstein, 1994) or 0.60 (Awang, 2012), and the AVE value should be over 0.50 (Hair et al., 2006). However, Fornell and Larcker (1981) hold that if the CR values are above 0.60, they are still acceptable once the AVE values are below 0.50. Discriminant validity measures whether items correlate with each other in one construct more than other items in another construct. Discriminant validity is confirmed if the square root of the AVE of an individual construct is higher than the squared factor correlation between the same construct and other constructs (Barclay et al., 1995). Discriminant validity of the instrument can also be assessed through the heterotrait–monotrait ratio of correlations (HTMT) (Henseler et al., 2015), with discriminant validity confirmed if HTMT values are below 0.85 (Kline, 2016).

4.3.4 Measurement invariance analysis

Measurement invariance using multigroup CFA is also employed in the research. This process involves testing the measurement model for configural, metric, and scalar invariance by applying equality constraints on factor loadings and item intercepts across groups. The configural invariance model assumes an equivalent number of latent variables and item-factor associations across both groups, with all model parameters estimated independently for each group. Metric invariance requires equal loadings for latent variables across groups, while scalar invariance involves equality constraints on item intercepts. Scalar invariance allows for a comparison of factor means between groups. Different threshold values in the psychometric literature, such as those proposed by Chen (2007), suggest that model fit changes are considered nonsignificant when ΔCFI ≤ -0.010, ΔRMSEA ≤ 0.015, and ΔSRMR ≤ 0.030.

4.3.5 Rasch model analysis

The Rasch measurement model has been widely applied in multiple studies that use a Likert scale to measure unobservable variables (Hendriks et al., 2012; Ishar & Masodi, 2012). Although EFA and CFA apply to the construct of instruments, the Rasch analysis concentrates on the pattern of item responses and expresses the mutual relationship between an individual and an item. Rasch model analysis assesses the strengths and weaknesses of the instrument as well as the precision of its construct, both individually and systematically (Boone, 2016). The Rasch approach does not

attempt to change the model to fit the data but works from the opposite direction, enabling the instrument to be finessed by re-scoring or removing items (Hendriks et al., 2012). Moreover, because Rasch analysis also uses individual and item parameters to measure the score of an item and requires the data to fit the model, researchers can measure how well the items on the instrument reflect the latent traits (Andrich, 2004). The individual items are analyzed and assessed through fit statistics – item fit and person fit. Item fit uses an index that involves item functionality, whereas person fit refers to an index that specifies the responses of a participant. Infit items (which really measure the latent trait) are expected to be in the 0 to 1 range. In the studies in the next chapter, Rasch model analysis is employed to test the item fit in the modes of administration with the ACER ConQuest program (Adams & August, 2010).

4.3.6 Structural equation modelling (SEM)

SEM is not only utilized for CFA, as discussed in section 4.3.3; it is also employed to examine the causal relationship between appraisal and objective assessments in this study. The application of SEM involves six fundamental steps: specifying the model; assessing model identification; selecting measures (operationalizing constructs); collecting, preparing, and screening data; estimating the model; respecifying the model; and reporting the results (Kline, 2011). These steps are iterative because issues at a later stage may necessitate revisiting an earlier one. The initial and crucial first step is specification, wherein the hypotheses of the research are conceptualized in the form of a structural equation model. During the second step - specification, potential issues that could complicate the analysis are identified. A model is considered identified if it is theoretically feasible for the computer to derive a unique estimate for every model parameter. Following measure selection, data collection, and data screening in the third step, the model is estimated using model fit indices, as explained in the CFA section. Good model fit indices indicate that the model effectively explains the data, while poor fit may lead to model respecification in the fifth step. The respecified model is identified if it achieves acceptable or good model fit indices. Finally, the results, following the above basic steps, are documented in written reports (step 6). In this research, SEM was applied to assess whether digital self-efficacy influences DL achievement, examining standardized estimates of the path coefficient between the two instrument types. Additionally, the path coefficient value is scrutinized to determine whether perceived DL exerts a positive or negative effect on the DL test results.

CHAPTER 5. EMPIRICAL STUDIES

This chapter comprehensively presents the four sub-studies of student and teacher digital literacy assessment. Each study is specified in detail, including an introductory section, methodology, data analysis, results, discussion, conclusion, and implications for teaching and learning.

5.1 Sub-study 1. Adaptation and validation of a computer-assisted language learning attitude questionnaire in a Vietnamese EFL context: A comparison between online and paper modes of administration

5.1.1 Introduction

Computer-assisted language learning (CALL), which is defined as the process by which students use computers to improve their language learning (Beatty, 2010), has for years been an important part of acquiring a second language. CALL can aid students in different learning tasks, support the knowledge-constructed classroom (Muir-Herzig, 2004), empower students to be responsible for their learning, and create more opportunities to practice the language (Almekhlafi, 2006). The history of CALL could be categorized in three ways: (1) behaviorist, (2) communicative, and (3) integrative (Ürün, 2015). At the outset, the behaviorist approach to CALL involved repetitive language drills for instructional purposes. A communicative pedagogy then replaced behaviorism, thus creating more opportunities for students to practice through digital devices. The changing needs in language education in the 21st century paved the way for integrative CALL, allowing students to practice their language skills in authentic environments while improving their technological capabilities. With the sheer growth of information and communication technology (ICT), the term CALL has been extended beyond the computer to applications ("apps") and digital devices (Tafazoli et al., 2018). It has even been proposed that a culture component be incorporated into CALL to become "Computer-Assisted Languaculture Learning" (Abolghasseminits et al., 2013; Chun et al., 2016; Zhu et al., 2009).

In educational institutions around the world, CALL has been extensively used for different purposes in language education and has become a fundamental feature of language teaching methodology to achieve learning objectives (Lodhi et al., 2019) through multimedia with video, sound, graphics, and text. Different studies have examined factors that impact the integration of digital applications in the classroom (Aslan & Zhu, 2017; Chen, 2008; Guillén-Gámez & Mayorga-Fernández, 2020). Several such studies have attempted to explore organizational factors and personal traits (Van Braak, 2001), overt and covert deterrents (Al-Kahtani, 2004), first- and

second-order barriers (Yang & Huang, 2008), third-order barriers (Tsai & Chai, 2012), extrinsic and intrinsic barriers (Chen et al., 2012), and internal and external factors in "low resource" and "high resource" settings (Abedalaziz et al., 2013; Albirini, 2006; Al-Ruz & Khasawneh, 2011; Aslan & Zhu, 2017; Atai & Dashtestani, 2011; Ifinedo et al., 2020; Lodhi et al., 2019). The research on ICT integration in the classroom finds that "human agency" is a significant element in the acceptance and efficacy of CALL (Abolghasseminits et al., 2013), so students' attitudes to the use of technological tools should be considered one of the vital issues in the successful use of technology in language learning (Ma et al., 2005). It is a well-established fact that attitudes bear a strong relationship with students' behavioral intentions and computer usage (Ajzen & Fishbein, 2000), with positive CALL attitudes definitely impacting EFL learning (Levy & Hubbard, 2005).

In Vietnam, the MOET has mandated multiple projects for implementing technology in education. The current project is titled "Enhancing the application of information technology in management and support for teaching–learning activities: Research on enhancing the quality of education and training in the 2016–2020 period with a view to 2025." This has aided teachers and students in integrating technology with a variety of fields, including English as a foreign language (EFL) education. CALL has thus been implemented in several study areas in Vietnamese universities. However, research in EFL education and technology has mostly focused on teachers' attitudes to CALL, even though both teachers' and students' attitudes are pertinent because learning will only take place if their attitudes are congruent (McGrail, 2005). Surveying learners' CALL attitudes may therefore reveal challenges and opportunities for the education system (Aryadoust et al., 2016), given that understanding students' attitudes facilitates the integration of technologies into learning. Available research on Vietnamese teachers' attitudes to integrating ICT into English language teaching (e.g., Truong & Qalati, 2020) finds few questionnaires that address the comparison of paper-based and online questionnaire validity or questionnaires translated into Vietnamese. The current study seeks to fill the gap by validating an instrument designed for both paper and online modes to be used for Vietnamese EFL learners.

5.1.2 Methodology

The study was conducted as cross-sectional research, employing exploratory factor analysis (EFA), confirmatory factor analysis (CFA), measurement invariance analysis, and Rasch model analyses.

5.1.2.1 Participants

The questionnaire was administered both electronically and with hard copy documents to EFL

undergraduate students at ten universities in Vietnam. There were 1,769 participants (28% male, 72% female; 7.3% freshmen, 23.3% sophomores, 15.8% juniors, 53.5% seniors; $M_{age} = 20.98$, $SD_{age} = 1.79$), who completed both the online and paper questionnaires. The sample was then split into two groups: an online cohort and a paper cohort. The online cohort (N = 1002) comprised 1,002 students (23.8% male, 76.2% female; $M_{age} = 20.16$, $SD_{age} = 1.86$). The paper cohort (N = 767) comprised 767 students (33.6% male, 66.4% female; $M_{age} = 22.07$, $SD_{age} = 0.89$), who used pen and paper to complete the questionnaire. The participants who volunteered for the research had various majors; however, EFL was a compulsory course for all of them. According to Kline (2016), 10–20 participants per parameter, or a minimum of 210 participants, are adequate to test the model. Thus, the number of students in the two groups (N = 1002 and N = 767) was sufficient.

5.1.2.2 The instrument and procedure

The Vietnamese CALL questionnaire was adapted from a questionnaire on attitudes to ICT tools (Habók & Nagy, 2017). This is a self-report measurement tool that examines the attitude of language students to technologies in language learning through internal and external factors. The original questionnaire contains 28 four-point Likert-scale items ranging from disagree to agree and categorized into four internal factors (affective ICT strategies, metacognitive strategies, personal significance of ICT, and significance of mobile devices) and four external factors (curriculum-based limitation, task-centered strategies, use of ICT tools in learning, and motivating role of ICT).

The adapted version of the 28-item questionnaire from the previous study (Habók & Nagy, 2017) was translated into Vietnamese; then, the two versions were compared for similarities and differences. The translated questionnaire was modified and improved several times by several researchers, IT teachers, and EFL teachers to ensure that all the questions were clear and could easily be understood by the students. During the translation, the researchers paid particular attention to cultural adaptation and key terms (e.g., ICT and virtual learning) and made some adjustments so that they are understandable and contextually suitable. The translated questionnaire items were assessed carefully in terms of conceptual, semantic, experiential, and operational equivalences. Additionally, an English-language version of the questionnaire that had been back translated from the Vietnamese version was compared with the original to check that all the instructions and items on the two English-language versions of the questionnaire were consistent with each other. Then, the final version of the Vietnamese questionnaire was modified into an

online Google form and a paper document (Figure 5.1.1 & Figure 5.1.2). The online form was designed to be convenient for the undergraduates to respond to the questions. All the functions of the online system were also checked carefully before the questionnaire was administered. Paper copies of the questionnaire were also organized carefully to aid the respondents. The two types of questionnaires had the same number of questions and the same content to facilitate data comparison.

Phần 4. Quan điểm đối với việc sử dụng CNTT và truyền thông (CNTT) để học tiếng Anh Câu hỏi 21. Hãy cho các phản hồi phù hợp cho những nhận xét sau đây	không đồng ý	không đồng ý một phần	đồng ý một phần	đồng ý
1. Sử dụng máy tính để học tập rất quan trọng đối với em.	1	2	3	4
2. Sử dụng máy tính bảng để học tập rất quan trọng đối với em.	1	2	3	4
3. Sử dụng điện thoại thông minh để học tập rất quan trọng với em.	1	2	3	4
4. Sử dụng các công cụ CNTT để học tập rất quan trọng với em.	1	2	3	4
5. Sử dụng máy tính để học khiến em vui.	1	2	3	4
6. Sử dụng các công cụ CNTT vào việc học tập khiến em vui.	1	2	3	4
7. Em sử dụng các công cụ CNTT để học vì em hứng thú với CNTT.	1	2	3	4
8. Em tiết kiệm thời gian nếu em sử dụng máy tính để học.	1	2	3	4
9. Em tiết kiệm thời gian nếu em sử dụng các công cụ CNTT khi học tập.	1	2	3	4
10. Em có thể tập trung vào việc học nhiều hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
11. Em có thể hiểu bài dễ dàng hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
12. Em có thể nhớ những gì em đã học tốt hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
13. Các công cụ CNTT có vai trò quan trọng đối với em trong quá trình học tập.	1	2	3	4
14. Công cụ CNTT giúp em học nhanh hơn.	1	2	3	4

Figure 5.1.1 *Paper administration mode layout of the instrument*

Figure 5.1.2 *Google Forms administration mode layout of the instrument*

5.1.2.3 Research questions & hypotheses

The following research questions were formed to address the research objectives:

RQ1. What evidence is there for the reliability and validity of the ICT attitude questionnaire in the Vietnamese context?

RQ2. Is there equivalence in the construct of the instrument and the results based on the paper and online modes of administration?

RQ3. Is there equivalence at the item level of the instrument with respect to the dual modes of administration?

Based on the above research questions, some hypotheses have been formulated as follows:

RH1: The ICT attitude questionnaire is reliable and valid in the Vietnamese context (Habók & Nagy, 2018; Nguyen & Habók, 2022a).

RH2: The constructs of the online and paper instruments are equivalent (Neumann & Neumann, 2019).

RH3: The online and paper administration modes are equivalent at the item level (Buerger et al., 2019).

5.1.3 Data collection procedure

5.1.3.1 Pen-and-paper questionnaire

The paper questionnaire was administered to the students in their classrooms. The students were notified that it was part of a research study, and the aims and ethical considerations were explained. The data collectors emphasized that the students' responses would be used purely for research purposes and would not be divulged to anyone. The students were thus encouraged to answer all the questions truthfully. The participants were then given time to reply to the paper questionnaire before their responses were collected by the data collectors. The data were then coded in an Excel file.

5.1.3.2 Online questionnaire and Google forms

The electronic questionnaire was administered to the students in their online classrooms. Following the same procedure used for the paper questionnaire, the data collector explained the purpose of the research and related ethical issues. The students then logged in to the questionnaire on Google Forms and responded to the questions. After completing the form and submitting the answers to the data collector, all the data were made available on the website and were ready for analysis.

5.1.4 Data analysis & results

5.1.4.1 Research question 1: What evidence is there for the reliability and validity of the questionnaire in the Vietnamese context?

5.1.4.1.1 Exploratory factor analysis

Analysis showed that the online and paper data collected from the students is appropriate for data analysis, as the KMO index is 0.89 and Bartlett's sphericity is highly significant ($p < 0.01$). Although the original questionnaire contains four internal factors and four external ones with 28 items mentioned in the description of the instrument, the EFA suggested a six-factor model for the Vietnamese instrument with 27 items involving three internal factors and three external ones (Table 5.1.1): (1) internal ICT importance (III – 6 items), (2) internal affective attitude (IAA – 6

items), (3) internal metacognitive strategies (IMS – 5 items), (4) external learning activities (ELA – 3 items), (5) external use of ICT tools in learning (EUITL – 4 items), and (6) external ICT facility and material limitation (EIFML – 3 items). The labels for the six factors on the adapted Vietnamese questionnaire were adjusted to fit with the content of the items that fall within each factor; however, they were still named on the basis of the four internal factors and four external ones on the original questionnaire (Table 5.1.1). The six-factor structure of the instrument thus derived achieved a reasonable level of cumulative variance (53.174% in total), as values between 40% and 60% are adequate for social studies (Dunteman, 1989) with variance explained by each component described in Table 5.1.1.

Table 5.1.1 *EFA for students' attitudes to CALL (with varimax rotation)*

Items	Statement	Factor loading
	(1) III (Eigenvalue = 7.405, Variance = 26.447%)	
Item 9	I can focus on English learning more if I use ICT tools.	0.509
Item 10	I can understand the English material much more easily if I use ICT tools.	0.681
Item 11	I can remember what I have learned better if I use ICT tools.	0.741
Item 12	ICT tools play an important role in my English learning process.	0.599
Item 13	ICT tools make English learning faster for me.	0.701
Item 14	ICT tools improve my English grades.	0.714
	(2) IAA (Eigenvalue = 2.328, Variance = 8.314%)	
Item 4	Using a tablet for English learning is very important to me.	0.419
Item 5	Using a computer for English learning makes me happy.	0.657
Item 6	Using ICT tools for English learning makes me happy.	0.661
Item 7	I use ICT tools for English learning because I am very interested in IT.	0.673
Item 8	I save time if I use a computer for English learning.	0.638
Item 17	I save time if I use ICT tools for English learning.	0.563
	(3) IMS (Eigenvalue = 1.654, Variance = 5.906%)	
Item 2	Using a computer for English learning is very important to me.	0.665
Item 3	Using a smartphone for English learning is very important to me.	0.703
Item 15	Using ICT tools for English learning is very important to me.	0.691
Item 18	Information is much more easily available by using ICT tools than by visiting the library.	0.534
Item 28	Teachers should incorporate the use of ICT tools into their English	0.494

	teaching.	
	(4) ELA (Eigenvalue = 1.782, Variance = 6.363%)	
Item 21	Teachers give us guidance on how to use ICT tools for English learning tasks to be completed at home.	0.796
Item 22	Teachers give us guidance on how to use ICT tools for English learning in class.	0.869
Item 23	Teachers support the use of ICT tools for English learning.	0.841
	(5) EUITL (Eigenvalue = 1.415, Variance = 5.054%)	
Item 1	I use a computer as part of my English learning process.	0.634
Item 24	My teachers use a computer during their English classes.	0.586
Item 25	My teachers expect me to use a computer as part of my English learning process.	0.775
Item 26	Virtual English learning environments are used in the courses I am enrolled in.	0.712
	(6) EIFML (Eigenvalue = 1.090, Variance = 3.894%)	
Item 16	I cannot learn English without using ICT tools.	0.461
Item 19	The English material covered does not allow for the use of ICT tools in class.	0.836
Item 20	The English material covered does not allow for the use of ICT tools at home.	0.823

5.1.4.1.2 Confirmatory factor analysis

After the structure of the instrument was determined for the Vietnamese context, the six-factor solution was then evaluated on the basis of the model fit indices. The CFA of the model (Figure 5.1.3) showed acceptable indices (χ^2 = 1560.940; df = 237; CFI = 0.901; RMSEA = 0.056; SRMR = 0.053). The model also demonstrated an acceptable level for convergent validity. The analysis showed that the questionnaire has high reliability (α = 0.88, ω = 0.90). The reliability of each factor was also supported by Cronbach's alpha for each factor, with ranks from 0.62 to 0.85 and with omega values in the 0.67–0.90 range. Internal ICT importance and external learning activities dimensions showed a high level of reliability (α = 0.85, ω = 0.90; α = 0.87, ω = 0.87) with good Cronbach's alpha and omega for internal affective attitude and internal metacognitive strategies (α = 0.79, ω = 0.88; α = 0.74, ω = 0.77). The components related to the external use of ICT tools in learning, as well as external ICT facility and material limitations, exhibited slightly

lower values but remained within an acceptable range (α = 0.62, ω = 0.69; α = 0.63, ω = 0.67). The model showed some AVE values for internal ICT importance, internal affective attitude, internal metacognitive strategies, and external use of ICT tools in learning lower than 0.50 (Table 5.1.2), but all CR values for the factors were higher than 0.60. Therefore, the model was found to be valid in terms of convergence (Fornell & Larcker, 1981).
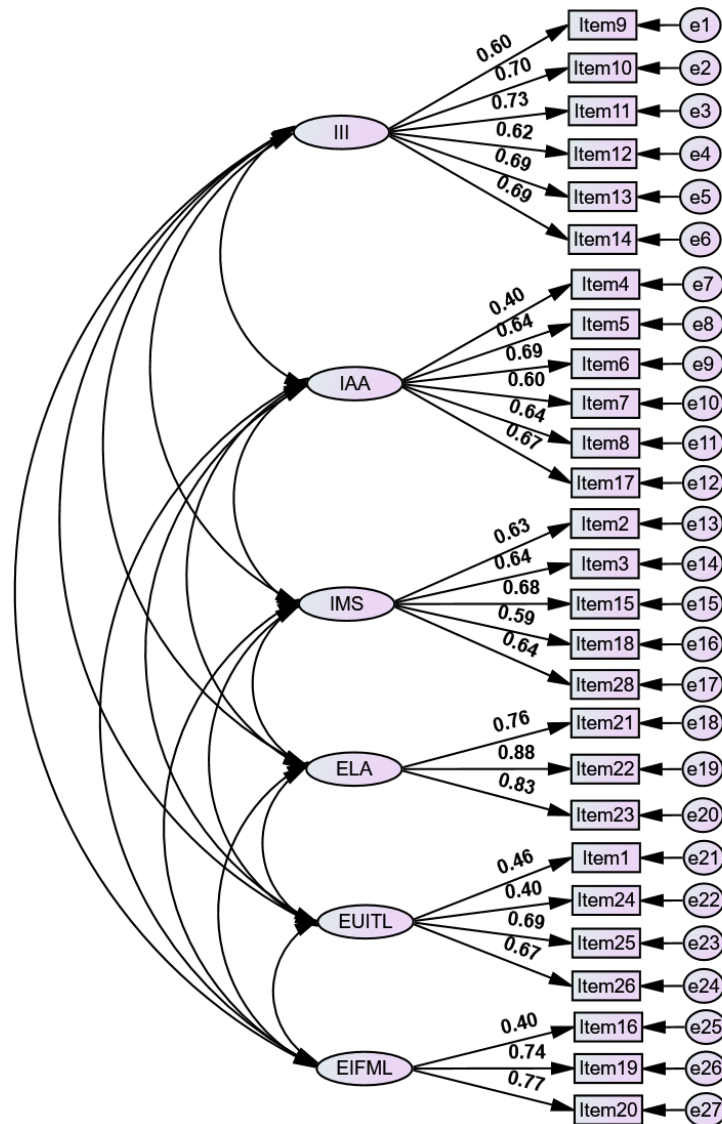
Figure 5.1.3 *The six-factor structural model (N = 1769)*

Note: III: internal ICT importance; IAA: internal affective attitude; IMS: internal metacognitive strategies; ELA: external learning activities; EUITL: external use of ICT tools in learning; EIFML: external ICT facility and material limitation

Table 5.1.1 *Convergent validity measures*

Factors	Cronbach's α (>0.60)*	ω (>0.60)*	(AVE) (>0.50)*	(CR) (>0.60)*
1. III	0.85	0.90	0.43	0.82
2. IAA	0.79	0.88	0.37	0.77
3. IMS	0.74	0.77	0.38	0.75
4. ELA	0.87	0.87	0.69	0.87
5. EUITL	0.62	0.69	0.46	0.77
6. EIFML	0.63	0.67	0.53	0.76
Total	0.88	0.90	0.45	0.95

Note: **Sufficient level of reliability or validity; CR was calculated using $(\Sigma\lambda)2/(\Sigma\lambda)2 + \Sigma(1 - \lambda2)$; AVE was calculated using $\Sigma\lambda2/\Sigma\lambda2 + \Sigma(1 - \lambda2)$.*

As regards the discriminant validity of the questionnaire, the square root of AVE and inter-construct correlation in the component correlation matrix was compared, confirming the discriminant validity of the model because the square root of AVE was above the inter-construct correlation values between the factors. The values are shown in Table 5.1.3.

Table 5.1.2 *Discriminant validity measures*

Component correlation matrix						
Factors	III	IAA	ELA	IMS	EUITL	EIFML
1. III	.642*					
2. IAA	.541	.583*				
3. IMS	.292	.290	.616*			
4. ELA	.432	.329	.423	.616*		
5. EUITL	.147	.110	.040	−.080	.707*	
6. EIFML	.278	.290	.251	.073	.061	.721*

Note: *The square root of average variance extracted value

5.1.4.1.3 Rasch model analysis

Moreover, Rasch model analysis found that item and person fit statistics were acceptable for all the items on the questionnaire with deviance = 94123.071, $p < 0.01$ (Tables 5.1.6 and 5.1.7) and with

values ranging from 0.85 to 1.42. For internal ICT importance and internal affective attitude, items 14 and 6 best fit in terms of person fit, respectively, whereas items 3 and 23 fit well in terms of person fit for internal metacognitive strategies and external learning activities, respectively. For the external use of ICT tools in learning dimension, item 1 is the most appropriate, whereas for the external ICT facility and material limitations component, item 19 was deemed the most suitable.

Overall, the research confirmed the reliability and validity of the six-factor model at both the construct and item levels. Accordingly, the first hypothesis, which indicated that the ICT attitude questionnaire is reliable and valid in the Vietnamese context, was confirmed.

5.1.4.2 Research question 2: Is there equivalence in the construct of the instrument and the results based on the two modes of administration?

In an effort to address the second research question, which aims to examine the equivalence in the construct of the instrument based on the two modes of administration, data collected from the online (N=1002) and paper-based (N=769) versions of the instrument were separated and then tested using the six-factor model with the two types of data. Both types of data fit the model because all the values reached a good or acceptable level, although the CFI for the paper data is slightly lower than that of the online data (Table 5.1.4).

Table 5.1.3 *Fitness indices of the six-factor model for the online and paper instruments*

Six-factor model	χ^2	df	CFI (>0.90)*	RMSEA (<0.08)*	SRMR (<0.08)*
Online	847.035	237	0.917	0.051	0.048
Paper	1039.166	237	0.870	0.066	0.062

Note: *Acceptable level of model fit indices*

Additionally, the online and paper instruments achieved a good level of reliability ($\alpha = 0.87$, $\omega = 0.89$; $\alpha = 0.90$, $\omega = 0.91$, respectively). The Cronbach's alpha and omega values for the two versions of the questionnaire had good or acceptable levels of reliability for each factor (see Table 5.1.5). The levels of reliability of the two types of questionnaires were consistent with each other. Although internal ICT importance and external learning activities attained the highest reliability, this value in internal affective attitude and internal metacognitive strategies was slightly lower. External use of ICT tools in learning and external ICT facility and material limitation achieved the lowest level of reliability compared with the other factors but were still acceptable. As with the full

sample (N = 1769), the AVE values are lower than 0.50 in some factors in both versions of the instrument. Nevertheless, the convergent validity of the electronic and paper instruments was still validated, as the CR values for all factors were above 0.60 (Fornell & Larcker, 1981) (see Table 5.1.5).

Table 5.1.4 *Convergent validity of the online and paper questionnaires*

Factors	Cronbach's α (>.60)*		ω (>.60)*		AVE (>.50)*		CR (>.60)*	
	Online	Paper	Online	Paper	Online	Paper	Online	Paper
1. III	0.84	0.86	0.90	0.92	0.43	0.50	0.81	0.83
2. IAA	0.76	0.82	0.91	0.89	0.57	0.39	0.84	0.76
3. IMS	0.71	0.71	0.74	0.75	0.46	0.27	0.72	0.72
4. ELA	0.87	0.87	0.87	0.87	0.38	0.61	0.76	0.85
5. EUITL	0.70	0.47	0.75	0.56	0.52	0.74	0.81	0.85
6. EIFML	0.68	0.56	0.71	0.62	0.54	0.66	0.77	0.79
Total	0.87	0.89	0.90	0.91	0.47	0.46	0.95	0.95

Note: CR was computed using $(\Sigma\lambda)2/(\Sigma\lambda)2 + \Sigma(1 - \lambda2)$; AVE was computed using $\Sigma\lambda2/\Sigma\lambda2 + \Sigma(1 - \lambda2)$.

Moreover, the discriminant validity of the paper and online instruments was also confirmed, as the HTMT ratio values of both versions were lower than 0.85 for all six factors (Henseler et al., 2015). The discriminant validity values for the electronic and paper instruments are shown in Tables 5.1.6 and 5.1.7, respectively. Thus, the construct of the electronic and paper versions is equivalent because the convergent and discriminant validity of both types of instruments was confirmed.

Table 5.1.5 *HTMT ratios from the correlations between the components of the online instrument*

Factors	III	IAA	IMS	ELA	EUTIL	EIFML
1. III	1	0.575	0.489	0.721	0.078	0.694
2. IAA		1	0.615	0.631	0.033	0.650
3. IMS			1	0.701	0.102	0.406
4. ELA				1	0.025	0.489
5. EUTIL					1	0.025
6. EIFML						1

Table 5.1.6 *HTMT ratios from the correlations between the components of the paper instrument*

Factors	III	IAA	IMS	ELA	EUITL	EIFML
1. III	1	0.788	0.704	0.459	0.211	0.241
2. IAA		1	0.790	0.432	0.297	0.300
3. IMS			1	0.523	0.172	0.208
4. ELA				1	0.227	0.159
5. EUITL					1	0.129
6. EIFML						1

Additionally, we conducted an analysis of measurement invariance using multigroup CFA to compare paper and online modes. This involved testing the measurement model for configural, metric, and scalar invariance by applying equality constraints on factor loadings and item intercepts across two groups: paper and online. For the grouping variable of online and paper modes, the configural model demonstrated an acceptable data fit, supporting the suitability of the nested factor model for both groups. Additionally, the metric and scalar invariance models showed satisfactory fit values. Various benchmarks in the psychometric literature, like those outlined by Chen (2007), indicate that alterations in model fit are deemed statistically insignificant when ΔCFI is $\leq$ –0.010, ΔRMSEA is ≤ 0.015, and ΔSRMR is ≤ 0.030. In our multigroup CFA, we found that the criteria for ΔCFI, ΔRMSEA, and ΔSRMR values were all met (Table 5.1.8). This discovery confirms the validity and reliability of comparing means between groups and suggests that the same scale can be used to measure the same construct across both groups. Hence, the present study validated the second hypothesis, which asserts the equivalence of constructs between the online and paper instruments.

Table 5.1.8 *Goodness-of-fit statistics and multigroup invariance attitude comparisons*

Measurement invariance models	χ^2	df	CFI	RMSEA [90% CI]	SRMR	$\Delta \chi 2$ ($\Delta2(df)$)	ΔCFI	ΔRMSEA	ΔSRMR
Configural model	1038.178	287	0.902	0.058 [0.051, 0.063]	0.053	-	-	-	-
Metric model	1069.731	298	0.900	0.062	0.058	31.553(11)	–0.002	0.004	0.005

| | | | | [0.054, 0.071] | | | | | |
| Scalar model | 1108.035 | 337 | 0.901 | 0.067 [0.063, 0.084] | 0.059 | 38.304(39) | 0. 001 | 0.005 | 0.001 |

Note: Grouping variable: paper and online data

5.1.4.3 Research question 3: Is there equivalence at the item level of the instrument with respect to the dual modes of administration?

The six-factor model was specified through EFA and then confirmed through CFA, with a Rasch model analysis conducted on the subscale level. After comparing the construct of the electronic and paper instruments, item fit was analyzed with the partial credit model because the likelihood ratio test was significant ($p < .001$). The analysis showed that all individual items on both types of instruments have a good fit, with an infit and outfit ranking from 0.88 to 1.43 for the online data, whereas the values for the paper data fell within the 0.81–1.43 range. A summary of fit statistics for all the data (online and paper data) is shown in Table 5.1.9.

These findings suggest that all the individual items in each factor for both types of samples achieve good fit parameters and that all the items are suitable because they do not exceed the prescribed infinite range. Furthermore, a comparison of the deviance values for the two types of instruments (see Table 5.1.10) shows that, although all the items on both versions of the questionnaire fit very well in terms of person fit, the paper instrument is superior to the online one (deviance$_{paper}$ = 39943.179, deviance$_{online}$ = 46582.296). Thus, the third hypothesis of this study, which suggests the equivalence of the online and paper administration modes at the item level, has been validated.

Table 5.1.9 *Rasch model analysis of the items on the online and paper instruments*

Factors	Items	Online			Paper			Full sample		
		Location	SE	Weighted fit	Location	SE	Weighted fit	Location	SE	Weighted fit
	Item 9	0.096	0.029	0.95	0.616	0.034	0.91	0.379	0.021	0.92
1. III	Item 10	−0.083	0.030	0.93	0.039	0.035	0.82	−0.036	0.022	0.87
	Item 11	0.039	0.029	0.94	0.285	0.034	0.85	0.139	0.021	0.89
	Item 12	−0.265	0.031	0.89	−0.480	0.036	0.85	−0.347	0.023	0.87

	Item									
	Item 13	−0.241	0.031	0.87	−0.363	0.036	0.83	−0.274	0.023	0.85
	Item 14	0.011	0.029	0.93	0.265	0.034	0.90	0.100	0.022	0.90
2. IAA	Item 4	0.179	0.029	1.09	0.395	0.034	1.05	0.252	0.021	1.09
	Item5	−0.180	0.031	0.97	−0.265	0.036	0.90	−0.213	0.023	0.93
	Item 6	−0.294	0.031	0.94	−0.332	0.036	0.80	−0.285	0.023	0.89
	Item 7	0.038	0.030	0.95	0.195	0.034	0.84	0.108	0.022	0.93
	Item 8	−0.138	0.031	0.87	0.047	0.034	0.90	−0.016	0.022	0.90
	Item 17	−0.204	0.031	0.87	−0.287	0.035	0.81	−0.245	0.023	0.86
3. IMS	Item 2	−0.343	0.033	1.00	−0.685	0.037	0.89	−0.515	0.024	1.00
	Item 3	−0.334	0.033	0.94	−0.905	0.038	0.92	−0.601	0.024	0.97
	Item 15	−0.309	0.033	0.97	−0.906	0.037	0.86	−0.548	0.024	0.94
	Item 18	−0.372	0.033	0.89	−0.657	0.037	0.99	−0.510	0.023	0.95
	Item 28	−0.252	0.032	0.87	−0.986	0.038	0.97	−0.557	0.023	0.95
4. ELA	Item 21	−0.008	0.031	0.88	−0.021	0.035	0.99	−0.022	0.022	0.93
	Item 22	−0.006	0.031	0.88	−0.227	0.035	0.97	−0.110	0.022	0.93
	Item 23	−0.025	0.031	0.84	−0.299	0.036	1.01	−0.161	0.023	0.93
5. EUITL	Item 1	0.229	0.028	1.46	0.550	0.035	1.08	0.352	0.021	1.29
	Item 24	−0.401	0.030	1.28	−0.695	0.036	1.23	−0.506	0.022	1.25
	Item 25	0.411	0.028	1.35	0.752	0.032	1.33	0.581	0.020	1.33
	Item 26	0.817	0.155	1.40	1.575	0.179	1.43	1.123	0.112	1.42
6. EIFML	Item 16	0.623	0.027	1.05	0.659	0.033	1.30	0.619	0.020	1.14
	Item 19	0.489	0.027	1.07	1.241	0.032	1.33	0.787	0.020	1.21
	Item 20	0.524	0.027	1.05	0.490	0.033	1.34	0.505	0.020	1.18

Table 5.1.10 *Model comparison for the online and paper questionnaires*

Model	Deviance	Parameters	p-value
Full sample	94123.071		
Online sample	46582.296	82	<0.01
Paper sample	39943.179		

5.1.5 Discussion and conclusions

This study provides a new structure of dimensionality for an instrument that assesses students' attitudes to CALL in a Vietnamese EFL context. The study confirmed the hypotheses that approved the validity of the adapted questionnaire and compared the validity of the instrument between online and paper modes at the construct and item levels. The questionnaire was translated into Vietnamese with due attention to technical terms and regional culture. Some adjustments were made to certain key terms on the questionnaire so that all the items would be appropriate for Vietnamese students and their knowledge. The final version of the adapted questionnaire was distributed to EFL learners electronically and physically. Both online and paper data were then used to validate the questionnaire. The collected online and paper data were initially used for EFA, which showed the structure of the CALL instrument in a Vietnamese EFL context with six components (which were different from those of the original version). The labels for these six factors were modified to fit with the items because some had been reconstructed in different factors: internal ICT importance (6 items), internal affective attitude (6 items), internal metacognitive strategies (5 items), external learning activities (3 items), external use of ICT tools in learning (4 items), and external ICT facility and material limitation (3 items). As with the original instrument developed by Habók & Nagy (2017), although the instrument was structured differently, three basic elements (cognition, affect, and behavior) were reflected in these factors on the questionnaire. Six factors on the adapted questionnaire were re-organized on the basis of the three basic elements of attitude: cognitive (internal ICT importance, internal metacognitive strategies, and external ICT facility and material limitation), affective (internal affective attitude), and behavioral (external use of ICT tools in learning and external learning activities). The current study takes the same approach as studies whose authors investigated all three basic elements or merely selected one out of three factors and linked them to other components to assess learners' attitudes to CALL. The factors were also grouped and renamed based on the fundamental structure of attitude (Teo, 2006; Vandewaetere & Desmet, 2009). However, in Nagy and Habók (2018) and in the current study, the cognitive component of CALL attitude is broader than that of previous studies. It not only includes learners' knowledge of the integration of technology into the language learning process, but also their perception of materials or devices other than laptops in the modern classroom, such as tablets and smartphones. Although the six factors on the questionnaire were re-organized into the three classic elements, as noted above, the affective and cognitive components

are not clear-cut. This has also been explored in previous research (e.g., Ajzen, 2005), and these two dimensions of attitude were categorized into one component.

The values for the model fit indices show that the model fits with the data acceptably. The convergent and discriminant validity of the model was also demonstrated although the data analysis showed low AVE values on some sub-scales. The data were then subdivided into two groups based on the type of questionnaire, and these two types of data were used to test the fitness of the model and investigate the equivalence in the construct between the two versions of the instrument. Although the CFI value for the paper data is less than that of the online data and a little lower than the suggested value (CFI$_{paper}$ = 0.870), other values achieved an acceptable level. Additionally, measurement variance in the validity of two modes of administration was also tested, and the results showed that the paper and online instruments were equivalent in terms of the construct. Thus, the online and paper data fit with the six-factor model. Moreover, Rasch model analysis further confirmed the structural validity of the six-factor model of the adapted Vietnamese CALL questionnaire because all the items on the online and paper instruments fit well. At the item level, the paper version proved better than the online instrument because the deviance value of the former was less than that of the latter. Thus, the online and paper versions display no difference at the construct and item levels because the goodness of the construct level can complement the deficiency of the item level, and vice versa. The present study supported the hypotheses regarding the equivalence between online and paper questionnaires at both the construct and item levels.

On the whole, the adapted, six-factor Vietnamese questionnaire is reliable and valid in a Vietnamese EFL context. Hence, it can be used either online or in the traditional pen-and-paper format. This study provides evidence for the reliability and validity of both the online and traditional paper-and-pen versions of the instrument to assess EFL learners' attitudes to the integration of technology into language education. This may benefit CALL research in Vietnam, given the paucity of validated instruments to assess learners' attitude to CALL. Because the administration of the questionnaire in both modes attained satisfactory results, future research could adapt and use both versions of the instrument or use them interchangeably, especially in situations like the current pandemic period. Additionally, since the participants of the study are students in different years and from a variety of majors, the questionnaire could be used or adapted in multiple EFL contexts in Vietnam to assess language learner attitudes to technology in foreign language education. Understanding the attitudes of learners, teachers, and other stakeholders could support the successful incorporation of educational technology into the language classroom.

Nevertheless, it is suggested that further investigation should be conducted if the two modes of administration of the questionnaire are used in other EFL contexts. This study only collected data from undergraduate students at certain Vietnamese universities; hence, the results cannot be generalized to the whole country or to other developing countries. Because the structure of Vietnamese students' attitude to CALL consists of internal and external dimensions, future research can examine the intercorrelation between components and other constructs. Furthermore, future research may explore the construct of the questionnaire in another context or in the same context with more male students because female students were overrepresented in the current study. In addition, it is recommended that other researchers conduct studies that compare teachers' and students' attitudes in an EFL context because learning will not happen if their attitudes are not consistent (McGrail, 2005). Additionally, students' attitudes can change over time, so it is necessary to study language learners' attitudes to CALL at regular intervals (Aryadoust, Mehran, & Alizadeh, 2016) because of the shift from "low resource" to "high resource" settings and the significant growth of technologies. It has also been suggested that longitudinal studies can investigate the constancy of the model for the EFL context in Vietnam or other developing countries.

5.2 Sub-study 2. Digital literacy of EFL students: An empirical study in Vietnamese universities

5.2.1. Introduction

The enhancement of ICT has enriched all professions, including education. New digital trends have encouraged schools and educational systems to integrate ICT in teaching and learning. Indeed, there are many benefits to digital learning environments (Soroya & Ameen, 2020). Several previous studies have proved that integrating ICT in education not only benefits teachers in the classroom, but it has positive effects on students' learning (Arrosagaray et al., 2019; Bai et al., 2016). Additionally, many studies have examined factors affecting ICT integration among teachers and students (Aesaert et al., 2015; Drent & Meelissen, 2008). Among the factors under investigation, one of them relating to teachers and students is how their ICT competency affects their ICT integration in the teaching and learning process (Aslan & Zhu, 2016). To successfully integrate ICT in education, school administrators need to understand teachers' and students' ICT competency levels to deliver suitable policies and training courses to support education in schools.

In the Vietnamese context, the MOET has recognized the effects of digital technologies on education, particularly English teaching and learning. It has put a lot of effort into reforming education through the implementation of technology at all levels of education since technology can create huge changes in teaching and learning methods. Likewise, technology will affect education management, and integrating technology into schools will positively affect the quality of education and the development of the country (Peeraer et al., 2009). Despite this national emphasis on technology integration, some challenges affect the speed of integration in teaching and learning, including students' DL (Dashtestani & Hojatpanah, 2020). However, some previous studies reported that using ICT applications in English teaching and learning in Vietnam is limited (Peeraer & Van Petegem, 2011). Unfortunately, few studies focus on measuring student DL levels. Meanwhile, students' attitudes are fundamental aspects in the successful integration of new technology in education (Rogers, 2000) and DL is known to significantly affect the application of digital technologies in the EFL context (Alavi et al., 2016). Consequently, this study aims to examine student DL, and the research results should provide implications regarding the direction of ICT integration in English as a foreign language learning and instruction.

5.2.2 Research questions & hypotheses

This article aims to investigate the level of DL of Vietnamese university students who are non-English majors. The study's main objectives were addressed with the following specific guided questions:

(1) To what extent do students use digital tools when learning English?

(2) Is there any significant discrepancy between male and female university students concerning DL?

(3) Is there any significant difference between freshmen, sophomores, juniors, and seniors regarding DL?

Formulated from the aforementioned research questions, two hypotheses were derived:

RH1: There is a significant difference between males and females concerning DL (Alakpodia, 2014; Nguyen & Habók, 2022b).

RH2: There is a significant difference among year groups regarding DL (Lazonder et al., 2020).

5.2.3 Methods

5.2.3.1 Sample for the study

The study selected 1,661 Vietnamese university students (73.2% female and 26.8% male) from different public universities in Vietnam. The participants ranged in age from 18 to 22. Of the 1,661 university students who responded to the questionnaire, 7.7% were freshmen, 22.2% were sophomores, 15.5% were juniors, and 54.6% were seniors (Table 5.2.1). Participants come from different majors like Physics Education, Math Education, Business, and others.

Table 5.2.1 *Sample for the study*

	Females (N = 1217)		Males (N = 445)	
	Number (N)	Percentage (%)	Number (N)	Percentage (%)
Freshmen (N = 128)	101	78.9	27	21.1
Sophomores (N = 369)	277	75.1	92	24.9

Juniors (N = 258)	204	79.1	54	20.9
Seniors (N = 906)	634	70	272	30

5.2.3.2 Instrument development

The instrument was developed according to the theoretical background and the research issues regarding DL (Son et al., 2017; UNESCO, 2018) and attitudes toward using ICT tools in educational and EFL contexts (Habók & Nagy, 2017; Nagy & Habók, 2018). The questionnaire items were adapted, translated into Vietnamese, reviewed, revised, and edited by teachers and researchers several times. The instrument that was used in the research contained five main parts: background information, general digital knowledge test, technological skills, attitudes toward technology integration in English learning, and frequency of using digital tools in English learning. In the first section, background information, students were asked to answer questions regarding their gender, school year, English learning experience, digital technology use, and the availability of digital facilities at home and in school. The second part, the general digital knowledge test, asked multiple-choice questions to investigate data about students' digital knowledge. The third part, technological skills, includes 4-point Likert-scale questions with responses from "no level of competence" to "high level of competence" as well as "Yes/No questions" to elicit data about students' skills. In the last two sessions, 4-point Likert-scale questions with responses from "agree" to "disagree" as well as from "almost never" to "almost always" are used to explore students' attitudes toward using digital technologies and the frequency of using digital tools in English learning. Exploratory factor analysis indicated that the instrument had a suitable factorial structure to confirm the questionnaire's construct validity. The Kaiser-Meyer-Olkin measure of sampling adequacy was used for all sections except for the background information section (section 2 =0.96, section 3 = 0.93, section 4 = 0.89, section 5 = 0.95). Bartlett's test of sphericity was also used (p=0.00). Cronbach's Alpha coefficients rank from 0.87 to 0.95, implying a good level of reliability for the questionnaire fields (Taber, 2018).

5.2.3.3 Procedure

The survey was administered to students on paper, as well as Google forms, from mid-August to mid-October 2020. Students who volunteered to complete the questionnaire understood the study's

purpose before they filled in the form. In total, 767 answers were collected on paper, and 894 replies came from Google forms.

5.2.4 Data analysis

Data were analyzed using the Statistical Package for the Social Sciences version 22. The *t*-tests and one-way variance of analysis (ANOVA) were performed to explore the discrepancies in DL between males and females and among year groups of students.

5.2.5 Results

5.2.5.1 Students' digital familiarity and experiences in learning English
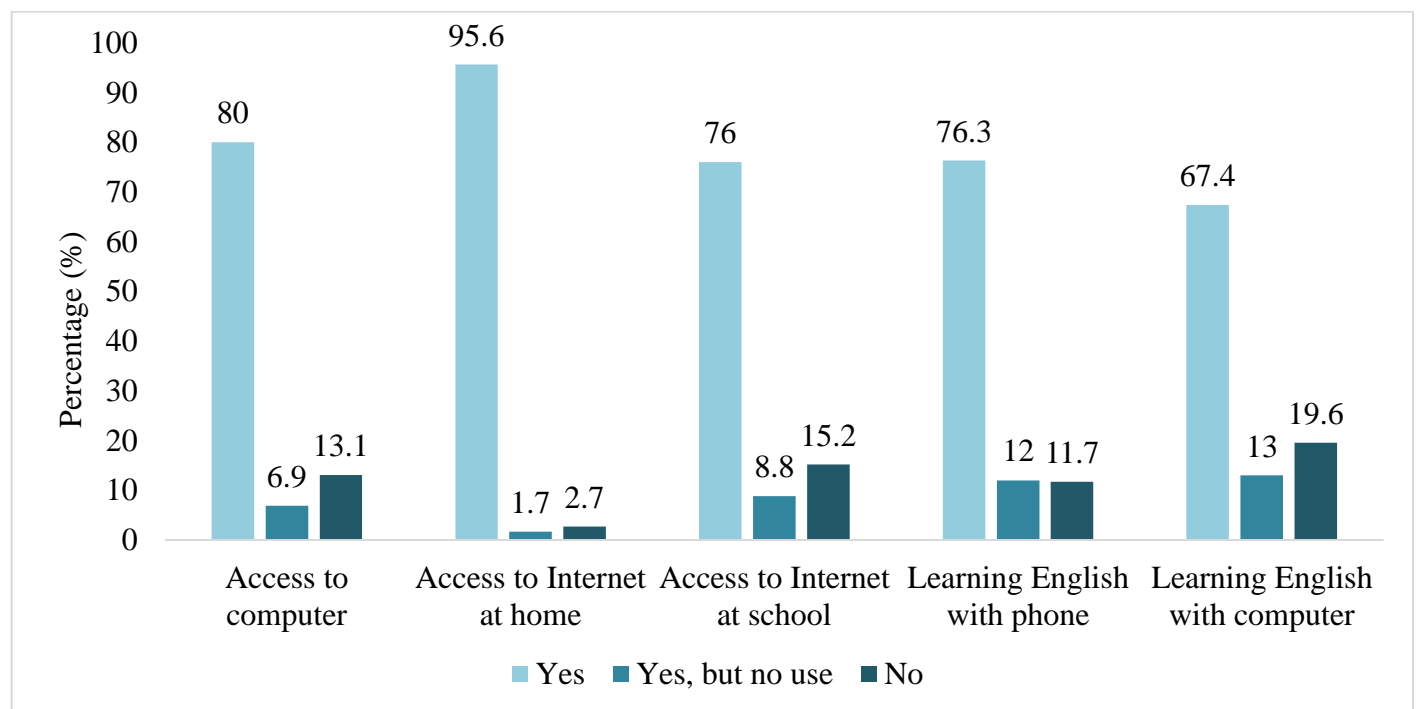
Figure 5.2.*1 Access to Internet and technological devices (%)*

We will take a closer look at the descriptions of the participants who volunteered to complete the questionnaire (Figure 5.2.1). Of the 1,661 respondents who were asked whether they have access to a computer at home, 1,331 (80%) stated that they own and use computers at home, while 6.9% do not use the computers at home. However, they can access a computer, and 217 (13.1%) cannot access a computer at home since they do not own personal computers. When asked if they were able to access the Internet at home, 1,588 (95.6%) participants replied that the Internet is available at their home, while 1.7% can access the Internet, but they do not use it, and 2.7% do not have the Internet available at their home. When asked whether they can connect to the Internet at school,

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1,263 (76%) out of 1,661 students reported that they do have an Internet connection while studying at school. The percentage is smaller than the percentage of students whose Internet is available at home (95.6%). A total of 146 (8.8%) students can connect to the Internet at school, but they do not use it, while 252 (15.2%) survey respondents have no Internet connection at school. A total of 76.3% of participants have used their phones to learn English, while 12% of students stated that they have English learning applications on their phone, but they do not use them. Further, 11.7% of respondents do not use phones to learn English. Compared to the percentage of participants learning English on their phone, the percentage of students utilizing computers to learn English is slightly smaller: 1,120 (67.4%). In total, 216 (13%) respondents learn English on the computer, while 325 (19.6%) students do not learn English on computers. In particular, it has been revealed that students are equipped with necessary supplies, which facilitate them in learning English with technology.
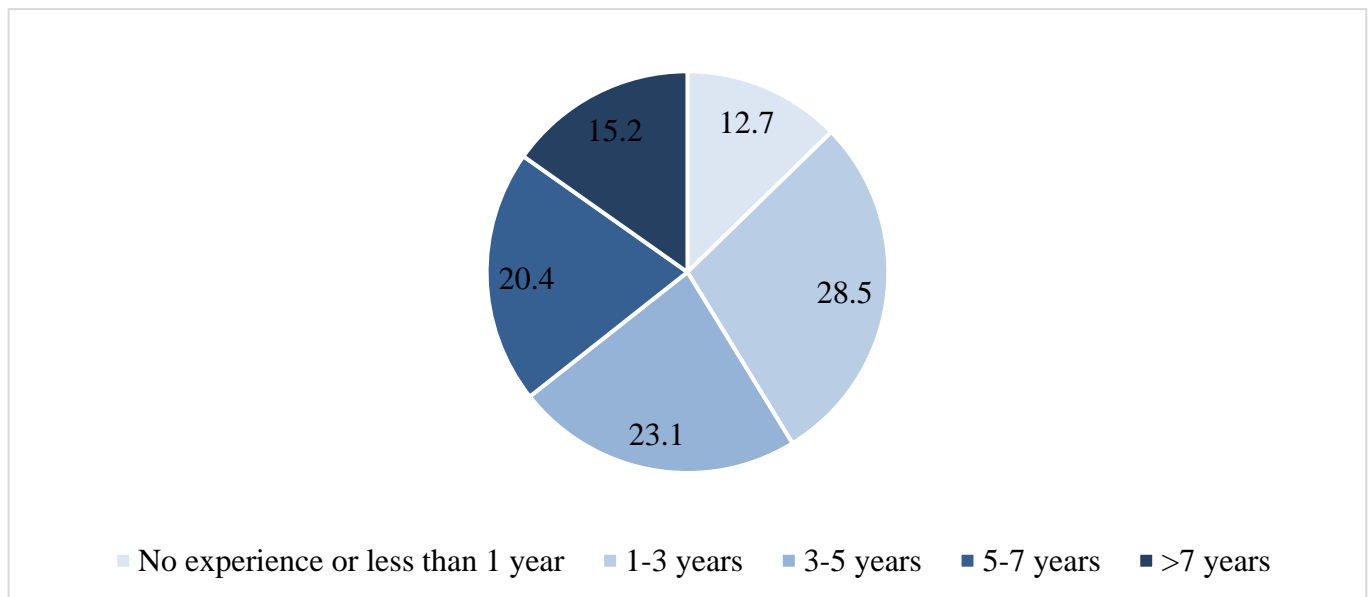
Figure 5.2.2 *Experience with computers (%)*

The informants were asked to indicate the computer experience they have had until now when filling in the questionnaire (Figure 5.2.2). A total of 211 (12.7%) students have no experience or less than one year of experience of using a computer. In comparison, 474 (28.5%) respondents have used a computer for one to three years, and 384 (23.1%) participants have three to five years' experience of using a computer. The number of students who started to use a computer five to seven years ago is 339 (20.4%) and 253 (15.2%) students have more than seven years' experience

of using computers. In general, almost all students have been accustomed to using computer in the learning process, and their experiences may have positive effects on their ICT integration in learning.
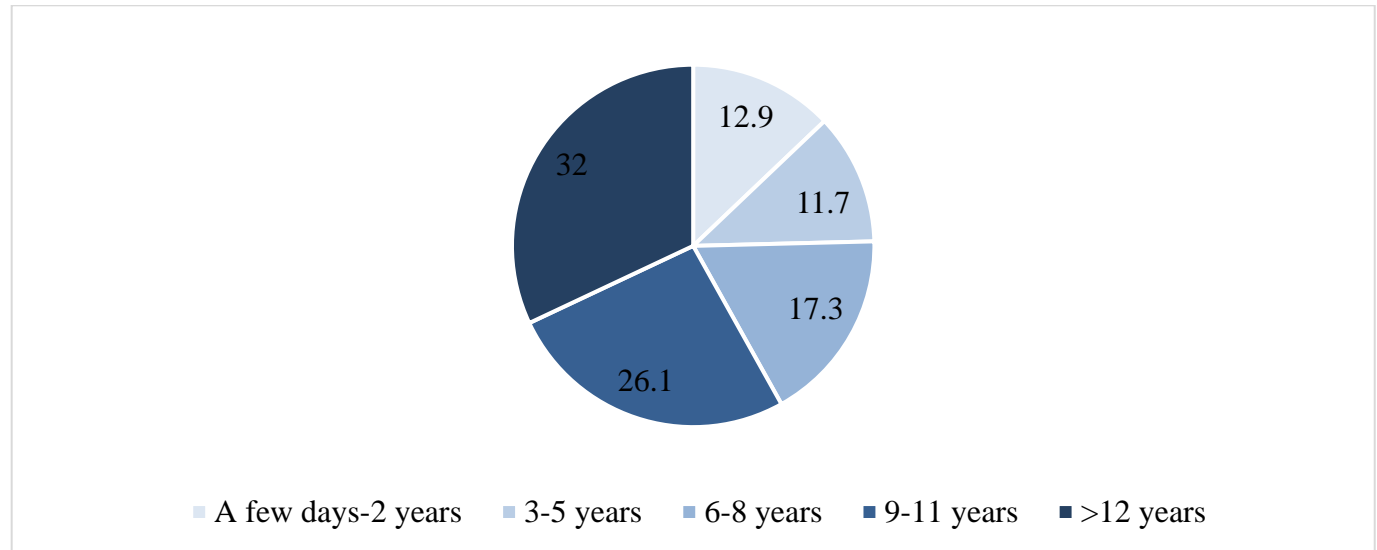
Figure 5.2.3 *Experience with English (%)*

The participants were also asked about their experience with English learning (Figure 5.2.3). While 215 (12.9%) students stated that they had learned English from a few days to two years, 194 (11.7%) students have three to five years of English learning experience. A total of 287 (17.3%) students have learned English for six to eight years; 434 (26.1%) students have learned English for nine to 11 years; 531 (32%) students have more than 12 years of English learning experience. The majority of the participants are reported to have considerable experience in language learning.

5.2.5.2 Gender differences in digital literacy

To address the second research question about the difference between male and female university students concerning DL, we used *t*-tests to compare their DL knowledge, technological skills, attitudes toward digital applications when learning English, and the frequency of digital tool usage in English learning.

The DL knowledge test results show that the females' mean is 0.80 (SD = 1.03) while that of their male peers is 0.82 (SD = 1.23), t = 2.64, and p = 0.01. This indicates a significant difference between males and females in terms of digital knowledge ($p < 0.05$), and that male students have a better knowledge of DL than female students.

Table 5.2.2 shows the findings of students' perceived assessment of technical skills in terms of mean and standard deviation. The mean range of 1-2.5 illustrates either no level or a low level, 2.6-3.5 indicates an average level, and 3.6-5 suggests a moderately high to a high level. In general, the average skills of male students (M_{male} = 3.47, SD = 0.65) are slightly higher than those of female students (M_{female} = 3.42, SD = 0.55). Male students see themselves as having higher skills as compared to the responses from the females. The findings show that male students have a higher level of skills than their female peers in typing skills, computer skills, and digital skills, while female participants' Internet skills are better than their male peers. Additionally, while there is no significant difference between males and females as regards levels of typing skills and Internet skills ($p > 0.05$), while computer skills and digital skills are significantly different between the two genders ($p < 0.05$). In terms of web search skills, both genders are at the same level (M = 3.63).

Table 5.2.2 *Male and females' self-assessment of technological skills*

Skills	Gender	Mean (M)	SD	t	p
Typing skills	Male	3.42	0.78	0.79	0.46
	Female	3.39	0.69		
Web search skills	Male	3.63	0.71	0.03	0.96
	Female	3.63	0.66		
Computer skills (the capability to use a computer)	Male	3.51	0.77	2.35	0.01
	Female	3.41	0.68		
Internet skills (the capability to use the Internet)	Male	3.73	0.77	−1.46	0.14
	Female	3.80	0.69		
Digital skills (the capability to use digital technologies)	Male	3.08	0.87	3.41	0.01
	Female	2.92	0.82		
Average	Male	3.47	0.65	1.34	0.15
	Female	3.42	0.55		

Table 5.2.3 shows the results of self-rating skills for using computer and Internet applications. In general, students have a low level or no level in terms of learning management systems, virtual worlds, web design, podcasts, wikis, and blog applications. Although students' levels are low, male students reported having better skills than females, except for blogs. About word processing applications, spreadsheets, databases, presentation, communication, file sharing sites, photo sharing

sites, and dictionaries, all students are at an average level. Female students' word processing, spreadsheets, presentations, and dictionary application skills are slightly higher than their male counterparts. However, males' skills are significantly better than their peers in terms of file sharing sites, photo sharing sites, and video sharing sites. Both genders are equal in terms of databases and communication applications. The respondents also reported that they have moderately high to high skill levels with social networking services and web search engines. Male students assess themselves as having higher skills than females; however, there is no significant difference between them ($p > 0.05$).

Table 5.2.3 *Male and females' self-ratings of skills for using computer and Internet applications*

Applications	Gender	Mean (M)	SD	t	p
Word processing	Male	3.31	0.78	−0.10	0.82
	Female	3.32	0.70		
Spreadsheets	Male	3.10	0.81	−0.22	0.79
	Female	3.11	0.72		
Databases	Male	3.47	0.86	−0.18	0.94
	Female	3.47	0.78		
Presentations	Male	3.18	0.82	−0.98	0.28
	Female	3.23	0.77		
Communication	Male	3.22	0.82	−0.19	0.94
	Female	3.22	0.80		
Learning management systems	Male	2.41	1.05	0.88	0.42
	Female	2.37	1.04		

Applications	Gender	Mean (M)	SD	t	p
Virtual worlds	Male	2.31	1.13		
				2.40	0.01
	Female	2.16	1.06		
Social networking services	Male	3.84	0.88		
				−1.07	0.35
	Female	3.88	0.84		
Blogs	Male	2.46	1.06		
				−0.42	0.92
	Female	2.46	1.08		
Wikis	Male	2.57	1.09		
				2.15	0.02
	Female	2.43	1.12		
Podcasts	Male	2.29	1.09		
				1.73	0.05
	Female	2.18	1.10		
File sharing sites	Male	3.33	0.92		
				2.78	0.00
	Female	3.18	0.91		
Photo sharing sites	Male	3.18	1.05		
				1.82	0.03
	Female	3.05	0.99		
Video sharing sites	Male	3.56	0.92		
				3.78	0.00
	Female	3.35	0.92		
Web design	Male	2.28	1.14		
				1.66	0.07
	Female	2.17	1.11		
Web search engines	Male	3.61	0.93	1.62	0.09

Applications	Gender	Mean (M)	SD	t	p
	Female	3.52	0.93		
Dictionaries	Male	3.15	0.99		
				−4.04	0.00
	Female	3.37	0.96		

The results of students' self-reported specific tasks show that students are able to deal with computing tasks well since the means for these abilities are highest (M_{male} = 0.96, SD = 0.23; M_{female} = 0.94, SD = 0.20; t = 2.06, and p = 0.17) while students' skills as regards web design are not good (M_{male} = 0.47, SD = 0.49; M_{female} = 0.50, SD = 0.50; t = −1.42, p = 0.23). In general, the results also indicate that males are better than females in terms of these specific tasks.

Differences between males and females regarding attitudes to the use of digital tools are examined concerning the eight factors identified in the previous study with internal factors and external factors (Nagy & Habók, 2018). As shown in Table 5.2.4, both male and female students have positive attitudes toward using digital technologies. However, girls' positive attitudes toward the use of digital tools are stronger than boys, and the differences are significant regarding Use of ICT tools (M_{male} = 3.07, SD = 0.53; M_{female} = 3.19, SD = 0.53; p < 0.01). Derived from the analysis of digital knowledge, digital skills, and attitudes towards ICT tools among males and females, the current study substantiates the initial hypothesis, asserting a significant difference in DL between males and their female counterparts.

Table 5.2.4 *Male and females' attitudes toward the use of technologies*

Attitude	Gender	Mean (M)	SD	t	p
Affective attitude	Male	3.21	0.45		
				−1.69	0.08
	Female	3.25	0.43		
Metacognitive strategies	Male	3.12	0.60		
				−2.19	0.02
	Female	3.20	0.60		

Attitude	Gender	Mean (M)	SD	t	p
Use of ICT tools	Male	3.07	0.53	−4.07	0.00
	Female	3.19	0.53		
ICT importance	Male	2.94	0.82	−1.19	0.23
	Female	2.99	0.85		
ICT facility and material limitation	Male	3.25	0.63	−1.61	0.10
	Female	3.31	0.63		
	Male	2.96	0.65		
Learning activities	Female	2.93	0.65	0.76	0.44
	Female	3.32	0.55		

The frequency of digital technology use between the two groups of students is revealed in the last section of the survey (Table 5.2.5). Students were asked to report their frequency of using technological tools for learning English, and the findings were described regarding the means. In general, students' frequency of using technologies in English learning is not high. The collected data show that students use social and media tools (e.g., Facebook, Skype, Hangouts, etc.), search engines and browsing, as well as translation tools (e.g., Google Translate, films with Vietnamese subtitles, etc.) more extensively than other types of tools. In contrast, students less frequently use podcasts, task-based tools (e.g., programming, simulations, etc.), or online learning (e.g., online courses, online learning with a native speaker, etc.). Although males tend to use digital tools more frequently than females, the difference between the two groups of students is not significant, except for the frequency of using task-based tools (M_{male} = 1.92, SD = 0.68; M_{female} = 1.82, SD = 0.70; p = 0.01) and online learning (M_{male} = 1.87, SD = 0.62; M_{female} = *1.80*, SD = 0.63; p = 0.05). This finding is interesting since females have more positive attitudes toward using digital technologies than males, while the latter use technologies more frequently.

Table 5.2.5 *Male and female frequency of use of digital tools*

Tools	Gender	M	SD	*t*	*p*
Social and media tools	Male	2.92	0.81	−1.88	0.40
	Female	2.96	0.78		
Task-based tools	Male	1.92	0.68	2.56	0.01
	Female	1.82	0.70		
Search engines and browsing	Male	3.02	0.88	1.07	0.43
	Female	2.96	0.88		
Podcasts	Male	1.72	0.86	1.34	0.20
	Female	1.66	0.83		
Dictionaries and lexicons	Male	2.52	0.67	−1.76	0.06
	Female	2.59	0.68		
Online learning	Male	1.87	0.62	1.96	0.05
	Female	1.80	0.63		
Editing and visual representation of information	Male	2.40	0.74	0.53	0.84
	Female	2.38	0.74		
Communication tools	Male	2.70	0.77	1.64	0.10
	Female	2.63	0.80		
Videos	Male	2.26	0.68	1.35	0.21
	Female	2.20	0.68		
Translation tools	Male	2.99	0.79	0.58	0.78
	Female	2.97	0.75		

5.2.5.3 Year group discrepancies in digital literacy

ANOVA analyzed the disparity among freshmen, sophomores, juniors, and seniors' knowledge of DL. It seems that seniors and sophomores have a better knowledge of technologies than freshmen and juniors, and seniors have the best knowledge of DL compared to other groups (Table 5.2.6). Furthermore, a *post hoc* test also revealed significant differences between freshmen and seniors and seniors and juniors ($p < 0.05$).

Table 5.2.6 *Year groups of students' digital literacy knowledge test*

	Groups	M	SD	Mean square	F	p
DL knowledge test	Freshmen	0.77	0.75			
	Sophomores	0.80	0.45	0.17	7.05	0.00
	Juniors	0.77	0.83			
	Seniors	0.82	1.25			

Table 5.2.7 shows the discrepancies among year groups of students regarding technological skills. In general terms, freshmen's perceived skills are the highest (M = 3.61, SD = 0.66), while seniors' skills are the lowest (M = 3.38, SD = 0.57) among year groups of students. A p*ost hoc* test indicated a significant difference between freshmen and seniors, sophomores and seniors, as well as juniors and seniors concerning typing skills and digital skills ($p < 0.05$). Simultaneously, there is no remarkable divergence among the three first groups ($p > 0.05$). In addition, web search skills, computer skills, and Internet skills among student groups are not significantly different.

Table 5.2.7 *Year groups of students' self-assessment of computing skills*

	Groups	M	SD	Mean square	F	p
Typing skills	Freshmen	3.65	0.72			
	Sophomores	3.47	0.74	3.79	7.45	0.00
	Juniors	3.48	0.69			
	Seniors	3.33	0.70			
Web search skills	Freshmen	3.78	0.74			
	Sophomores	3.70	0.73	1.33	2.92	0.03
	Juniors	3.61	0.68			
	Seniors	3.59	0.64			
Computer skills (the capability to use a computer)	Freshmen	3.57	0.70			
	Sophomores	3.47	0.74	1.57	3.15	0.02
	Juniors	3.52	0.70			
	Seniors	3.39	0.68			
Internet skills (the capability to use the Internet)	Freshmen	3.76	0.80			
	Sophomores	3.86	0.72	0.92	1.83	0.13
	Juniors	3.77	0.68			
	Seniors	3.76	0.70			

	Groups	M	SD	Mean square	F	*p*
Digital skills (the capability to use digital technologies)	Freshmen	3.31	0.84	11.25	16.27	0.00
	Sophomores	3.10	0.82			
	Juniors	3.15	0.78			
	Seniors	2.85	0.84			
Average	Freshmen	3.61	0.66	2.60	7.71	0.00
	Sophomores	3.51	0.60			
	Juniors	3.50	0.56			
	Seniors	3.38	0.57			

The results of the self-rating skills for using computer and Internet applications are also specified. In terms of word processing, spreadsheets, databases, communication, wikis, video sharing sites, and dictionary tools, the most proficient students are the freshmen, and the level gradually reduces with sophomores, juniors, and seniors. The order among year groups of students changes for presentation, learning management systems, virtual worlds, blogs, podcasts, photo sharing sites, and web design. While the freshmen are still the most skillful and seniors are the least proficient, the *post hoc* test showed that the juniors' levels are higher than those of sophomores, though the differences are not significant ($p>0.05$). Concerning the skills relating to using social networking services, file sharing sites, and web search engines, freshmen maintain the highest level. Seniors are more proficient than their junior peers or sophomore peers with social networking services, web search engines, and file sharing sites.

Students' self-reported tasks in different year groups indicated that freshmen could complete specific tasks well compared to other groups. Although the discrepancies among groups are not remarkable, freshmen are in the highest position (M = 0.80, SD = 0.21) and second highest is juniors (M = 0.75, SD = 0.21) while sophomores (M = 0.74, SD = 0.21) and seniors (M = 0.74, SD = 0.19) are in equal last position.

Students' attitudes toward the use of digital technologies are positive. The study results show that seniors express the most positive attitudes to technologies, followed by sophomores and juniors, then freshmen (Table 5.2.8). Seniors have the most positive attitudes toward affective attitude, ICT importance, ICT facility and material limitation, and the learning activities. Sophomores' attitudes are the most positive in terms of metacognitive strategies, affective attitude, use of ICT tools, and ICT importance. The finding is exciting since freshmen have the best skills

for using technologies. Their positive attitudes toward using digital tools are the lowest compared to other year groups of students. In examining digital knowledge, digital skills, and ICT attitudes across different student year groups, this study affirms another hypothesis, suggesting a notable difference among the various year groups in terms of their DL.

Table 5.2.8 *Year groups of students' attitudes toward the use of technologies*

Attitude	Groups	Mean	SD	Mean square	F	*p*
Affective attitude	Freshmen	3.11	0.48	0.77	4.04	0.00
	Sophomores	3.22	0.39			
	Juniors	3.20	0.40			
	Seniors	3.27	0.45			
Metacognitive strategies	Freshmen	3.13	0.69	0.66	1.80	0.14
	Sophomores	3.23	0.58			
	Juniors	3.20	0.58			
	Seniors	3.15	0.61			
Use of ICT tools in learning	Freshmen	3.10	0.60	0.56	0.19	0.89
	Sophomores	3.16	0.51			
	Juniors	3.15	0.54			
	Seniors	3.15	.532			
ICT Importance	Freshmen	3.12	0.64	1.91	5.97	0.00
	Sophomores	3.18	0.64			
	Juniors	3.22	0.57			
	Seniors	3.31	0.56			
ICT facility and material limitation	Freshmen	2.91	0.93	0.62	0.87	0.45
	Sophomores	3.01	0.87			
	Juniors	2.91	0.86			
	Seniors	2.99	0.81			
Learning activities	Freshmen	2.86	0.74	3.35	8.03	0.00
	Sophomores	3.05	0.64			
	Juniors	3.02	0.68			
	Seniors	2.88	0.62			

The study results also describe the differences between the groups of students regarding the frequency of using digital tools. Seniors tend to use social media tools, search engines and browsing, communication tools, editing and visual representation of information (e.g., photo editing, Excel, Prezi, text editing, and email), and translation tools more than other groups of students. In contrast, freshmen, sophomores, and juniors use task-based tools (e.g., programming, audio chat, simulations, video chat), podcasts, online learning, and videos in English learning more extensively than seniors.

5.2.6 Discussion and conclusion

The study aimed to measure EFL student DL, which is a subset of ICT competency, in Vietnamese universities. To achieve the aim, we used an adapted questionnaire to investigate students' knowledge, skills, and attitudes toward using digital technologies and the frequency of applying technologies in learning English. The study's findings show that most students can access computers and the Internet both at home and at school, and they are provided with enough facilities to apply technologies in learning. In addition, they seem to be familiar with using computers and phones to learn English. The results show that the applications of English education technologies are feasible and applicable in the Vietnamese context.

Generally, students have a good knowledge of DL and positive attitudes toward ICT usage in language learning. The results indicate that students are aware of the significance of technologies regarding their language learning and that digital tools have a positive effect on their studies. However, students' technological skills normally range from a low level to an average level, and they do not frequently apply technologies when learning English. The findings are in line with some previous empirical studies in different contexts (Dashtestani & Hojatpanah, 2020; Mabayoje et al., 2015). Those studies also explored a variety of factors affecting students' levels of DL, including the vague plans made by the Ministry of Education or the lack of facilities. In Vietnam, the education system has a long-term plan for integrating ICT in education; universities' facilities are improving to keep pace with the new policy. However, students' low to average levels of DL may have implications. They have limited opportunities to apply technologies in the classroom, and the curriculum primarily emphasizes acquiring knowledge. Additionally, levels of teachers' technological skills may also affect students' DL. This may be a potential reason for the current findings, which show that students' attitudes toward using technologies are positive, and their digital knowledge is higher than their skills.

Regarding gender differences in DL, the study substantiated the hypothesis that a significant difference exists between male and female students in terms of their digital knowledge and attitude towards ICT tools. However, the difference in their digital skills was found to be insignificant. In detail, male students exhibit superior knowledge and skills compared to their female peers. This result concurs with previous studies where the authors claimed that males' ICT skills are better than those of their female counterparts (e.g., Alakpodia, 2014; Calvani et al., 2012). Interestingly, due to having more positive attitudes toward the use of digital tools, female students do not use technologies as frequently as males when learning English. Some previous studies concluded that attitudes could predict the use of new technologies in educational settings and that a positive attitude toward technology usage is related to the greater use of ICT tools (Albirini, 2006; Potosky & Bobko, 2001). Nevertheless, the findings of the current study, compared to the results of these former studies, show that female students do not use technologies more frequently than males. At the same time, they have more positive attitudes toward ICT applications when learning English. Regarding the skill ratings for using computer and Internet applications, students are not highly competent when using learning management systems, virtual worlds, web design, podcasts, wikis, and blogs, but their levels for social networking services and web search engines range from moderately high to high. This finding is similar to earlier studies' results. The authors discovered that students do not apply a wide range of digital tools in their learning and do better when social networking or surfing the Internet. However, their knowledge and skills of using educational technologies are limited (e.g., Danner & Pessu, 2013; Shopova, 2014).

Concerning the variations among freshmen, sophomores, juniors, and seniors in DL, this study validated the hypothesis asserting a significant difference in DL among the four-year groups of students. Specifically, the study found that seniors and sophomores possess better DL knowledge than the two other year groups, with seniors achieving the highest results in DL tests compared to the other groups. While freshmen exhibit the highest perceived skills, seniors display the lowest skills among the year groups. However, seniors' attitudes toward using ICT tools are the most positive compared to other groups of students. In the literature, few studies have compared DL among different age cohorts. Those studies considered that students' skills get better as they get older, and grade level is one factor related to the development of DL (Kim et al., 2019; Lazonder et al., 2020). However, the results of this study are not in complete agreement with those previous studies. Teachers should be aware of the issues surrounding suitable learning facilities for teaching English. Moreover, earlier studies indicated that students' DL levels could increase through ICT

integration in teaching and learning (Ng, 2012). Therefore, improvements in ICT integration may have positive effects on students' levels of DL.

The current study has some limitations which should be acknowledged when interpreting the results. The research covers a wide range of students from different majors in the field of language learning. To draw more specific conclusions, future researchers should focus on students in one specific field. Additionally, the study samples were collected from universities in big cities in Vietnam; hence, the study results cannot be generalized to all educational contexts. Furthermore, with regard to the participants' digital skills, because most questionnaire items required them to self-assess their skills, students may have accurately assessed their digital skills, or the gap between their perceived and actual skills may be trivial (Aesaert et al., 2017), or there may be some discrepancy between students' self-rated skills and their actual skills (Gross & Latham, 2012). Future studies can investigate students' actual skills from practical digital tasks or compare their perceived and actual skills of using technology in the EFL context.

5.3 Sub-study 3. Digital literacy of English majors: Subjective versus objective assessment

5.3.1 Introduction

Digital technologies, especially computers, were introduced as educational devices that have exerted positive effects on teaching and learning since the 1980s. Especially, in recent years, school stakeholders reformulated education systems and curricula with the integration of didactic technologies to cope with the globalization of technology innovation. Along with many educational systems worldwide, Vietnam was also affected by the global digital trend. A report by the international labour organization indicated that Vietnam is the nation in ASEAN that is most affected by digital transformation (Chang & Huynh, 2016). Consequently, the digitalized context introduces a great challenge for higher education in Vietnam in terms of training human resources. Recently, the Prime Minister of Vietnam approved the National Digital Transformation Program through 2025 and the 2030 strategic vision (Vietnamese Government, 2020). Afterward, the Ministry of Education and Training (MOET) expressed awareness of the significance of technology in all levels of education, especially in higher education. Hence, multiple policies were issued to provide educational institutions across the country with digital technologies and facilitate school stakeholders in integrating didactic technologies into teaching and learning. This initiative included English language education, which is considered one of the most important foreign languages that facilitate Vietnamese students in approaching globalized knowledge and support them in their future professions. Similar to other educational subjects, didactic technologies were approved to be supportive of the language skills and vocabulary knowledge (Golonka et al., 2014) of EFL learners. However, understanding the level of DL of students is essential for school stakeholders to enable them to effectively and appropriately implement digital technologies in education and identify the deficiencies and qualify the DL level of students through appropriate training (Zhang & Zhu, 2016; Nguyen & Habók, 2022b). Therefore, scholars recommend that DL should be considered in language educational systems to address problems in a learning environment rich in digital technology (Scherer & Siddiq, 2019). However, thus far, studies that focus on measuring the DL of students in technology application to language education in the educational context in Vietnam are few. One of the reasons may be the lack of reliable and valid instruments for evaluating DL among students in a specific context such as English language education. Thus, the question emerges about whether Vietnamese students are digitally competent to learn in such a language learning environment. To address these concerns, the current study is conducted with the objective of

exploring whether or not English majored students at universities are digitally competent in the context of EFL education. In this study, the authors aim to use both assessments - a self-assessment questionnaire (subjective assessment) and a multiple-choice test of DL-related knowledge (objective assessment) - to measure students' DL and reveal the gap between these instruments. In addition, the study tests the reliability and validity of the self-developed questionnaire prior to using them to measure DL in students. Moreover, the study elucidates the relationships between the two types of DL assessment.

5.3.2 Methodology

We conducted a cross-sectional study to evaluate the DL levels of English majors at Vietnamese universities. Prior to the study, the Ethics Committee of the Doctoral School of Education at the University of Szeged reviewed and approved the research. The authors ensured the respondents of the anonymity of their information. The study aims to find the answers to the following research questions:

RQ1. Are the author-developed instruments in the current study reliable and valid for the DL assessment of EFL students?

RQ2. What is level of DL of English majors based on subjective and objective assessments?

RQ3. Is the perceived DL of students consistent with their result; does a relationship exist between the subjective and objective assessments of students?

Two research hypotheses were derived from the aforementioned research questions as follows:

RH1: The author-developed instruments in the current study are reliable and valid for assessing the DL of EFL students (van Deursen et al., 2014, 2015).

RH2: The perceived DL of students aligns with their performance in the DL test; there is a positive relationship between subjective and objective assessments of students (Aesaert et al., 2017).

5.3.2.1 Development of the instruments and data collection process

The questionnaire, applied to EFL education, was developed based on the content of the DigComp framework (Carretero et al., 2017) and the Vietnamese Digital Framework (Do et al., 2021). The questionnaire includes two main sections, except for the demographic section, which explores the personal information of students (e.g., gender, year group, experience of using technology for English learning, and level of English proficiency). The first section (self-assessment questionnaire) includes 23 items rated using a four-point Likert scale (1 = *disagree*; 2 = partially disagree; 3 = partially agree; 4 = agree; Figure 5.3.1). The items are designed for English majors to

self-evaluate their DL across four proposed components: digital task response and content creation, collaboration, interaction, and communication, learning safety protection, and digital self-learning and updating. For example, *I am able to use some programming software to create the digital content for English learning (e.g., Scratch).* This example belongs to the 'digital task response and content creation' component, reflecting students' self-evaluation of their ability to create digital content for language learning using programming software. The second section (DL knowledge test) presents 28 multiple-choice items aiming to evaluate the DL knowledge among students. The content of items in this part is based on the four proposed components of DL for English majors, which are the same as those in the subjective assessment section. Accordingly, the content is correlated with the self-assessment of DL. For example, 'On Scratch, when designing an English story, which command block allows you to hide or show the character? A. Motion B. Looks C. Sound D. Events E. I don't know' (see Figure 5.3.2). Similarly, this example belongs to the 'digital task response and content creation' component, reflecting students' knowledge in using programming software to create digital content for language learning. Two researchers designed the questionnaire, and experts in the field of technology integration in language learning reviewed and revised it. The assessment tool was then translated into Vietnamese and back-translated to English to ensure transparency of content. The Electronic Diagnostic Assessment System (eDia) was used for data collection, created by the Center for Research on Learning and Instruction of the University of Szeged (Csapó & Molnár, 2019). The online questionnaire was sent to English majors at the selected universities in Vietnam.
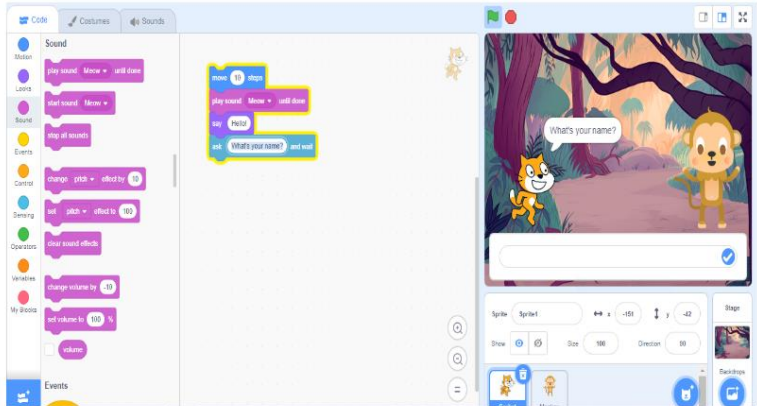
Figure 5.3.1 *Examples of the self-assessment items*

Figure 5.3.2 *An example of a test item*
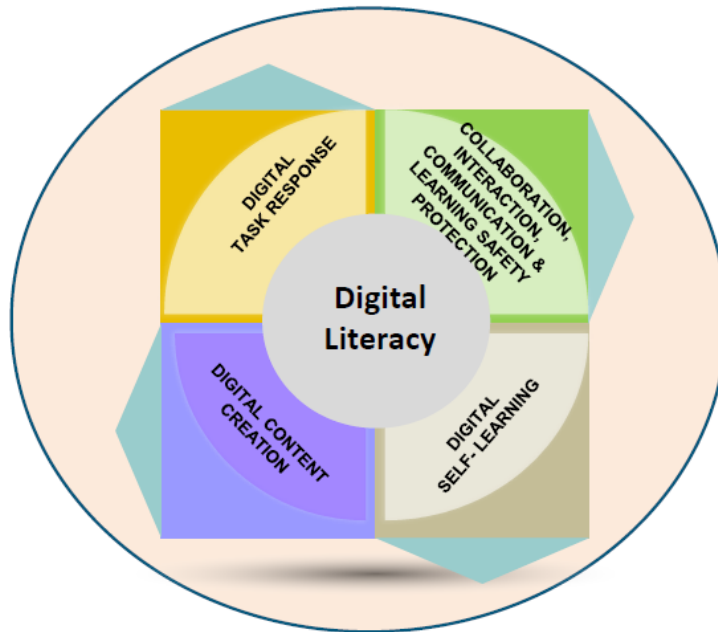
Figure 5.3.3 *Factors of digital literacy instruments*

5.3.2.2 Participants

The sample was composed of 511 undergraduate students (male: 265 [52%], female: 246 [48%]) majoring in the English language in the selected universities in Vietnam. Freshmen, sophomores, juniors, and seniors comprised 25.1%, 24.3%, 24.3%, and 26.3% of the sample, respectively. In terms of experience in technology use for English learning, 28.8% and 34.5% of students learned English for less than one year and one to three years, respectively. The difference between the two groups of students who spent from three to five years and more than 5 years on English learning with technologies was not significant, with percentages of 18.8% and 17.8%, respectively. The level of proficiency in English was determined using the Common European Framework of Reference for Language Assessment. The results indicated that students at the intermediate and upper intermediate levels accounted for 48.4% and 25.3% of the sample, and students at the elementary and advanced levels reached 22.9% and 2.9%, respectively.

5.3.3. Data analysis and results

To address the research questions, the study employed SPSS for descriptive statistics, Mplus for structural equation modeling, and ACER ConQuest for item response theory analysis during the data analysis phase.

5.3.3.1 RQ1. Are the author-developed instruments in the current study reliable and valid for the DL assessment of EFL students?

Regarding content validity, six experts in the field of English teaching and learning with technology checked the content of the instrument to test the content validity index (CVI) of all items. The experts were requested to rate all items based on relevance using a four-point Likert-type scale (1 = *not relevant,* 2 = *relevant but need some revision,* 3 = *relevant but need some minor revision,* 4 = *very relevant*). CVI was then calculated on the basis of the percentage of experts who scored the items. Previous scholars advise that the CVI of new instruments should reach a minimum of .80 after evaluation from at least six experts (Polit et al., 2007). In the current study, this value is 0.92 for the Likert scale items and 0.90 for the multiple-choice items. Table 5.3.1 provides detailed results.

Regarding the reliability and construct validity of the instruments, descriptive statistics were used for item analysis to ensure the appropriateness of individual items. The results indicated that the means of individual items did not reach extreme values. Specifically, the means of all items in the first part rank from 2.81 to 3.51 with standard deviations (SD) ranging from 0.77 to 1.02, and the means of the 28 items in the second part ranges from 0.17 to 0.80 with SD ranging from 0.29 to 0.50. Hair et al. (2017) suggested that skewness ranges from −2 to +2 and kurtosis between −7 and +7 are acceptable values to prove that the data are normal. The result demonstrates that the data are normal with skewness and kurtosis within the suggested ranges. Table 5.3.1 presents the detailed results. The 23 items in the first part were validated using exploratory (EFA) and confirmatory factor analyses (CFA), and the 28 items in the second part were validated using multidimensional Rasch measurement.

Table 5.3.1 *Distributional properties and CVI results of items*

Item	Min	Max	Mean	SD	Skewness	Kurtosis	I-CVI	Item	Min	Max	Mean	SD	Skewness	Kurtosis	I-CVI
I1	1	4	3.39	0.79	−1.38	1.58	1	Q6	0	1	0.56	0.50	−0.24	−1.95	1
I2	1	4	3.25	0.90	−1.11	0.44	1	Q7	0	1	0.34	0.47	0.69	−1.53	1
I3	1	4	3.22	0.89	−1.03	0.28	0.83	Q8	0	1	0.55	0.50	−0.20	−1.97	1
I4	1	4	3.14	0.95	−0.92	−0.08	1	Q9	0	1	0.88	0.33	−2.30	3.30	1
I5	1	4	3.38	0.79	−1.31	1.38	0.83	Q10	0	1	0.17	0.38	1.74	1.04	1
I6	1	4	3.31	0.86	−1.14	0.50	0.83	Q11	0	1	0.34	0.47	0.70	−1.52	1
I7	1	4	3.41	0.82	−1.38	1.20	1	Q12	0	1	0.30	0.46	0.88	−1.23	1

I8	1	4	3.49	0.79	−1.64	2.20	0.83	Q13	0	1	0.29	0.46	0.90	−1.19	0.83
I9	1	4	3.15	0.99	−0.95	−0.21	1	Q14	0	1	0.56	0.50	−0.24	−1.95	0.83
I10	1	4	3.04	1.02	−0.75	−0.60	0.83	Q15	0	1	0.49	0.50	0.06	−2.00	1
I11	1	4	2.81	1.08	−0.44	−1.10	1	Q16	0	1	0.42	0.49	0.32	−1.90	0.83
I12	1	4	3.27	0.92	−1.17	0.43	0.83	Q17	0	1	0.39	0.49	0.46	−1.80	0.83
I13	1	4	3.48	0.77	−1.50	1.76	0.83	Q18	0	1	0.48	0.50	0.10	−2.00	0.83
I14	1	4	3.38	0.78	−1.19	1.00	0.83	Q19	0	1	0.38	0.49	0.48	−1.78	0.83
I15	1	4	3.45	0.77	−1.41	1.47	1	Q20	0	1	0.80	0.40	−1.51	0.28	1
I16	1	4	3.36	0.81	−1.27	1.16	1	Q21	0	1	0.31	0.46	0.84	−1.30	1
I17	1	4	3.33	0.82	−1.15	0.77	0.83	Q22	0	1	0.79	0.41	−1.40	−0.03	1
I18	1	4	3.17	0.90	−0.88	−0.08	1	Q23	0	1	0.10	0.30	2.72	5.40	0.83
I19	1	4	3.51	0.74	−1.51	1.76	1	Q24	0	1	0.36	0.48	0.57	−1.68	1
I20	1	4	3.37	0.83	−1.25	0.86	1	Q25	0	1	0.74	0.44	−1.11	−0.78	0.83
I21	1	4	3.22	0.85	−0.89	0.05	0.83	Q26	0	1	0.33	0.47	0.74	−1.47	0.83
I22	1	4	3.19	0.88	−0.81	−0.26	1	Q27	0	1	0.58	0.49	−0.31	−1.91	0.83
I23	1	4	3.29	0.85	−1.02	0.23	1	Q28	0	1	0.56	0.50	−0.24	−1.95	0.83
Q1	0	1	0.29	0.45	0.94	−1.13	0.83								
Q2	0	1	0.21	0.41	1.44	0.07	0.83								
Q3	0	1	0.54	0.50	−0.17	−1.98	0.83								
Q4	0	1	0.61	0.49	−0.47	−1.79	0.83								
Q5	0	1	0.52	0.50	−0.06	−2.00	0.83								

Exploratory factor analysis

The sample was randomly divided into two groups. The first half (n = 255) was used for EFA to determine the structure of the items in relation to DL. In particular, the principal component method with varimax rotation was used to investigate the structure of the items for perceived DL. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy, which is used to test common variance, is 0.92. Moreover, we calculated Bartlett's test of sphericity to examine the homogeneity of variance in the data, which reached a value of 3349.03 and is statistically significant ($p < 0.01$). The results of KMO and Bartlett's test demonstrate that the data are appropriate for factor analysis (Hair et al., 2017). In the rotated component matrix, the study extracted four factors with eigenvalues greater than one, which effectively explained 68.35% of total variance. Thus, the study used the 23 items due to adequate factor loadings (Field, 2009). The names of the four proposed components were adjusted to match the grouping of items, namely digital task response (five items), collaboration, interaction, communication & learning safety protection (nine items), digital content creation (six items), and digital self-learning and updating (three items). The factors of the DL instrument for English majors were described in figure 5.3.3. Eigenvalues and explained percentages of the total variance of the four factors are 11.07/48.15%, 2.00/8.69%, 1.34/5.86%, and

1.29/5.63%, respectively. The reliability coefficient using Cronbach's alpha (α) was calculated to test the internal consistency of the questionnaire. The 23 items achieved a high reliability of 0.95; the Cronbach's α values of each factor are also acceptable at 0.91, 0.92, 0.88, and 0.90, respectively.

Confirmatory factor analysis

After exploring the structure of the questionnaire, the study performed CFA on the second half of the sample (n = 256) to test the factorial validity of the four-factor model, which was explored using the first half. Kline (2011) suggested that the minimum goodness-of-fit of a model should be confirmed using chi-square (χ^2) value, comparative fit index (CFI), standardized root mean square residual (SRMR), and root mean square error of approximation (RMSEA). The initial CFA model with four components indicates acceptable fitness (χ^2/df = 3.05, CFI = 0.90, RMSEA = 0.08, SRMR = 0.06). After revising the model by addressing the constraints of independence between three pairs of errors (item 3 and 2, 10 and 11, and 7 and 8), the results depicted a more adequate model fitness to the data (χ^2/df = 2.78, CFI = 0.92, RMSEA = 0.07, SRMR = 0.05). The model exhibited a few average variance extracted (AVE) values for factors <0.50; however, the composite reliability (CR) values for all factors were >0.60; therefore, the study confirmed the convergence validity of the model (Fornell & Larcker, 1981; Table 5.3.2).

Table 5.3.2 *Internal consistency, reliability, AVE, and CR*

Factors	Cronbach's α (>0.60)*	(AVE) (>0.50)*	(CR) (>0.60)*
1. Digital task response	0.91	0.36	0.74
2. Communication, interaction, collaboration, and learning safety protection	0.92	0.39	0.84
3. Digital content creation	0.88	0.50	0.85
4. Digital self-learning	0.90	0.69	0.87
Total	0.95	0.45	0.70

Rasch measurement

For the DL test items, the study conducted the multidimensional Rasch model analysis to test the validity of all test items in the model with four components similar to the first part of the

questionnaire (digital task response: seven items; collaboration, interaction, communication & learning safety protection: eight items; digital content creation: nine items, and digital self-learning and updating: 4 items). Previous scholars suggested that infit and outfit MNSQ values ranging from 0.5 to 1.5 are acceptable (Linacre 2010, Table 5.3.3). Rasch analysis was conducted on the ACER ConQuest (Adams & August, 2010). The result indicated that the reliability coefficient of all test items is Cronbach's $\alpha = 0.75$, and the values for the four components are 0.71, 0.70. 0.70, and 0.64, respectively with a skewness value of −0.47, and kurtosis at −0.12. Rasch analysis indicated a good weighted fit result for the test items, with the infit and outfit ranging from 0.77 to 1.23. However, we omitted three test items for further analysis, because they reached a discrimination value of less than 0.2 (Q1, Q23, and Q26; Table 5.3.3). Moreover, the Rasch measurement suggested that the DL test is appropriate for the level of the sample. Among the 25 remaining test items, Q10 and Q2 were the most difficult for the English majors, whereas Q9 and Q20 were the easiest. The results of the Rasch measurement also demonstrate that the DL test is appropriate for the students' level (Figure 5.3.4). Drawing from the outcomes of EFA, CFA, and Rasch analysis, it can be inferred that the hypothesis regarding the reliability and validity of both subjective and objective instruments has been substantiated in assessing the DL of English majors.

Table 5.3.3 *Result of Rasch analysis*

	Estimate	MNSQ	Infit MNSQ	Outfit MNSQ	Discrimination	Remain
Q1	0.68	1.04	0.91	1.09	0.18	no
Q2	1.14	1.03	0.88	1.12	0.20	yes
Q3	–0.48	0.94	0.95	1.05	0.46	yes
Q4	–0.81	0.96	0.94	1.06	0.45	yes
Q5	–0.37	0.95	0.95	1.05	0.46	yes
Q6	–0.57	1.05	0.94	1.06	0.30	yes
Q7	0.43	1.03	0.93	1.07	0.24	yes
Q8	–0.49	1.09	0.93	1.07	0.37	yes
Q9	–2.58	0.94	0.80	1.20	0.47	yes
Q10	1.58	1.11	0.85	1.15	0.27	yes
Q11	0.56	0.92	0.92	1.08	0.49	yes

|					
Q12	0.75	0.88	0.91	1.09	0.46	yes
Q13	0.78	1.10	0.91	1.09	0.26	yes
Q14	–0.54	0.95	0.93	1.07	0.47	yes
Q15	–0.18	1.03	0.93	1.07	0.39	yes
Q16	0.12	0.94	0.93	1.07	0.49	yes
Q17	0.25	1.08	0.93	1.07	0.21	yes
Q18	–0.15	1.02	0.94	1.06	0.37	yes
Q19	0.27	0.96	0.93	1.07	0.46	yes
Q20	–1.86	0.88	0.86	1.14	0.54	yes
Q21	0.66	0.98	0.92	1.08	0.40	yes
Q22	–1.76	0.89	0.87	1.12	0.51	yes
Q23	2.19	1.12	0.77	1.23	–0.10	no
Q24	0.38	0.97	0.92	1.08	0.31	yes
Q25	–0.97	0.91	0.89	1.11	0.50	yes
Q26	1.08	1.15	0.92	1.08	0.19	no
Q27	–0.10	0.96	0.93	1.07	0.36	yes
Q28	–0.01	1.01	0.93	1.07	0.42	yes
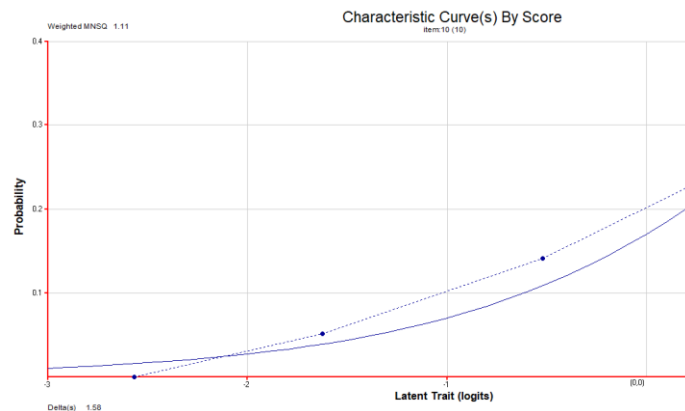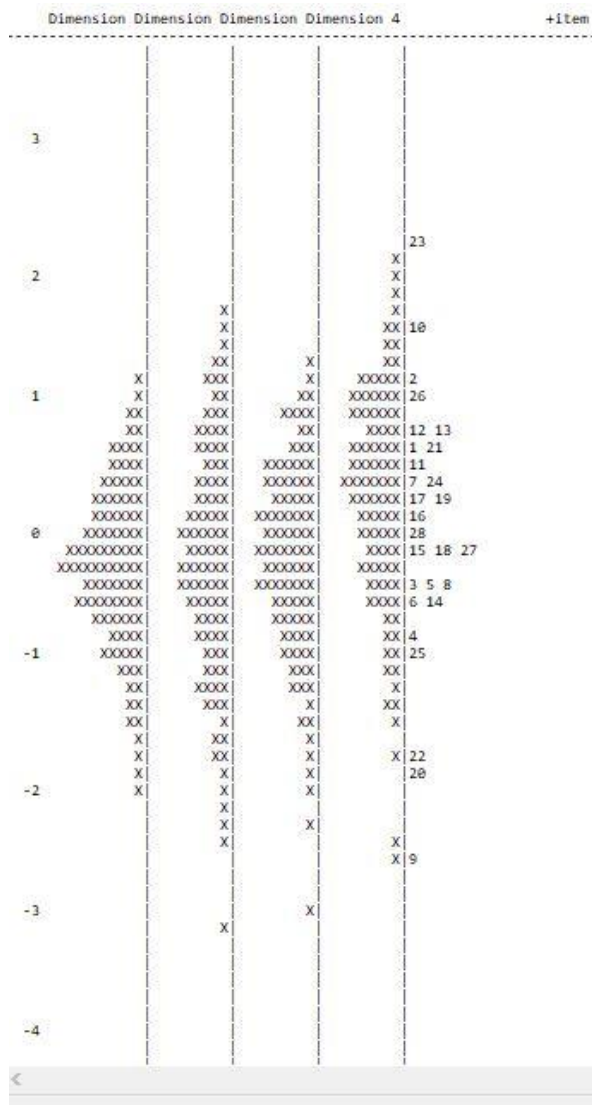
Figure 5.3.4 *The person–item map indicates person ability levels and item difficulty on the same scale. An example of the characteristic curve is provided according to the score of an item.*

Note: Each "X" represents 5.2 cases

5.3.3.2 RQ2. What is level of DL of English majors based on subjective and objective assessments?

In the case of the assessment of perceived DL in English learning, the students reported that they possess a good level of DL in general (M = 3.28; SD = 0.63). The undergraduates assessed that they achieved the highest level of competence in digital task response compared with other competences (M = 3.40, SD = 0.68) and the lowest level for digital content creation (M = 3.10, SD = 0.79). In addition, English learners evaluated their competence in using technology to

communicate, interact, collaborate, or ensure online learning safety higher than that in digital self-learning and updating (M = 3.37, SD = 0.65; M = 3.24; SD = 0.79, respectively). Moreover, the study investigated gender differences in perceived DL, and the results suggest that no significant difference exists between male and female students in terms of the level of DL ($p > 0.01$). Although no significant difference exists in the DL levels between genders, discrepancy among students across year groups is convincing. In general, junior and senior students tend to evaluate their level of DL higher than those of freshmen and sophomores. Although the juniors rated their level of DL as the highest (M = 3.58, SD = 0.54), the first-year students self-assessed the lowest level compared with the three other groups (M = 2.97, SD = 0.70). Compared to the self-assessed DL level of the sophomore students (M = 3.21, SD = 0.67), the perceived DL of the fourth-year students is higher (M = 3.38, SD = 0.48). Post-hoc one-way ANOVA indicates a significant difference in perceived DL between freshmen and junior, between freshmen and senior, between sophomore and junior, and between sophomore and senior students (mean square = 4.73, F = 12.57, $p < 0.01$). Table 5.3.5 provides the detailed results.

Table 5.3.4 *Results of ANOVA on self-assessed digital literacy of the participants*

Component	Group	Mean	SD	Mean square	F	*p*
Digital task response	1st year	3.10	0.84	3.83	8.17	0.00
	2nd year	3.34	0.72			
	3rd year	3.61	0.60			
	4th year	3.52	0.50			
	Total	3.40	0.68			
Communication, interaction, collaboration, & learning safety protection	1st year	3.22	0.77	2.73	6.66	0.00
	2nd year	3.29	0.70			
	3rd year	3.63	0.49			
	4th year	3.44	0.51			
	Total	3.37	0.65			
Digital content creation	1st year	2.58	0.95	12.02	21.42	0.00
	2nd year	3.00	0.81			
	3rd year	3.53	0.59			
	4th year	3.30	0.59			

Component	Group	Mean	SD	Mean square	F	p
	Total	3.10	0.79			
Digital self-leaning and updating	1st year	2.98	0.91			
	2nd year	3.21	0.81			
	3rd year	3.54	0.65	3.43	5.61	0.01
	4th year	3.25	0.73			
	Total	3.24	0.79			
Perceived DL	1st year	2.97	0.70			
	2nd year	3.21	0.67			
	3rd year	3.58	0.54	4.73	12.57	0.00
	4th year	3.38	0.48			
	Total	3.28	0.63			

The results of the DL test demonstrate that English majors achieved moderate levels of DL (M = 0.48, SD = 0.17). Their highest and lowest levels of achievement were attained for digital task response and digital content creation, respectively (M = 0.50, SD = 0.25; M = 0.40, SD = 0.27). In addition, their competencies in digital communication, interaction, and learning safety protection are higher than that in digital self-learning and updating (M = 0.48, SD = 0.21; M = 0.40, SD = 0.20, respectively). In the case of gender differences, the result of the DL achievement test is in line with that of perceived DL. In other words, the study found no significant discrepancy between genders in terms of achievement. The result was also compared among the four-year groups of students. Post-hoc ANOVA indicated that the discrepancy in the test results for DL achievement between year groups is significant. In detail, a significant difference was noted between freshmen and senior students as well as between sophomore and senior students ($p < 0.01$). The result also suggested that senior and junior students achieved the highest levels of DL (M = 0.50, SD = 0.17; M = 0.49, SD = 0.16, respectively), while the freshmen and sophomore students achieved lower levels (M = 0.47, SD = 0.17; M = 0.48, SD = 0.18, respectively).

Table 5.3.5 *Results of ANOVA for the digital literacy test of the participants*

Component	Group	Mean	SD	Mean square	F	p
Digital task response	1st year	0.44	0.23	0.22	3.35	0.00
	2nd year	0.50	0.26			

	3rd year	0.54	0.23			
	4th year	0.49	0.28			
	Total	0.49	0.25			
Communication, interaction, collaboration, & learning safety protection	1st year	0.48	0.21			
	2nd year	0.47	0.20			
	3rd year	0.49	0.21	0.08	0.17	0.01
	4th year	0.48	0.21			
	Total	0.48	0.21			
Digital content creation	1st year	0.43	0.21			
	2nd year	0.39	0.21			
	3rd year	0.35	0.18	0.15	3.70	0.01
	4th year	0.42	0.19			
	Total	0.40	0.20			
Digital self-leaning and updating	1st year	0.53	0.26			
	2nd year	0.54	0.28			
	3rd year	0.56	0.25	0.02	0.31	0.01
	4th year	0.55	0.28			
	Total	0.55	0.27			
DL test achievement	1st year	0.47	0.17			
	2nd year	0.48	0.18			
	3rd year	0.49	0.16	0.07	0.22	0.00
	4th year	0.50	0.17			
	Total	0.48	0.17			

5.3.3.3 RQ3. Is the perceived DL of students consistent with their result; does a relationship exist between the subjective and objective assessments of students?

The results of the self-assessment questionnaire and test achievement were then standardized to compare the mean differences between two results using the same scale. Afterward, the study analyzed the t-test between perceived DL and the test results. The study noted no significant difference in the standardized data between the two types of assessment ($p > 0.01$; Table 5.3.6).

However, the mean of subjective assessment was found to be higher than that of objective assessment.

Table 5.3.6 *Paired sample tests between components of self-assessment questionnaire and test*

	Mean difference	SD	SE	t	df	*p*
Z-score (DTR1) – Z-score (DTR2)	0.005	1.312	0.058	0.089	498	0.929
Z-score (CICS1) – Z-score (CICS2)	0.009	1.445	0.064	0.146	497	0.884
Z-score (DCC1) – Z-score (DCC2)	0.007	1.421	0.063	0.110	497	0.912
Z-score (DSL1) – Z-score (DSL2)	0.005	1.351	0.060	0.095	490	0.924

Note:
- *Self-assessment questionnaire (DTR1 - Digital Task Response; CICS1 - Communication, Interaction, Collaboration, & Learning Safety Protection; DCC1 - Digital Content Creation; DSL1 - Digital Self-Learning and Updating)*
- *Test (DTR2 - Digital Task Response; CICS2 - Communication, Interaction, Collaboration, & Learning Safety Protection; DCC2 - Digital Content Creation; DSL2 - Digital Self-Learning and Updating)*

We also assessed the standardized results of the four components between the two evaluation types and found that the participants overestimated their DL in the four aspects with their results in the DL achievement test. However, the gap between subjective and objective is non-significant. Moreover, we performed structural equation modeling to verify the causal relationship between appraisal and objective assessments. The model of the measurement suggested an adequate fit (χ^2/df = 2.96, CFI = 0.90, RMSEA = 0.08, SRMR = 0.06). The standardized estimates of the path coefficient between the two types of instruments indicated that digital self-efficacy moderately impacts DL achievement ($\beta = 0.15$, $p < 0.01$; Figure 5.3.5). In addition, the path coefficient value is positive, which indicates that perceived DL exerts a positive effect on the DL test result. Based on the results of this study, the hypothesis that asserts the perceived DL of students corresponds with their performance in the digital literacy test, indicating a positive correlation between subjective and objective assessments of students, was confirmed.
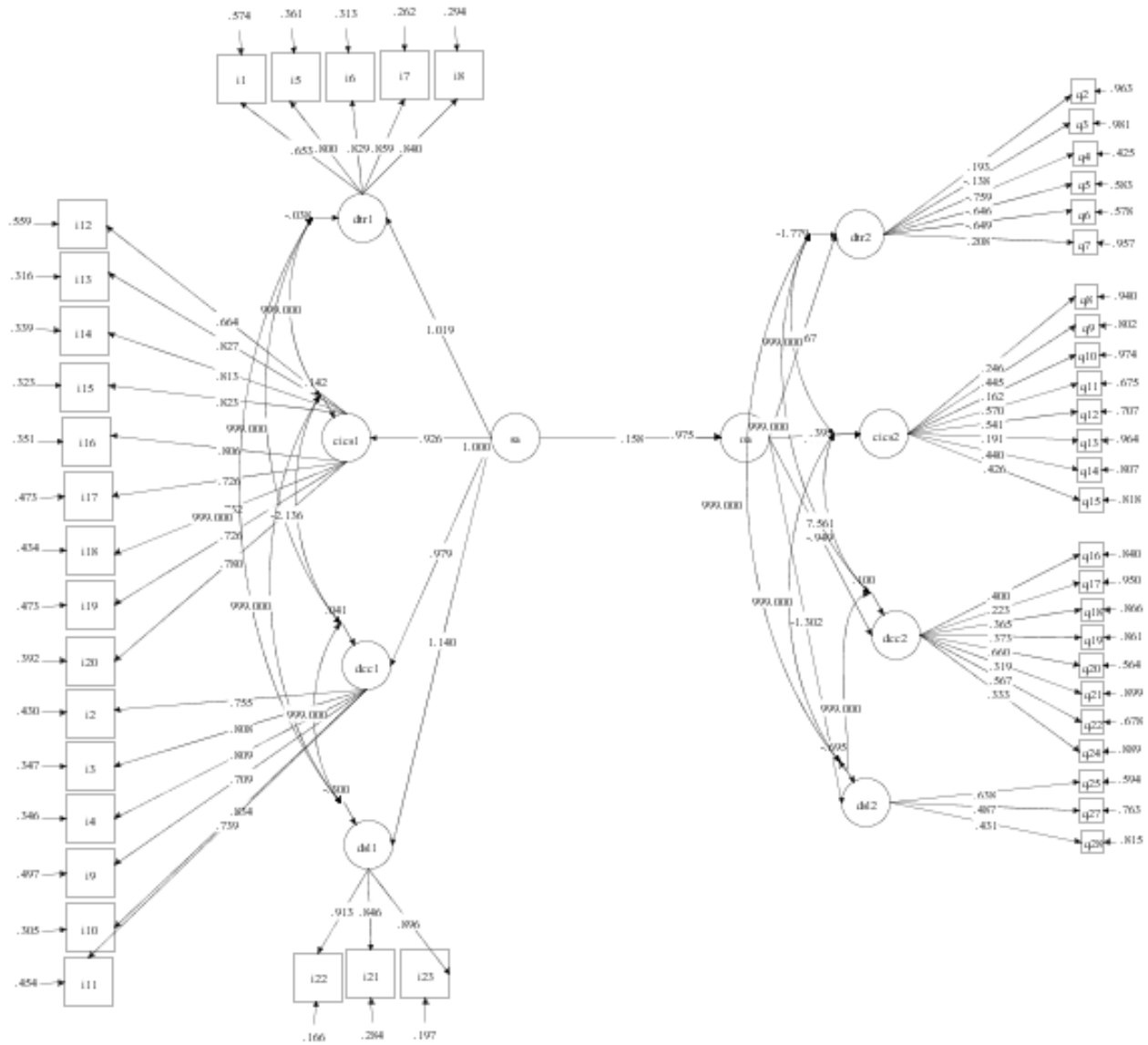
Figure 5.3.5 *Standardized estimates of the path coefficients between the two types of assessments*

Note:

- *SA – Subjective assessment (DTR1 - Digital Task Response; CICS1 - Communication, Interaction, Collaboration, & Learning Safety Protection; DCC1 - Digital Content Creation; DSL1 - Digital Self-Learning and Updating)*

- *OA – Objective assessment (DTR2 - Digital Task Response; CICS2 - Communication, Interaction, Collaboration, & Learning Safety Protection; DCC2 - Digital Content Creation; DSL2 - Digital Self-Learning and Updating)*

5.3.4 Discussion

The current study aims to investigate the level of DL of English majors using two types of self-developed subjective and objective assessments, confirm the reliability and validity of the questionnaire, and explore the relationship between the two types of instruments. First, the study tested the reliability and validity of the self-developed questionnaires through content validity, EFA, CFA, and the Rasch measurement. The result demonstrated that DL is confirmed as multidimensional in the current research context with four dimensions, namely, digital task response; collaboration, interaction, communication, and learning safety protection; digital content creation; and digital self-learning and updating. When designing the 23-items questionnaire for DL self-efficacy, digital task response and content creation were supposed to be grouped as one factor. However, the EFA results suggested different groups of items; therefore, the groups were put into two separate factors. In addition, although the items belonging to learning safety protection were proposed to be a separate factor, all items under this aspect were grouped into one group in terms of the dimension collaboration, interaction, communication, and learning safety protection. Therefore, the names of the components were adjusted to match the content of the items after EFA and confirmed by CFA. We then regrouped the 28 test items based on the component names suggested by the perceived DL questionnaire. Subsequently, we conducted a multidimensional Rasch measurement to confirm the four components of the DL test items, omitting three items due to low discrimination values. In general, subjective and objective assessments were proven reliable and valid for measuring the DL level, and the hypothesis regarding the reliability and validity of the author's self-developed instruments was confirmed. These findings align with previous studies that confirm DL as a multidimensional model (e.g., van Deursen et al., 2014, 2015).

Regarding DL, although the participants self-assessed that their DL levels are higher than the results of their achievement, they were most confident and capable of completing the digital tasks (e.g., uploading English files to digital devices or learning management platforms; browsing; and searching and filtering information from English digital resources). Furthermore, their ability in using digital technology to communicate, collaborate, and ensure a safe online learning environment (e.g., information sharing through documents, videos, audios, and images with English teachers and classmates via digital learning platforms, and protecting personal information when using digital tools) is better than other aspects of DL. Among the four components, language learners are least confident about using technology to create digital content in the English language (e.g., recording and editing video and audio for English-speaking tasks and using programming

software to create digital contents for English learning). The DL test result also depicted that students are not capable of doing these tasks better than other competences. Many previous studies did not mention digital self-learning and updating component is a new competency, but this dimension of DL has only been involved in the global framework of reference on DL (Law et al., 2018). This component was also included in the proposed DL framework for Vietnamese students (Do et al., 2021). Although *digital natives* or the *Internet generation* were born and are living in the digital era, where technology is available in nearly all aspects of life, this competency is essential for engaging in a world where digital technology is constantly updating and changing. In a specific field, such as English learning with technology, students are required to recognize digital trends or opportunities for learning English on updated digital platforms and resources. Moreover, they are able to self-update their digital skills to facilitate language learning with new technologies and devices. Together with digital content creation, students express less confidence in the aspects of digital self-learning and updating compared to the other two aspects. Additionally, the results of the objective assessment reflect this issue in DL achievement.

In the literature, scholars also investigated the DL of learners of the English language; however, the majority of them used subjective assessment to assess DL. For example, Son et al. (2017) measured DL levels of English learners in two contexts: English for academic purpose (EAP) and EFL. The authors reported that the DL of the students was good or very good for EAP students and acceptable or good for EFL learners. However, the DL components were not grouped according to component but as different types of computing skills and Internet applications. Moreover, the contents of the items did not specifically focus on DL in an English language learning environment. Nguyen & Habók (2022b) also evaluated English learners through a self-assessment instrument and a knowledge DL test. The result illustrated that the students achieved good DL knowledge, and DL skills derived from the results ranged from low to high levels based on the types of digital application. The current study filled the research gap when it used objective and subjective assessments, and the content of the two types of instruments are correlated with each other. Moreover, the study demonstrated that for both types of instruments, no significant differences in gender exist in terms of DL, whereas the levels of DL exhibited significant differences according to year group. In addition, the junior and senior students tended to exhibit higher levels of DL for digital self-assessment and achievement. This finding may contribute to those of previous studies on gender differences in DL (e.g., Siddiq & Scherer, 2019) and to research results, in which grade level is related to the improvement of the DL of students (Lazonder et al., 2020).

Furthermore, the finding depicted that the self-assessment of their level of DL is higher than the test result; however, the gap between self-assessment and objective evaluation is small, because the *t*-test results between the two standardized variables shows no significance between self-assessment and objective assessment. The finding of the current study is in agreement with that of Aesaert et al. (2017). The authors stated that although a gap exists between self-assessment and objective measurement, students can evaluate their level of DL. Moreover, the current study found that the DL self-efficacy of English majors exerted positive effects on DL achievement despite the low value of the path coefficient. Accordingly, the study validated the hypothesis asserting that students' perceived DL aligns with their performance in the DL test, demonstrating a positive correlation between subjective and objective assessments. In other words, the current finding supports self-efficacy theory by Bandura (1992), and the high confidence of the students in their DL resulted in their acceptable achievement. However, the finding is not in agreement with those of previous research, which revealed that a lack of correlation may exist between self-efficacy beliefs and digital proficiency. For example, a few students can be overconfident, but their expected achievement may be lower than their self-efficacy assessment (e.g., Meelissen, 2008). Alternatively, they may estimate that their level of DL is lower than their actual levels of competencies (e.g., Son et al. 2011). The findings of other studies also reflect this issue, which against self-efficacy assessment (e.g., Porat et al., 2018). Other authors even found that the relationship between self-efficacy assessment and actual DL is negative (e.g., Ehrlinger et al., 2008). In other words, students with high levels of DL underestimate their actual ability, but the opposite is true for students with low levels of DL.

Diverse results across studies may be explained by many factors that influence students' perceived assessments, such as personal factors (e.g., technology experience and usage) or environmental factors (Hatlevik et al., 2018). Consequently, self-assessed DL skills do not always reflect practical DL. Furthermore, EFL learners have their own expectations about their DL based on their contexts. Therefore, despite the finding that no large gap was noted between the appraised DL and their DL test result, the perceived DL of the students is higher than those of achievement; thus, the measurement of self-efficacy cannot accurately predict the actual DL or achievement of students. The reason is that other personal or environmental factors may influence the self-assessment of the students; therefore, their self-efficacy assessment may not reflect their actual and total competence or achievement.

5.3.5 Conclusion, implications for teaching and learning, and limitations

In summary, the current research revealed the DL level of English learners at universities in Vietnam through self-developed and correlated subjective and objective instruments. Evidence concerning the reliability and validity of the instruments was indicated. Moreover, the findings pointed out that English learners overestimated their moderate levels of DL. However, no significance exists in the discrepancy between appraisal assessment and test achievement. The research also found that the digital self-efficacy of the students exerted a positive effect on actual achievement.

Based on the findings, the study presents a few implications related to English teaching and learning with technology. As previously mentioned, the MOET provided Vietnamese institutions with much support through digital facilities as well as policies, such that school stakeholders, especially teachers and students, can conveniently apply technology to English learning and teaching. However, the DL level of students should be considered in the application of new technologies to learning, because technology investment cannot facilitate learning if students lack knowledge in the effective use of technology (Nguyen & Habók, 2022a). The DL test result demonstrated that the English majors are at a moderate level. In other words, they have not reached a good or proficient level for integrating technology effectively into English learning. Therefore, the curriculum should also include training in technology application to English education. In addition, the level of DL of EFL teachers should be considered because it may affect the DL level of the students. Furthermore, the level of DL of teachers could support language learners in engaging with rich language learning with technology environment and technology use for academic purposes (Ng, 2012). In addition, based on the result of the DL assessment, we suggest that more opportunities should be created for students to develop their competencies related to all aspects of DL, especially digital self-learning and updating as well as digital content creation, because technology is consistently updating. Thus, if students are proficient in their DL, especially in these two competencies, then they can improve their DL independently when faced with digital tasks in their future profession or real life. We also found that students with high grades achieve high levels of DL. The reason may be the fact that students with high grades obtain opportunities to apply technology to learning. Therefore, if students gain additional opportunities to frequently apply technology to learning, then their DL level may be improved (Ng, 2012; Nguyen & Habók, 2022a).

This research has its limitations. The sample is only approximately 500 English majors in selected universities in Vietnam; therefore, the result cannot be generalized to other EFL contexts in the country. In addition, this study is cross-sectional in nature; thus, the result may change from time to time. To draw a specific and comprehensive understanding of DL among EFL students, longitudinal studies on this topic should be conducted with updated DL assessment related to new technologies and competencies with a combination of different types of subjective and objective assessments. Furthermore, studies related to the DL of EFL teachers were few. Therefore, future research can focus on measuring the DL of EFL teachers because teachers with high levels of DL can support and empower students in improving their DL in language learning.

5.4 Sub-study 4. Are educators digitally competent? Investigating digital literacy among English as a foreign language teachers in Vietnamese universities

5.4.1 Introduction

Digital technologies have become an essential component in various schools at all levels, supported and invested in by governments and the MOET around the world. This is especially prominent in higher education, driven by innovation and technological advancements. Recognizing the effects of ICT on education in general and on language teaching and learning in particular, the Vietnamese MOET launched a series of policies on the application of ICT to education for all subjects, especially English as a foreign language (EFL). The objectives of these policies are to establish directions for ICT development in education, because various stakeholders believe that education accompanied by technology could lead to major changes in teaching and learning methods and education management. Furthermore, they can enhance the quality of education, create better human resources, and promote the development of a country. The latest national project, Decision No. 1400/QD-TTg, approved the 10-year national plan for Teaching and Learning Foreign Language in the National Formal Education System between 2008 and 2020. This decision was issued on September 30, 2008. The project exerts effort to train English teachers to be qualified in English proficiency and pedagogy to meet the needs of the context of the globalized world. Along with the English proficiency required for each teaching level based on the Common European Framework for Reference, grammar-translation method and teacher-centered approach in English teaching, which were mainly traditional English teaching methods, was called to shift to a more practical orientation. In this manner, English classrooms can provide authentic experiences for students and bring the context of real life for language utilization. One of the elements of practical orientation is the expectation of integrating ICT in teaching and learning.

According to a report on the status of ICT integration into education in Southeast Asian countries in 2010, Vietnam was in the third stage of the four-stage model of the UNESCO ICT development in education (Southeast Asian Ministers of Education Organization [SEAMEO]), 2010), which includes emerging (becoming aware of ICT), applying (learning how to use ICT), infusing (understanding how and when to use ICT), and transforming (specializing in the use of ICT). However, the result from OECD Teaching and Learning International Survey (OECD, 2018) depicts that only 43% of Vietnamese teachers who participated in the survey "frequently" provide opportunities for students to apply ICT to the learning process, while 53% is the average

percentage of other countries in the group. Additionally, 97% of teachers in the survey reported that ICT use for teaching has been included in formal education or training, while 80% of teachers on average felt *well-prepared* for the use of ICT for teaching after finishing their studies. Furthermore, the survey reported that 93% of teachers on average participated in professional development activities including the *use of ICT for teaching* in the 12 months prior to the survey; thus, a large need (55%) exists for training in the use of ICT for teaching compared with 18% across the OECD. In other words, the DL of teachers is becoming a major issue while digitalization is rapidly expanding in the Vietnamese education system, because technology integration in education is only effective if teachers are digitally competent. Despite the significance of DL, an updated image of the DL of teachers at universities in the Vietnamese context, especially EFL teachers, is lacking, while DL is one of key factors that determines technology adoption and educational institution innovation (Nguyen & Habók, 2022a).

In the field of EFL teaching and learning, recent studies indicate that DL can facilitate teachers in achieving their pedagogical goals and support language learners in improving their language skills and in broadening and deepening their vocabularies (e.g., Golonka et al., 2014). Basically, technology that supports EFL teachers in planning lessons, communicating with colleagues and students, searching for information, producing word texts, and presenting lectures, among others, is becoming popular (e.g., Blin & Munro, 2008). Thus far, EFL teachers and learners can obtain full support in education with the integration of new digital technology specifically designed for language teaching and learning. Furthermore, educators are considered role models for students; hence, if teachers are fully equipped with DL, then they would be capable of providing guidance, demonstrating their knowledge and skills to students, and facilitating students in applying technology to learning in a creative and critical manner. To respond to these needs, the current research aims to fill the research gap and to explore the DL of EFL teachers in Vietnam universities using quantitative and qualitative data. In addition, the study reveals a few potential factors that may impact their DL.

5.4.2 Methodology

The study employed a cross-sectional design to assess the DL level of EFL teachers at Vietnamese universities. It was conducted in two stages: participants initially completed a questionnaire, followed by in-depth interviews with select participants to enhance and supplement the questionnaire responses.

5.4.2.1 Research questions & hypotheses

The study aims to seek answers to the following research questions:

RQ1. Is the questionnaire reliable and valid for assessing the DL of EFL teachers?

RQ2. What is the status quo of the DL of EFL teachers based on quantitative data?

RQ3. What is the extent of the digital literacy of EFL teachers based on qualitative data?

RQ4. What are potential personal or school-related factors that influence the DL of EFL teachers?

Two hypotheses were formulated based on the aforementioned research questions, as follows:

RH1: The questionnaire for assessing the DL of EFL teachers is deemed reliable and valid in the Vietnamese higher educational context (Nguyen & Habók, 2022b).

RH2: A majority of EFL teachers' DL is at least at the B1 (integrator) level (Peled, 2021).

5.4.2.2 Sample of the study

The study recruited 205 EFL teachers working at different universities in Vietnam. Table 5.4.1 provides the detailed demographic characteristics of the sample. In the case of digital tools, the teachers mostly used presentations, video/audio clips, video/audio creation, digital quizzes or polls, and interactive apps or games at 85.9%, 81.6%, 83.5%, 79.1%, and 74.3%, respectively. For online learning environments; digital posters, mindmaps, planning tools; and blogs or wikis are less used at 38.3%, 42.7%, and 29.6%. In addition, 26.7% of the teachers use other types of tools for story or game creation, video/audio recording, or feedback. Regarding the criteria of the working environment, teachers reported positive views on the support of their departments through digital facility and investment. For example, "the department supports the development of my digital competence" or "the department invests in updating and improving the technical infrastructure" (M = 4.09, SD = 0.37). Additionally, the teachers expressed confidence in relation to their use of digital technology (M = 4.01, SD = 0.21).

Table 5.4.1 *Demographic characteristics of the sample*

Gender	Male	Female		
N	70	135		
%	34.1	65.9%		
Age range	<25	25-29	30-39	40-49
N	14	50	117	24

%	6.8	24.4	57.1	11.7	
Year of teaching with technology experience	1-5 years	6-10 years	11-15 years	16-20 years	>20 years
N	30	65	98	12	0
%	14.6	31.7	47.8	5.8	0

5.4.2.3 Instrument

The questionnaire was adapted from the DigCompEdu CheckIn Tool for Academics (Inamorato Dos Santos, 2019) with two major components based on DigCompEdu, which comprises 22 competencies organized under six categories. The questionnaire includes 25 items with seven components, namely, professional development, digital resources, teaching and learning, assessment, empowerment of learners, facilitation of the digital competence of learners, and digital self-learning and updating. The original questionnaire was designed to evaluate the DL of teachers in higher education; however, all items of the questionnaire were narrowed down in terms of scope to match that of EFL teachers. The first part aims to explore the demographic information of the teachers (e.g., gender, age, years of experience, and school digital development). The second part focuses on exploring the DL of teachers by requesting them to respond to questions with multiple choices that describe the level of DL. Based on the responses of the participants, the study evaluated their level of DL using six levels of skills, namely, A1 (newcomer), A2 (explorer), B1 (integrator), B2 (expert), C1 (leader), and C2 (pioneer). The questionnaire was translated into Vietnamese, and a few language teachers and researchers verified the content and language prior to its dissemination to teachers via Google forms. The questionnaire was followed by in-depth interviews to objectively evaluate the DL of teachers as well as strengthen the responses to the questionnaire.

5.4.3 Data analysis and results

5.4.3.1 RQ1. Is the questionnaire reliable and valid for assessing the DL of EFL teachers?

The study used CFA to analyze and test the model fitness. Two types of models were tested: one-dimensional and seven-dimensional models. One item was omitted due to its low factor loading. For the one-dimensional model, the result of CFA did not exhibit good fitness values between the data and the sample (CFI = 0.88, TLI = 0.87, RMSEA = 0.06, SRMR = 0.07). After modifying the model by connecting four pairs of errors, the results displayed an acceptable fit (CFI = 0.91, TLI =

0.90, RMSEA = 0.05, SRMR = 0.06). Regarding the seven-factor model, the model achieved an acceptable fit according to the cut-off criteria (CFI = 0.90, TLI = 0.89, RMSEA = 0.08, SRMR = 0.07). The model was also revised by addressing the constraints of independence between two pairs of errors; afterward, the model fit displayed better values (CFI = 0.92, TLI = 0.90, RMSEA = 0.05, SRMR = 0.06). In general, CFA depicted that the seven-dimensional model fits the data better than the one-dimensional model; however, both models were acceptable after revision (Figure 5.4.1).
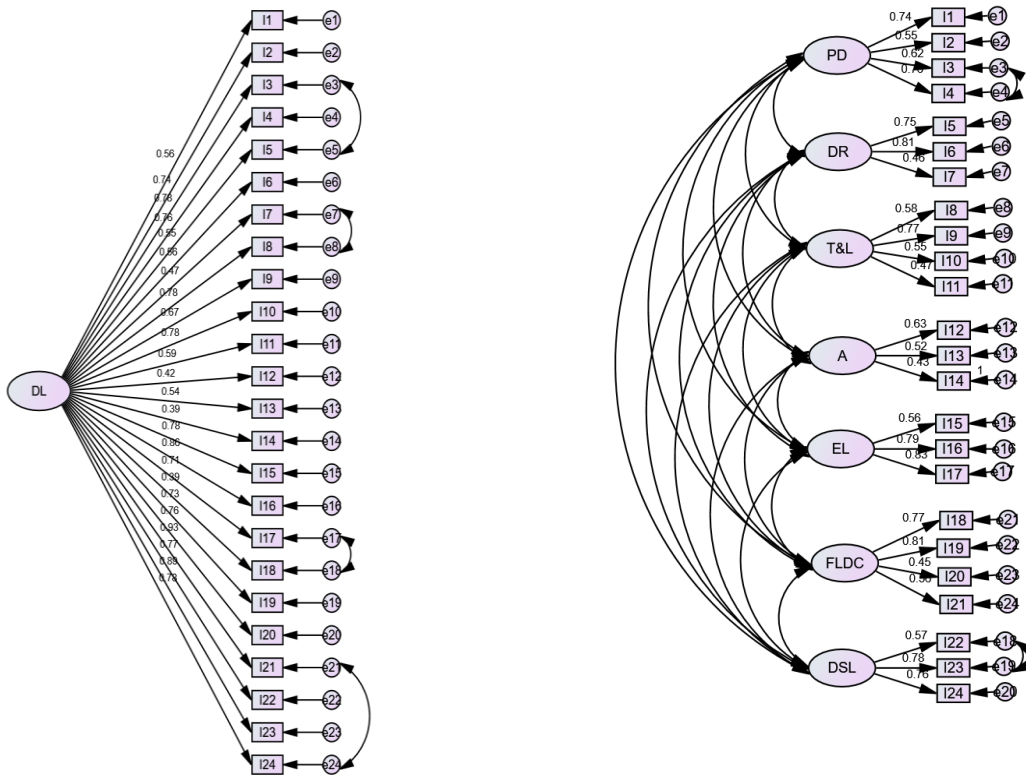

Figure 5.4.1 *One- and seven-dimensional models*

Note: DL – Digital Literacy: PD – Professional Development; DR – Digital Resources; T&L – Teaching & Learning; A – Assessment; EL – Empowering Learners; FLDC – Facilitating Learners' Digital Competence; DSL – Digital Self Learning & Updating

Additionally, Rasch analysis was employed to test the validity of the items (Table 5.4.2). The results indicated that item and person fit statistics were acceptable for all items in the questionnaire with values ranging from 0.61 to 1.23. In other words, the questions are also appropriate at the item level. Reliability reached Cronbach's α =.87, which indicates a good level (Hair et al., 2006). Drawing conclusions from the results of CFA and Rasch analysis, it can be inferred that the

questionnaire designed to assess the DL of EFL teachers is considered reliable and valid within the context of Vietnamese higher education, confirming the first hypothesis.

Table 5.4.2 *Rasch analysis result*

	Location	SE	Weighted fit
Item 1	0.97	0.02	1.05
Item 2	0.88	0.03	0.61
Item 3	0.96	0.01	0.98
Item 4	0.98	0.02	1.06
Item 5	–1.15	0.02	1.22
Item 6	0.98	0.01	1.00
Item 7	–0.87	0.03	0.78
Item 8	–0.92	0.03	0.84
Item 9	0.88	0.03	0.85
Item 10	0.96	0.02	0.88
Item 11	0.92	0.02	0.86
Item 12	–0.91	0.04	1.15
Item 13	0.90	0.03	1.20
Item 14	–0.88	0.03	0.87
Item 15	0.85	0.03	0.78
Item 16	0.95	0.02	1.15
Item 17	0.96	0.01	1.16
Item 18	–0.97	0.03	1.22
Item 19	0.96	0.02	0.98
Item 20	–0.82	0.02	1.01
Item 21	0.90	0.02	1.22
Item 22	–0.82	0.02	1.03
Item 23	–0.85	0.01	1.00
Item 24	0.88	0.01	1.21

5.4.3.2 RQ2. What is the status quo of the DL teachers based on quantitative data?

The data were subjected to SPSS, and the descriptive statistics indicated that 40% of teachers were at the B2 (expert) level, 35.6% were at the B1 (integrator) level, and 19.5% of teachers were at the C1 (leader) level. A small percentage of teachers achieved a low level at A2 (explorer, 1.5%), while the highest level was reached by 3.4% at C2 (pioneer). Figure 5.4.2 describes the DL level of teachers based on their self-reported answers. These findings substantiated the hypothesis asserting that a significant proportion of EFL teachers possess digital literacy at a minimum of the B1 (integrator) level. Among the seven components of DL, teacher competencies in assessment, empowerment of learners, facilitation of the digital competence of learners, and professional development are higher than those of other competences (M = 4.12, SD = 1.72; M = 4.03, SD = 0.88; M = 4.02, SD = 0.91; M = 4.00, SD = 0.87, respectively). Although teacher competence in digital self-learning and updating is rated as the lowest component (M = 3.95, SD = 0.70), their competence in digital resources is higher than that in teaching and learning (M = 3.98, SD = 0.88; M = 3.96, SD = 0.96). The comparison results of teacher DL assessment among sub-components are described in Figure 5.4.3.
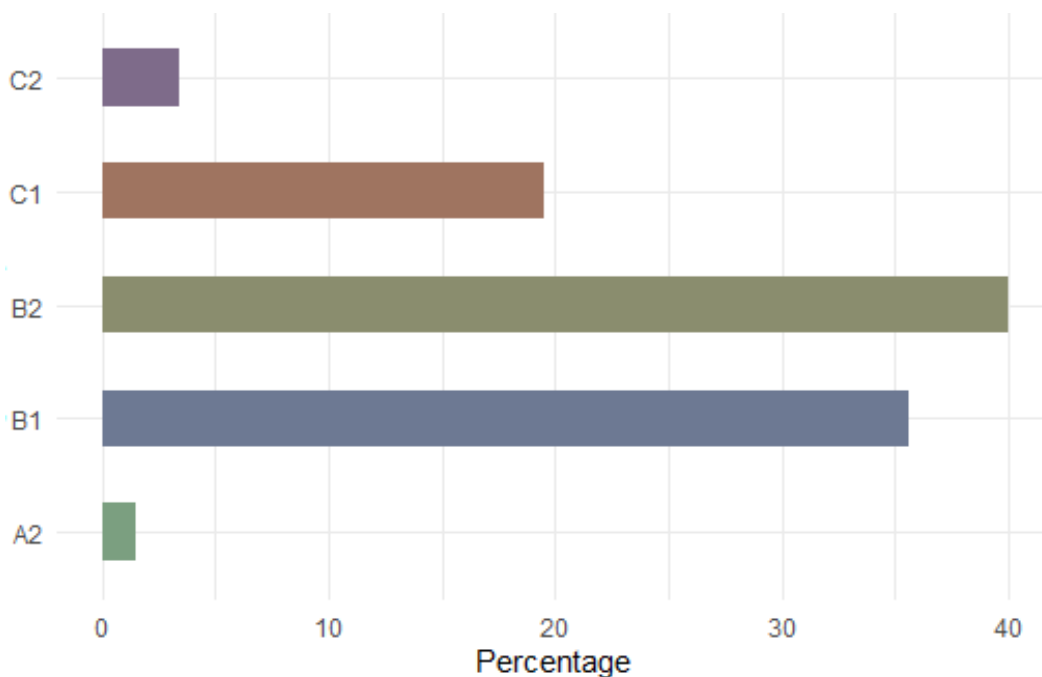

Figure 5.4.2 *Level of digital literacy of teachers*

Note: A2 – explorer, B1 – integrator, B2 – expert, C1 – leader, C2 – pioneer

The t-test results suggested that the DL of male teachers is higher than that of female teachers; however, the difference between the two genders is non-significant ($F = 0.12$, $t = 0.43$, $p > 0.01$). In addition, ANOVA demonstrated no significant discrepancies among teachers in terms of age (mean squared $= 2.07$, $F = 3.08$, $p > 0.01$). In the case of the experience of teachers with digital technology use, teachers with more experience in using technology in teaching tend to achieve higher levels of DL ($M_{1-5 \text{ years}} = 3.94$, $SD = 0.72$; $M_{6-10 \text{ years}} = 3.99$, $SD = 0.72$; $M_{11-15 \text{ years}} = 4.17$, $SD = 0.86$). This claim is false in the case of teachers with years of experience between 11 and 15 years and between 16 and 20 years. The results demonstrated that teachers with years of experience ranging from 6 to 9 years in using didactic technology achieved higher levels of DL than those with years of experience of more than 10 years ($M = 4.17$, $SD = 0.86$; $M = 3.62$, $SD = 0.16$, respectively). The difference between the DL of these teachers is significant ($p < 0.01$).
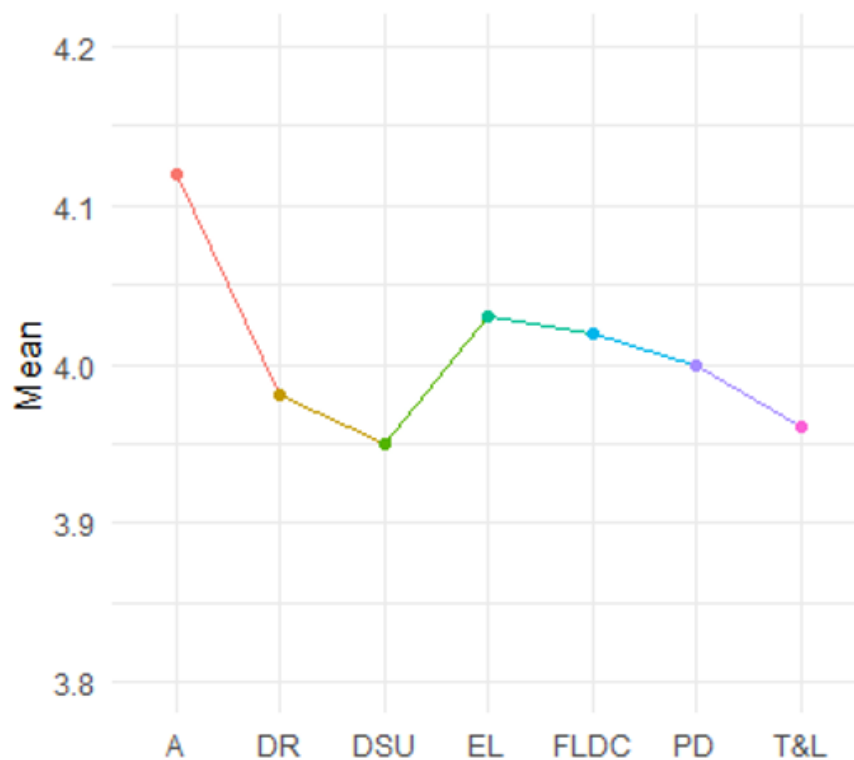

Figure 5.4.3 *Measures of teacher digital literacy components*

Note: A – Assessment, DR – Digital Resources, DSU – Digital Self-Learning and Updating, EP – Empowering Learners, FLDC – Facilitating Learners' Digital Competence, PD – Professional Development, T&L – Teaching and Learning

5.4.3.3 RQ3. What is the extent of the digital literacy of EFL teachers based on qualitative data?

Apart from the questionnaire, the study selected ten teachers to participate in in-depth interviews. The teachers were given the opportunity to demonstrate their competencies in relation to the seven components of DL. Regarding professional development, teachers used different types of digital channels to communicate and collaborate with colleagues. Six out of ten teachers used emails and Facebook groups to share documents and communicate; two of them collaborated with colleagues on a Zalo group, and two used their own working environments, provided by the faculty/university, to communicate and work with one another. The teachers also demonstrated how to send instant messages, react to the comments of other teachers, or contribute to the documents of their colleagues in these shared environments. Notably, the teachers tended to use popular digital channels to communicate and collaborate with one another.

> *I feel comfortable using Facebook to collaborate with my colleagues because I have already become accustomed to using it daily for communication with friends and family. We have created specific Facebook groups for various purposes, and we receive notifications for any updates or changes.*

> *Last year, the faculty collaborated with Microsoft, and we were provided with a secure and private working environment. We had to use our school emails to log in. Initially, we were not accustomed to this new online working environment and encountered some difficulties. However, after participating in some training sessions, we are now able to work on it efficiently.*

> *Zalo is very popular, free, and easy to use. When selecting a platform for all the teachers in the department to communicate and exchange information, Zalo was voted as the preferred option. Both young and old teachers can use it easily.*

Apart from the main platforms used for communication and sharing, they also used other forms of digital technology when necessary or urgent, such as Zoom or Skype. In general, teachers were skillful in using these digital channels because they frequently used these platforms not only at work but also in daily life.

In terms of digital resources, four interviewees demonstrated the manner in which they used available digital resources on the Internet or digital books to prepare lesson plans (e.g., pronunciation sounds from online dictionaries and downloaded videos/audios/images to attach to presentation platforms). Six other teachers combined available digital resources for lectures and independently created digital resources for their lectures (e.g., recorded videos, shortened/combined videos/images, created English stories using programming software, and created online tests).

> *Sometimes, I cannot find appropriate digital resources for my lecture, so I have to create them myself. For example, I recorded an English-speaking video where I discussed a target topic, answering some guided questions as a model for students to follow the criteria. Of course, students can also be creative.*

> *The course books that I use include everything I need for my lecture, so I don't have to create teaching materials myself; I simply use the materials accompanied by the digital book. Occasionally, I incorporate other relevant resources that I find on the Internet.*

In terms of the teaching and learning component, all the teachers who participated in the interview mentioned that their classrooms were equipped with projectors, laptops, and Internet access, enabling them to integrate technology into their lectures. Two out of the ten teachers occasionally used interactive whiteboards in their lectures; however, this usage depended on classroom management. The teachers demonstrated a few of their lecture products that combined technologies (e.g., interactive games, online speaking platforms like Flipgrid, and online writing platforms such as Massive Open Online Courses [MOOCs]). Their lectures were designed based on presentation platforms, such as PowerPoint and Prezi, with attached digital videos and online links, among other elements. In the classroom, three out of ten teachers used online platforms (e.g., Nearpod, Seesaw, and ClassPoint) where students could interact with their tasks. The rest of the teachers provided slideshow presentations and switched to online resources (e.g., digital interactive games and polls) when necessary.

> *I like to use ClassPoint for my lectures because this platform supports both teachers in teaching and students in completing teachers' tasks individually or in groups. However, it requires good internet access in the classroom to use this platform.*

The internet in my classroom is not reliable when many students use it simultaneously. Therefore, I use PowerPoint for my presentations. When necessary, students use their digital devices to complete tasks. Online and collaborative tasks are typically assigned as homework.

Assessment depends on the tasks in which teachers use different technologies. For example, four out of ten teachers used online platforms designed for speaking lessons in English (e.g., Flipgrid and Podcast), and teachers and classmates provided feedback online. Six teachers required students to prepare a digital presentation for speaking practice in class. For English writing tasks, seven out of ten teachers used the 'Review' function on Microsoft Word to give comments on the written assignments of the students. They also used Grammarly to double-check the written tasks. Others provided feedback on the writing platforms.

I like to use MOOCs for students' written assignments because the software supports basic grammar checking. Classmates can read and check each other's work if I set it up, providing students with a chance to learn from their friends' mistakes. Additionally, when I grade students, they also receive notifications.

For the empowerment of learners and facilitation of their digital competence, the teachers who were interviewed mentioned that they were concerned with the learning needs of their students and interest in creating collaborative digital learning tasks. In addition, they encouraged students to create their digital learning materials and share them with friends.

In my English lessons, students are given the chance to create their own stories related to the target topics. For example, Scratch is visual programming language software that allows students to craft their own English stories using their creative and language skills. Certainly, students have another course to learn how to use this software.

For digital self-learning and updating, four out of ten teachers mentioned that they enhanced their knowledge and skills in technology use by participating in conferences or online courses. Three collaborated with colleagues to learn how to use technology in teaching by observing the lectures of others and joining brief training courses. Other teachers are members of online groups in which they learn updated knowledge and skills in integrating technology in their teaching.

At times, the workload is overwhelming, and I find it challenging to allocate time for updating my digital skills. However, we have opportunities to participate in short trainings organized through collaborations among universities or higher-level organizations. We learn and practice based on the knowledge acquired from these trainings.

5.4.3.4 RQ4. What are potential personal or school-related factors that influence the DL of EFL teachers?

To identify the factors influencing the DL of teachers, the study conducted linear regressions. The results of the multiple regression analysis demonstrated that among the personal and school-related factors, personal characteristics, such as age, gender, and experience in digital technology usage, did not significantly influence the teachers' DL level. However, the digital working environment and the use of digital technology remarkably contributed to their level of DL at 14.77% and 11.0%, respectively. Table 5.4.3 provides the detailed results of the multiple regression analysis.

Table 5.4.3 *Results of multiple regression analysis on factors that influence digital literacy*

Variables	SE	β	Zero order	p	β x r (%)
Digital working environment	1.08	1.59	0.09	0.00	14.77
Digital technology usage	4.04	1.38	0.08	0.00	11.04
Age	3.13	0.15	0.17	0.74	0.10
Gender	2.04	-0.02	-0.04	0.03	2.75
Digital technologies experiences	1.59	-0.07	-0.05	0.32	0.39
R^2					29.05

5.4.4 Discussion and conclusion

The current study was conducted to explore the DL of EFL teachers at Vietnamese universities using a questionnaire and in-depth interviews. The questionnaire, employed to evaluate the teachers' DL, was proven to be reliable and valid for the study in terms of construct validity (CFA) and item validity (Rasch analysis). Consequently, the initial hypothesis regarding the reliability and validity of the assessment instrument was validated within the educational context of Vietnam. The study found that the majority of teachers (75.6%) are at the expert and integrator levels of DL, indicating a good level of DL among EFL teachers at universities. This result confirmed the second

hypothesis, suggesting that a majority of EFL teachers have a minimum level of B1 (integrator) DL. This observation is consistent with the outcomes of previous research, exemplified by Peled (2021), where it was similarly observed that more than half of the participants demonstrated a consistently high level of DL across various domains. Although teachers demonstrated the highest level of competence in assessment, their proficiency in digital self-learning and updating was the lowest. This finding may result from the frequent use of digital technologies for assessing students' achievements. Teachers expressed confidence in their ability to use technologies in assessment, as they supported them in checking students' language mistakes. Qualitative data from in-depth interviews partially complemented the quantitative data, reinforcing the questionnaire results. In-depth interviews reported that the extent to which teachers used technologies in their teaching, learning, and other tasks for professional development depended on the working environment, curriculum content and format, types of English skill lectures, and classroom facilities. Competence in digital self-learning and updating is a subscale of DL in the proposed DL framework for Vietnamese students (Do et al., 2021), and both teachers and students should be proficient in this competence due to the constantly changing nature of technology. As mentioned in the results, self-learning and updating competence is the lowest compared to the other six competences in DL. This component should be given more attention and improvement among teachers because those proficient in learning and updating their digital skills can enhance their DL in all competences despite the rapid development of technologies. Understanding to what extent teachers can integrate technologies into the teaching and learning process is the first step in preparing for the investment in digital facilities, further intervention, and improvement of technology integration in education. The research findings may be useful for policymakers, curriculum designers, school stakeholders, researchers, teachers, and students involved in English teaching and learning with technology and technology integration in education in general. Regarding gender differences in DL levels, the DL of male teachers is higher than that of female teachers, although the difference is nonsignificant. This result aligns with previous studies (e.g., Guillén-Gámez et al., 2020) and contrasts with the results of some other studies (e.g., Siddiq & Scherer, 2019). However, no consensus exists on this issue in different contexts, and individual DL levels depend on various personal and environmental factors.

This study has its limitations. First, the sample is restricted; thus, the results cannot be generalized to other educational EFL contexts in Vietnam. Additionally, the number of teachers who participated in the in-depth interviews is also modest. Future research on the same topic may

increase the sample size and use other instruments (e.g., observations and tests) to comprehensively evaluate the DL of teachers. Regarding DL instruments, updated assessment tools associated with new technologies and competencies should be conducted in longitudinal studies with a combination of subjective and objective assessments to gain a comprehensive understanding of DL among EFL teachers. It is suggested that questionnaires and interviews be combined with additional instruments for a more comprehensive evaluation of teacher DL (e.g., lecture observation, tests, etc.). The reason is that cultural elements may affect the research results. In Vietnam, generally, male teachers tend to be more confident, and teachers may not admit mistakes, while female teachers tend to be more modest. This could significantly affect self-assessment and other subjective research.

CHAPTER 6. CONCLUSION

In this chapter, an overarching conclusion for the entire research is provided, along with insights into its implications for English teaching and learning in Vietnamese higher education institutions. Subsequently, the contributions to the research on student and teacher digital literacy are outlined. Finally, a discussion of the research's limitations and recommendations for future research are presented.

6.1 General conclusions and implications for English teaching and learning at Vietnamese universities

The dissertation encompasses several cross-sectional studies focusing on the assessment of student and teacher DL in English education in Vietnamese universities. As mentioned in the introductory part, owing to the globalization of technology integration in education systems, the Vietnamese MOET has initiated various national projects on EFL education and ICT policies, accompanied by significant investments in technologies in schools to facilitate EFL students and teachers in applying technologies in education. Consequently, the issue of student and teacher DL has become a major concern for school stakeholders because technologies bring positive effects to education if students and teachers can apply them appropriately and effectively (Nguyen & Habók, 2021). Through the literature review, it is noted that few studies have been conducted to assess student and teacher DL in specific fields in the Vietnamese educational context, despite their digital competence playing a pivotal role in the success of technology integration in education (Hanell, 2018). The current research addresses this gap in the literature by conducting studies to measure the level of DL among Vietnamese students and teachers in their English learning and teaching. Before conducting the empirical studies in the Vietnamese educational context, the literature review process has provided an overview of student and teacher DL assessment based on findings from previous studies. In general, it was observed that self-evaluation instruments are common, while only a few studies promote subjective evaluation in combination with objective assessment to offer a comprehensive understanding of teacher digital competence. Therefore, in the current research, both subjective and objective assessments were employed to provide a comprehensive portrayal of Vietnamese student and teacher DL.

The research comprises four sub-studies that investigated DL among non-English majors, English majors, and EFL teachers at Vietnamese universities by addressing the answers to thirteen research questions and confirming nine research hypotheses. The first sub-study is a validation

study that tests the reliability and validity of the questionnaire concerning CALL attitude, which is a part of the DL questionnaire in the Vietnamese context. The findings of the study revealed a different structure with fewer factors in the model for Vietnamese students. Additionally, the reliability and validity of the instrument in the Vietnamese context, as well as the equivalence of paper and online questionnaires at the construct and item levels, were confirmed. Therefore, the questionnaire can be used either online or on paper to measure attitudes toward CALL among non-English majored learners. After confirming the reliability and validity of the instrument in the Vietnamese context, the subsequent study continued to verify the reliability of other parts of the questionnaire. The instrument was then utilized in measuring non-English majors' DL in the second sub-study. In detail, student DL was evaluated through their digital knowledge, perceived skills, and attitudes toward the use of digital technologies. The digital knowledge and perceived skills of students were reflected through the assessment of five factors: searching and evaluating information, creating, communicating, collaborating, and e-safety (Son, 2015). The study also explored the frequency of use of technology applications in their English learning. The findings initially revealed that most Vietnamese students can access digital technologies in their universities, confirming the investment in technologies in Vietnamese institutions to guarantee digital facilities for both teachers and students. Moreover, the knowledge test showed that students possess an adequate level of technical knowledge, and their technology skills range from low to the average level. Some factors that may affect student DL were discussed based on the context of English teaching and learning in Vietnamese universities. In the Vietnamese context, it is possible that students do not have many chances to apply technologies in the classroom, and the curriculum's focal point is knowledge. Additionally, the level of teachers' technological skills may also influence student DL, a factor further explored in sub-study four when evaluating teacher DL. Concerning gender differences in DL, the study suggested that teachers should understand that student motivations to use digital technology can differ between males and females (Jin et al., 2020). The research findings have implications for integrating ICT in English teaching and learning for non-English majors at Vietnamese universities. For instance, it is necessary to review curriculum design and teaching methods to equip students with DL practices that can successfully empower them in their future work. Additionally, it is important to ensure a balance between knowledge and skills in the curriculum, providing students with opportunities to apply their language skills with the support of technology. Teachers, trainers, educational officials, and all educational stakeholders should be aware of students' ICT competency levels in a school context.

Furthermore, training in the application of technology to English education should also be included in the curriculum. Furthermore, Vietnamese educators who work directly with students need to have knowledge and skills concerning digital technologies to assist in teaching and supporting students. This is because teachers affect how students learn with technologies (Margaryan et al., 2011), and students will not use educational technology tools if technologies are integrated without any purpose (Ng, 2012). Regarding the variations among freshmen, sophomores, juniors, and seniors in DL, this research validated the hypothesis asserting a significant difference in DL among the four-year groups of students. While some previous studies have generally suggested that students' skills improve with age, and grade level is a factor linked to DL development (Lazonder et al., 2020), the findings of this study partly confirmed the conclusions of these previous studies. Seniors achieved the highest results in DL tests compared to their counterparts and exhibited the most positive attitudes toward using ICT tools. However, freshmen demonstrated the highest perceived skills, and seniors displayed the lowest skills among the year groups. It is crucial for educators to be mindful of the challenges related to providing appropriate learning environments for teaching English. Moreover, earlier studies have indicated that students' DL levels can enhance through the integration of ICT in teaching and learning (Ng, 2012). Therefore, advancements in ICT integration may positively impact students' DL levels.

After measuring the non-English majors, the third sub-study conducts a DL assessment on English majors in universities in Vietnam using two types of self-developed and correlated measurement tools: subjective and objective. The self-developed instruments used in the study were based on the DigComp framework (Ferrari et al., 2013); however, the instruments were not designed to be used in a general educational context but in the EFL context. Before the assessment tools were used to evaluate English majors' DL, the reliability and validity were tested by using factor analysis, SEM, and Rasch measurement. The study confirmed a multidimensional model of the instruments in the EFL Vietnamese research context with four subscales: digital task response; collaboration, interaction, communication, and learning safety protection; digital content creation; and digital self-learning and updating. These four factors were re-arranged from the five factors which were suggested by the DigComp framework (information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving). Also, the factor of digital self-learning and updating is added to the instrument because this factor was included in the proposed DL framework for Vietnamese students (Do et al., 2021). The finding from the subjective assessment showed that English majors are at a good level of DL, and at a moderate level in the

objective assessment. Compared to the achievement test result, it is noticed that students overestimated their DL; however, the difference between subjective assessment and objective assessment is non-significant. Additionally, the study showed that students' DL self-efficacy has a positive effect on their achievement. In general, it can be stated from the finding of the current study that the measurement of self-efficacy cannot precisely foresee the actual DL or achievement of students though the gap is not significantly different. The reason is that factors belonging to personal or environmental issues may influence the self-evaluation of the students; therefore, there is a possibility that their assessment of self-efficacy does not accurately reflect their actual competence. As mentioned earlier, the Vietnamese MOET supports institutions with national projects on foreign languages, ICT policies, and facilities so that students and teachers can conveniently apply technologies in their English learning and teaching. However, the findings of the study indicated that students' DL is at a moderate level. This suggests that the DL level of students should be given more attention in the application of new technologies to learning because the investment in technologies will be only valuable if students can apply them effectively in their learning. The study indicated practical implications for integrating technology into English teaching and learning for English majors at Vietnamese higher education institutions. For example, it is suggested that there should be more opportunities for students to develop competencies in digital learning, especially in digital self-learning, updating, and content creation, as technology is constantly evolving. The study also found that students with high grades achieve high levels of DL. This could be attributed to the fact that students with high grades have more opportunities to apply technology to their learning. Therefore, providing additional opportunities for students to frequently use technology in learning may enhance their DL levels (Ng, 2012).

The fourth study explored EFL teacher DL based on an adapted questionnaire and in-depth interviews. The questionnaire used to assess teacher DL was adapted from the DigCompEdu CheckIn Tool for Academics (Inamorato Dos Santos, 2019). The findings revealed that the majority of teachers were at the expert or integrator level of DL. Consequently, the study indicated that university EFL teachers possessed a good level of DL. Despite teachers demonstrating the highest competence in assessment, their proficiency in digital self-learning and updating was found to be the lowest. The qualitative data from the in-depth interviews strengthened the questionnaire results. By examining teacher DL in their teaching context, we gained a more comprehensive understanding of how they integrate technology into English teaching. The study suggested implications for EFL teachers and school stakeholders in teaching English with technology in the

Vietnamese context. For instance, teachers should be proficient in all aspects of DL in English education, particularly in digital self-learning and updating, given the constant evolution of technology. Furthermore, the study found that teacher DL was unaffected by age, gender, or years of digital technology experience. However, the working environment and digital technology use did have an impact on DL. Previous studies have mainly focused on identifying the relationship between the level of DL and personal factors, neglecting school-related factors, which may influence teacher DL (Lucas et al., 2021). Therefore, this finding fills the gap by establishing a relationship between both personal and school-related factors and teacher DL. In other words, schools are advised to consider both teacher-related factors and their digital working environment. For example, school departments may invest in updating and improving technical infrastructure and provide the necessary technical support.

The research comprehensively depicted the levels of DL among EFL students and teachers in Vietnamese universities through four cross-sectional studies. All research questions and hypotheses aligned with the research aim were thoroughly addressed and confirmed, providing apt answers and explanations within the specific research context. As Lord Kelvin wisely asserted, "If you cannot measure it, you cannot improve it" (as cited in Kevin, 2022, p. 103). Therefore, gauging the extent to which teachers and students can integrate technologies into the English teaching and learning process is the initial step in preparing for the investment in digital facilities, implementing further interventions, and enhancing technology integration in EFL education. The research findings furnish valuable insights for various stakeholders, including policymakers, curriculum designers, school administrators, teachers, and students involved in English teaching and learning with technology. Policymakers can comprehend the current digital proficiency levels of EFL students and teachers in Vietnamese universities, ensuring that future ICT or foreign language policies or projects align with the competencies of these individuals. One reason for the failure of current national projects to achieve their aims by 2020, leading to their extension to 2025, is the policymakers' overestimation of the competence of teachers and students, encompassing language and digital knowledge and skills. Additionally, a lack of in-depth understanding of the exact status of language teaching and learning with technology may have led to the setting of inappropriate objectives that are challenging to achieve within the designated timeframe. Curriculum designers are anticipated to craft well-balanced language programs, integrating language knowledge, language skills, digital skills, and supporting the digitalization of English teaching and learning. School administrators can gain insights into the ICT status of teachers and students, guiding them

to invest in suitable facilities or organize pertinent training for those in need. Teachers, in turn, should possess a clear understanding of both their own digital competence and their students' DL. This knowledge is essential for designing language learning activities that align with students' digital skills and contribute to effective language acquisition. Students, in turn, need to be conscious of their own DL to update their skills through interactions with teachers, peers, or various resources. This awareness enables students to complete language learning tasks, achieve learning objectives, enhance language proficiency, and acquire digital skills essential for future job requirements.

6.2 Contributions to research on EFL student and teacher DL

The current research contributes to the theories of student and teacher DL by synthesizing previous studies in this field. It addresses a gap by employing both subjective and objective assessments to evaluate student DL and compares the results of these two assessment types. The use of mixed methods ensures a comprehensive understanding of teacher DL, combining quantitative and qualitative approaches. This contribution is significant, considering that most previous studies in the literature relied on subjective instruments and quantitative methods to examine student and teacher DL. Regarding student DL, the study made a noteworthy contribution by validating an adapted questionnaire for measuring DL among language learners. The validation process occurred within the language learning environment, ensuring the instruments' reliability and validity before their application in assessing student and teacher DL. Additionally, the research explored the impact of media on data collection, comparing online and paper-and-pencil questionnaires in terms of reliability and validity, addressing existing controversies. Furthermore, the research developed a DL model tailored for Vietnamese language learners majoring in English. This model incorporated essential components from global DL frameworks, localized for Vietnamese students, and resulted in two new instruments: a DL questionnaire and a DL test. These instruments were validated in the Vietnamese higher education context, addressing the absence of official frameworks and instruments for evaluating student DL in language learning. The research also shed light on potential factors influencing student DL, such as gender, year-group level, curriculum, and the frequency of using technology for language learning. This identification of factors provides valuable insights for future research and contributes to the literature. In the context of teacher DL, the research validated adapted questionnaires tailored to EFL Vietnamese teachers. These instruments, derived from international sources, were modified and expanded to suit the specific

needs of EFL teachers. The inclusion of interview questions aimed to further investigate the precise DL status of teachers. Notably, the study addressed the limitations of previous research on teacher DL, which often focused on specific aspects, by incorporating necessary DL components for language teachers. The research on teacher DL also made a significant contribution by testing potential personal and school-related factors impacting teacher DL. This comprehensive examination adds valuable insights to the existing literature and provides a better understanding of how teacher DL operates in the specific context of higher education in Vietnam, benefiting stakeholders at micro, meso, and macro levels.

6.3 Limitations and suggestions for future research

The research has some limitations that should be acknowledged. The first concern is related to the sample size of the sub-studies. The participants in the study come from prestigious government higher education institutions in big cities in Vietnam, where ICT policies and digital facilities investment are prioritized. It does not include government universities in small provinces or mountainous areas. Additionally, samples from private universities and international institutions are not included in the study. Therefore, the findings of the research cannot be generalized to all educational EFL contexts in Vietnam. Furthermore, the research is cross-sectional in nature; thus, the results may change over time depending on the situation. DL of teachers and students is affected by many factors, including personal and institution-related factors; hence, the results of the assessment of DL of teachers and students are only appropriate in the specific research context at a specific time.

Another concern is about the DL instruments used in the research. The study employed some adapted and self-developed subjective and objective DL instruments, which were validated in the specific Vietnamese educational context. Therefore, the reliability, validity, and the construct of the instruments may change in another research context. To guarantee the reliability and validity of the instruments in the new educational context, the instruments should be validated before being used to measure DL of students or teachers in the new context. Additionally, technology is always updated and changing at a high speed; thus, DL components are also updated based on the development of the digital world. Therefore, the instruments used in the research are appropriate at the current time in the specific educational Vietnamese context; however, they should be updated when the time changes. In the case of the teacher DL instruments, in sub-study four, due to the condition of the research context, the research practitioner only used questionnaires and in-depth

interviews to explore teacher DL. Furthermore, a limitation also arises from the low number of participating teachers in the interviews. While a larger number of interviewees was anticipated to provide the authors with more comprehensive data on teacher DL, various factors affected the actual number. These factors included the distance between the research context and the residence of the research practitioner, time zone differences, and pandemic-related issues during the research period.

Based on the limitations of the research, some directions or suggestions for future research have been proposed. For example, future research may enlarge the sample size of the participants. Also, government universities in small provinces or mountainous areas, international universities, and private higher education institutions should be involved and compared so that the DL assessment of teachers and students is comprehensive. Regarding the DL instruments, updated DL assessment tools associated with new technologies and competencies should be conducted with a combination of subjective and objective assessments in longitudinal studies on this topic to gain a comprehensive understanding of DL among EFL students and teachers. Furthermore, at the time this study was conducted, artificial intelligence (AI) was not widely discussed or used in English language teaching and learning in Vietnamese higher education institutions. The study did not include AI-based technologies in the DL questionnaires or tests. Subsequent future studies can delve into DL assessment, including AI-based technologies, and explore the utilization of innovative AI technologies in language education. In the case of the teacher DL instruments, it is suggested that questionnaires and interviews should be combined with some more instruments to evaluate teacher DL more comprehensively (for example: lecture observation, test, etc.). The reason is that there may be cultural elements affecting the research result. In Vietnam, generally, males tend to be more confident, and teachers may not readily admit to mistakes, while female students tend to be more modest. This can significantly impact self-assessment and other subjective research. Besides, the focal aim of the current research is to evaluate teacher and student DL through cross-sectional studies. Factors that may affect student DL were predicted and explained through the Vietnamese educational EFL context, and some factors which affect teacher DL were explored at the same time of evaluating their DL. Therefore, future research may concentrate on revealing more extensive factors which may contribute to teacher and student DL.

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STUDENTS' DIGITAL LITERACY IN LANGUAGE LEARNING
(Sub-study 1 and Sub-study 2)

Section 1. Demographic information

Q1. Your gender

  a. female   b. male

Q2. Your year at university

  a. year 1   c. year 3

  b. year 2   d. year 4

Q3. Your birthday: day… month … year…

Q4. Please tick (√) the option that apply to you.

	No	Yes, but I do not use them.	Yes, and I use them.
1. Do you have a computer/ laptop at home?	0	1	2
2. Do you have an Internet access at home?	0	1	2
3. Can you use a computer/smart phone at school?	0	1	2
4. Do you have an Internet access at school?	0	1	2
5. Do you use a computer to learn English?	0	1	2
6. Do you use phone applications to learn English?	0	1	2
7. Are there other places where you can use a computer and access the Internet (Internet cafes, libraries, etc.)?	0	1	2

Q5. How long have you used the computer?

(1) No or less than 1 year   (3) 3-5 years   (5) More than 7 years

(2) 1-3 years   (4) 5-7 years

Q6. How long have you been studying English?

(1) A few days-2 years   (3) 6-8 years   (5) More than 12 years

(2) 3-5 years   (4) 9-11 years

Q7. How much do you like English?

(1) Strongly dislike   (3) Neutral   (5) Like very much

(2) Dislike   (4) Like

Section 2. General knowledge

Please choose the best answer for each question and put a tick (√) at the appropriate option.

Q8. Which device do you need to install on your computer in order to have a video conference with your friends?

    A. Scanner   B. Webcam   C. Printer   D. DVD player

Q9. Where does a digital camera store its pictures?

    A. Battery   B. Film   C. Adapter   D. Memory card

Q10. What are AVI and MP4 examples of?

    A. Digital audio file formats   B. Digital video file formats

    C. Digital graphic file formats   D. Digital text file formats

Q11. Which technology is the process of converting spoken words into text?

A. Audio analysis   B. Audio compression   C. Speech synthesis   D. Speech recognition

Q12. What is Bluetooth?
    A. A digital tool to add special effects to recorded audios and videos
    B. A program designed to disrupt or damage a computer system
    C. A technology standard for the short-range wireless interconnection of mobile devices
    D. A network security system that controls the incoming and outgoing network traffic

Q13. Which of the following does not need to be asked when evaluating information provided on websites?
    A. Accuracy   B. Authority   C. Computation   D. Currency

Q14. What is the term for junk emails or unsolicited messages sent over the Internet?
    A. Spam   B. Firewall   C. Malware   D. Spyware

Q15. What is the process of confirming your username and password on the computer?
    A. Authorization   B. Authentication   C. Hacking   D. Defamation

Q16. What is the fraudulent attempt to acquire sensitive information such as passwords and credit card details in an electronic communication?
    A. Synthesizing   B. Crowdsourcing   C. Phishing   D. Streaming

Q17. Which of the following is not considered to be safe password practice?
    A. Do not share passwords with others
    B. Increase the strength of a password with symbols
    C. Avoid using the same password across multiple user accounts
    D. Generate a password that is easy to guess systematically

Section 3. ICT Skills
Q18. How would you rate your skills for using each of the following? Please put a tick (√) in the box at the appropriate spot: 'Very Good', 'Good', 'Acceptable', 'Poor', 'Very Poor', or 'Do Not Know'.

	Working with:	Very poor	poor	Acceptable	good	Very good
1	Word processing applications (e.g., MS Word)	1	2	3	4	5
2	Spreadsheet applications (e.g., MS Excel)	1	2	3	4	5
3	Database applications (e.g., MS Access)	1	2	3	4	5
4	Presentation applications (e.g., MS PowerPoint, Prezi, Sway, etc.)	1	2	3	4	5
5	Communication applications (e.g., Skype, Zoom,)	1	2	3	4	5
6	Learning management systems (e.g., Moodle)	1	2	3	4	5
7	Virtual worlds (e.g., Second Life)	1	2	3	4	5
8	Social networking services (e.g., Facebook)	1	2	3	4	5
9	Blogs (e.g., Blogger)	1	2	3	4	5
10	Wikis (e.g., PBworks)	1	2	3	4	5
11	Podcasts (e.g., Apple Podcasts)	1	2	3	4	5
12	File sharing sites (e.g., Dropbox)	1	2	3	4	5
13	Photo sharing sites (e.g., Picasa)	1	2	3	4	5
14	Video sharing sites (e.g., YouTube)	1	2	3	4	5
15	Web design applications (e.g., Dreamweaver)	1	2	3	4	5
16	Web search engines (e.g., Google)	1	2	3	4	5
17	Dictionary apps (e.g., Dictionary.com)	1	2	3	4	5

Q19. Please tick (√) one that best applies.

		Very poor	poor	Acceptable	good	Very good
1	How would you rate your typing skills?	1	2	3	4	5
2	How would you rate your web search skills?	1	2	3	4	5
3	How would you rate your computer literacy (the ability to use the computer)?	1	2	3	4	5
4	How would you rate your Internet literacy (the ability to use the Internet)?	1	2	3	4	5
5	How would you rate your digital literacy (the ability to use digital technologies)?	1	2	3	4	5

Q20. Please respond to each of the following questions by putting a tick (√) in the box at the appropriate spot: 'Yes' or 'No'.

		Yes	No
1	Can you change computer screen brightness and contrast?	1	0
2	Can you minimize, maximize and move windows on the computer screen?	1	0
3	Can you use a 'search' command to locate a file?	1	0
4	Can you scan disks for viruses?	1	0
5	Can you write files onto a CD, a DVD or a USB drive?	1	0
6	Can you create and update web pages?	1	0
7	Can you take and edit digital photos?	1	0
8	Can you record and edit digital sounds?	1	0
9	Can you record and edit digital videos?	1	0
10	Can you download and use apps on digital devices?	1	0

Section 4. Attitudes towards ICT
Q21. Please, rate the following statements

	disagree	partly disagree	partly agree	agree
1. Using a computer for learning is very important to me.	1	2	3	4
2. Using a tablet for learning is very important to me.	1	2	3	4
3. Using a smartphone for learning is very important to me.	1	2	3	4
4. Using ICT tools for learning is very important to me.	1	2	3	4

5. Using a computer for learning makes me happy.	1	2	3	4
6. Using ICT tools for learning makes me happy.	1	2	3	4
7. I use ICT tools for learning because I'm very interested in IT.	1	2	3	4
8. I save time if I use a computer for learning.	1	2	3	4
9. I save time if I use ICT tools for learning.	1	2	3	4
10. I can focus on learning more if I use ICT tools.	1	2	3	4
11. I can understand the material much more easily, if I use ICT tools.	1	2	3	4
12. I can remember what I've learnt better if I use ICT tools.	1	2	3	4
13. ICT tools play an important role in my learning process.	1	2	3	4
14. ICT tools make learning faster for me.	1	2	3	4
15. ICT tools improve my grades.	1	2	3	4
16. Information is much more easily available by using ICT tools than by visiting the library.	1	2	3	4
17. I cannot learn without using ICT tools.	1	2	3	4
18. ICT tools create a better atmosphere in the classroom.	1	2	3	4
19. Teachers give us guidance on how to use ICT tools for learning tasks to be completed at home.	1	2	3	4
20. Teachers give us guidance on how to use ICT tools for learning.	1	2	3	4
21. Teachers support the use of ICT tools for learning.	1	2	3	4
22. Teachers should incorporate the use of ICT tools into their teaching.	1	2	3	4
23. The material covered does not allow for the use of ICT tools in class.	1	2	3	4
24.The material covered does not allow for the use of ICT tools at home.	1	2	3	4

Section 5. Frequency of ICT use
Q22. How often do you engage in the following activities in language learning?

	almost never	some-times	often	almost always
1. I use a computer as part of my learning process.	1	2	3	4
2. My teachers use a computer during their classes.	1	2	3	4
3. My teachers expect me to use a computer as part of my learning process.	1	2	3	4
4. Virtual learning environments are used in the courses I'm enrolled in.	1	2	3	4

Q23. Please, tell us how frequently you use the following tools in language learning.

	almost never	some-times	often	almost always
1. Online learning with a native speaker (e.g. Language Exchange Community)	1	2	3	4
2. Blogs	1	2	3	4
3. Audio/video chat (e.g. Skype, Ms Teams, Zoom, Facebook Messenger, etc.)	1	2	3	4
4. E-mail	1	2	3	4
5. Target language encyclopedias/lexicons (e.g. Wikipedia)	1	2	3	4
6. Excel	1	2	3	4
7. Social media (e.g. Facebook, Twitter, Instagram)	1	2	3	4
8. Films/videos with English subtitles	1	2	3	4
9. Films/videos with original subtitles	1	2	3	4
10. Films/videos without subtitles	1	2	3	4
11. Translation software (e.g. Google Translate)	1	2	3	4

12. Monolingual dictionaries (e.g. Cambridge/Oxford/Duden)	1	2	3	4
13. Internet browsers	1	2	3	4
14. Instant messaging/text chat (e.g. Facebook Messenger, Hangouts)	1	2	3	4
15. Note-taking software (e.g. OneNote, Evernote)	1	2	3	4
16. Photo editing	1	2	3	4
17. Bilingual dictionaries (e.g. English-French)	1	2	3	4
18. Pronunciation tutorial videos	1	2	3	4
19. Smartphone apps	1	2	3	4
20. Online courses (MOOC)	1	2	3	4
21. Presentations (e.g. PowerPoint, Prezi, Sway, etc.)	1	2	3	4
22. Programming	1	2	3	4
23. Podcasts	1	2	2	4
24. Simulations	1	2	3	4
25. Word games	1	2	3	4
26. Dictionaries	1	2	3	4
27. Text editing	1	2	3	4
28. Vlogs	1	2	3	4

BẢNG KHẢO SÁT SINH VIÊN VỀ VIỆC SỬ DỤNG CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG TRONG VIỆC HỌC TẬP MÔN TIẾNG ANH

Phần 1. Thông tin cá nhân

Câu hỏi 1. Giới tính của em: ☐ nữ   ☐ nam

Câu hỏi 2. Sinh viên: ☐ năm nhất   ☐ năm hai   ☐ năm ba   ☐ năm tư

Câu hỏi 3. Ngày sinh: ngày … tháng … năm …

Câu hỏi 4. Hãy khoanh tròn vào số phù hợp (0: không hoặc 1: Có nhưng không sử dụng hoặc 2: Có và có sử dụng) cho các câu hỏi sau

	Không	Có nhưng không sử dụng	Có và có sử dụng
1. Em có máy tính/laptop ở nhà không?	0	1	2
2. Em có kết nối mạng khi ở nhà không?	0	1	2
3. Em có được sử dụng máy tính/ điện thoại khi ở trường không?	0	1	2
4. Em có thể sử dụng Internet khi ở trường không?	0	1	2
5. Em có sử dụng máy tính để học tiếng Anh không?	0	1	2
6. Em có sử dụng các ứng dụng trên điện thoại để học tiếng Anh không?	0	1	2
7. Em có dùng máy tính / điện thoại để vào Internet ở các nơi khác không? (ví dụ: cafe Internet, thư viện, ...)?	0	1	2

Câu hỏi 5. Em đã dùng máy tính bao nhiêu lâu rồi?
(1) Không hoặc ít hơn 1 năm   (2) 1-3 năm   (3) 3-5 năm   (4) 5-7 năm   (5) Nhiều hơn 7 năm

Câu hỏi 6. Em đã học tiếng Anh được bao lâu rồi?
(1) vài ngày-2 năm   (2) 3-5 năm   (3) 6-8 năm   (4) 9-11 năm   (5) Hơn 12 năm

Câu hỏi 7. Mức độ thích tiếng Anh của em?
(1) Rất không thích   (2) Không thích   (3) Bình thường (4) Thích   (5) Rất thích

Phần 2. Kiến thức chung
Chọn một câu trả lời mà em cho là đúng cho các câu hỏi sau
Câu hỏi 8. Thiết bị nào cần được cài đặt trên máy tính để có thể gọi video với thầy cô hoặc bạn bè?
    A. Máy quét   B. Webcam   C. Máy in   D. Đầu DVD
Câu hỏi 9. Máy ảnh kỹ thuật số lưu trữ hình ảnh ở đâu?
    A. Pin   B. Phim   C. Bộ chuyển đổi   D. Thẻ nhớ
Câu hỏi 10. AVI và MP4 là đuôi của định dạng nào sau đây
    A. Định dạng tệp âm thanh kỹ thuật số   B. Định dạng tệp video kỹ thuật số
    C. Định dạng tệp đồ họa kỹ thuật số   D. Định dạng tệp văn bản kỹ thuật số
Câu hỏi 11. Công nghệ nào thực hiện chuyển đổi lời nói thành văn bản?
    A. Phân tích âm thanh   B. Nén âm thanh   C. Tổng hợp giọng nói   D. Nhận dạng giọng nói
Câu hỏi 12. Bluetooth là gì?
    A. Một công cụ kỹ thuật số để thêm các hiệu ứng đặc biệt vào âm thanh và video
    B. Một chương trình được thiết kế để phá vỡ hoặc làm hỏng hệ thống máy tính
    C. Một chuẩn công nghệ dùng cho kết nối không dây các thiết bị di động ở khoảng cách ngắn
    D. Hệ thống bảo mật mạng điều khiển lưu lượng mạng vào và ra
Câu hỏi 13. Điều nào sau đây **không** quan trọng khi đánh giá thông tin được cung cấp trên các trang web?

A. Tác giả   B. Nguồn phát hành   C. Tốc độ tải trang   D. Tính cập nhật

Câu hỏi 14. Thuật ngữ cho email rác hoặc tin nhắn không mong muốn được gửi qua Internet là gì?

A. Spam   B. Tường lửa   C. Phần mềm độc hại   D. Phần mềm gián điệp

Câu hỏi 15. Quá trình xác nhận tên người dùng và mật khẩu của bạn trên máy tính là gì?

A. Ủy quyền   B. Xác thực   C. Hack   D. Sự phỉ báng

Câu hỏi 16. Nỗ lực gian lận để có được thông tin như mật khẩu và chi tiết thẻ tín dụng trong giao tiếp điện tử là gì?

A. Tổng hợp   B. Khảo sát đám đông   C. Lừa đảo   D. Truyền phát

Câu hỏi 17. Điều nào sau đây **không** được coi là giữ an toàn cho mật khẩu?

A. Không chia sẻ mật khẩu với người khác

B. Tăng độ mạnh của mật khẩu bằng các ký hiệu

C. Tránh sử dụng cùng một mật khẩu trên nhiều tài khoản người dùng

D. Tạo mật khẩu dễ đoán một cách có hệ thống

Phần 3. Kĩ năng

Câu hỏi 18. Em đánh giá kĩ năng sử dụng các ứng dụng CNTT của mình như thế nào?

Khoanh tròn lựa chọn mà em thấy phù hợp với năng lực của em: Không biết (1), Kém (2), Trung bình (3), Tốt (4), Rất tốt (5)

	Không biết	Kém	Trung bình	Tốt	Rất tốt
1. Các ứng dụng xử lý văn bản (Ms Word, Google docs, …)	1	2	3	4	5
2. Các ứng dụng bảng tính (Ms Excel, Google sheets, …)	1	2	3	4	5
3. Các ứng dụng cơ sở dữ liệu (Google, Youtube, Amazon, Ms Acess, …)	1	2	3	4	5
4. Các ứng dụng thuyết trình (Ms PowerPoint, Prezi, Sway, …)	1	2	3	4	5
5. Các ứng dụng giao tiếp (Ms Teams, Skype, Zoom, …)	1	2	3	4	5
6. Các hệ thống quản lý học tập (Moodle, Edmodo, Schoology, Blackboard, …)	1	2	3	4	5
7. Thực tế ảo (Minecraft, Merge cube, CoSpaces, Second Life, …)	1	2	3	4	5
8. Các dịch vụ mạng xã hội (Facebook, Instagram, Twitter, Whatsapp, …)	1	2	3	4	5
9. Blog (Blogger.com)	1	2	3	4	5
10. Wiki (PBworks, WikiHow, Wikitravel, Wikibooks, …)	1	2	3	4	5
11. Podcast (Apple podcast, …)	1	2	3	4	5
12. Các ứng dụng chia sẻ tập tin (Onedrive,Google drive, Dropbox, …)	1	2	3	4	5
13. Các ứng dụng chia sẻ hình ảnh (Google Photo, Flickr, Picasa, …)	1	2	3	4	5
14. Các ứng dụng chia sẻ video (YouTube, Google Video, Dailymotion, …)	1	2	3	4	5
15. Các ứng dụng thiết kế trang web (Dreamweaver, Notepad++, Firebug, ...)	1	2	3	4	5
16. Các công cụ tìm kiếm (Google, Bing, Yahoo, …)	1	2	3	4	5
17. Các ứng dụng từ điển (Dictionary, English Dictionary, …)	1	2	3	4	5

Câu hỏi 19. Em đánh giá năng lực sử dụng CNTT của mình như thế nào?
Khoanh tròn chọn lựa mà em thấy phù hợp với năng lực của em: Không biết (1), Kém (2), Trung bình (3), Tốt (4), Rất tốt (5)

	Không biết	Kém	Trung bình	Tốt	Rất tốt
1. Kỹ năng đánh máy	1	2	3	4	5
2. Kĩ năng tìm kiếm thông tin	1	2	3	4	5
3. Kĩ năng sử dụng máy tính	1	2	3	4	5
4. Kĩ năng sử dụng Internet	1	2	3	4	5
5. Kĩ năng sử dụng các công nghệ kỹ thuật số	1	2	3	4	5

Câu hỏi 20. Khoanh tròn Có (1) hoặc Không (0) để trả lời các câu hỏi sau

	Có	Không
1. Em có thể thay đổi độ sáng và độ tương phản của màn hình máy tính không?	1	0
2. Em có thể thu nhỏ, phóng to và di chuyển các cửa sổ trên màn hình máy tính không?	1	0
3. Em có thể sử dụng lệnh 'search' (Tìm kiếm) để tìm một tệp không?	1	0
4. Em có thể quét virus cho đĩa không?	1	0
5. Em có thể lưu tập tin vào đĩa CD, DVD hoặc ổ USB không?	1	0
6. Em có thể tạo và cập nhật các trang web không?	1	0
7. Em có thể chụp và chỉnh sửa ảnh không?	1	0
8. Em có thể ghi âm và chỉnh sửa âm thanh không?	1	0
9. Em có thể quay và chỉnh sửa video không?	1	0
10. Em có thể tải xuống và sử dụng các ứng dụng trên các thiết bị kỹ thuật số không?	1	0

Phần 4. Quan điểm đối với việc sử dụng CNTT để học tiếng Anh
Câu hỏi 21. Hãy cho các phản hồi phù hợp cho những nhận xét sau đây

	không đồng ý	không đồng ý một phần	đồng ý một phần	đồng ý
1. Sử dụng máy tính để học tập rất quan trọng đối với em.	1	2	3	4
2. Sử dụng máy tính bảng để học tập rất quan trọng đối với em.	1	2	3	4
3. Sử dụng điện thoại thông minh để học tập rất quan trọng với em.	1	2	3	4
4. Sử dụng các công cụ CNTT để học tập rất quan trọng với em.	1	2	3	4
5. Sử dụng máy tính để học khiến em vui.	1	2	3	4
6. Sử dụng các công cụ CNTT vào việc học tập khiến em vui.	1	2	3	4

7. Em sử dụng các công cụ CNTT để học vì em hứng thú với CNTT.	1	2	3	4
8. Em tiết kiệm thời gian nếu em sử dụng máy tính để học.	1	2	3	4
9. Em tiết kiệm thời gian nếu em sử dụng các công cụ CNTT khi học tập.	1	2	3	4
10. Em có thể tập trung vào việc học nhiều hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
11. Em có thể hiểu bài dễ dàng hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
12. Em có thể nhớ những gì em đã học tốt hơn nếu em sử dụng các công cụ CNTT.	1	2	3	4
13. Các công cụ CNT có vai trò quan trọng đối với em trong quá trình học tập.	1	2	3	4
14. Công cụ CNTT giúp em học nhanh hơn.	1	2	3	4
15. Công cụ CNTT cải thiện điểm số của em.	1	2	3	4
16. Em tìm kiếm được nhiều thông tin hơn bằng cách sử dụng các công cụ CNTT so với việc đến thư viện.	1	2	3	4
17. Em không thể học mà không sử dụng các công cụ CNTT.	1	2	3	4
18. Các công cụ CNTT tạo ra bầu không khí tốt hơn trong lớp học.	1	2	3	4
19. Giáo viên hướng dẫn chúng em cách sử dụng công cụ CNTT để hoàn thành bài tập về nhà.	1	2	3	4
20. Giáo viên hướng dẫn chúng em cách sử dụng công cụ CNTT để học tập.	1	2	3	4
21. Giáo viên hỗ trợ việc sử dụng các công cụ CNTT trong học tập.	1	2	3	4
22. Các công cụ CNTT nên được kết hợp vào giảng dạy.	1	2	3	4
23. Cở sở vật chất không đáp ứng để sử dụng các công cụ CNTT trong lớp.	1	2	3	4
24. Cơ sở vật chất không đáp ứng để sử dụng các công cụ CNTT ở nhà.	1	2	3	4

Phần 5. Tần suất sử dụng CNTT để học tiếng Anh
Câu hỏi 22. Em có thường xuyên tham gia vào các hoạt động học tập sau đây để học tiếng Anh không?

	hầu như không bao giờ	thỉnh thoảng	thường	hầu như thường xuyên
1. Em sử dụng máy tính như một phần trong quá trình học tập của mình.	1	2	3	4
2. Giáo viên của em sử dụng máy tính trong các buổi học.	1	2	3	4
3. Giáo viên của em muốn em sử dụng máy tính trong quá trình học tập.	1	2	3	4
4. Môi trường học tập ảo được sử dụng trong các khóa học em tham gia.	1	2	3	4

Câu hỏi 23. Tần suất em sử dụng các ứng dụng CNTT sau đây để học tiếng Anh như thế nào?

	hầu như không bao giờ	thỉnh thoảng	thường	hầu như thường xuyên
1. Học trực tuyến với người bản ngữ (Language Exchange Community)	1	2	3	4
2. Blog (nhật ký trực tuyến trên web để mô tả sự việc hoặc sự kiện)	1	2	3	4
3. Trò chuyện âm thanh/ video (Skype, Ms Teams, Zoom, Facebook Messenger, …)	1	2	3	4
4. Email	1	2	3	4
5. Từ điển bách khoa toàn thư / từ vựng (Wikipedia, …)	1	2	3	4
6. Exel	1	2	3	4
7. Các mạng xã hội (Facebook, Twitter, Instagram, …)				
8. Phim / video có phụ đề tiếng Việt	1	2	3	4
9. Phim/video có phụ đề tiếng Anh	1	2	3	4
10. Phim / video không có phụ đề	1	2	3	4
11. Phần mềm dịch thuật (Google dịch, …)	1	2	3	4
12. Từ điển đơn ngữ Anh -Anh (Cambridge/Oxford/Duden, …)	1	2	3	4
13. Trình duyệt Internet (Google Chrome, Internet Explorer, Firefox, Safari, Opera, …)	1	2	3	4

14. Tin nhắn / trò chuyện bằng văn bản (Facebook, Messenger, Hangouts, …)	1	2	3	4
15. Phần mềm ghi chú (OneNote, Evernote, …)	1	2	3	4
16. Phần mềm chỉnh sửa ảnh (Photohsop, Picasa, …)	1	2	3	4
17. Từ điển song ngữ (Anh - Việt)	1	2	3	4
18. Các video hướng dẫn phát âm	1	2	3	4
19. Các ứng dụng trên điện thoại thông minh	1	2	3	4
20. Các khóa học online (MOOCs, …)	1	2	3	4
21. Các phần mềm hỗ trợ thuyết trình (PowerPoint, Prezi, Sway, …)	1	2	3	4
22. Các phần mềm lập trình	1	2	3	4
23. Podcast	1	2	2	4
24. Các ứng dụng mô phỏng để sử dụng tiếng Anh trong ngữ cảnh (VirtualSpeech, ClassVR, AltspaceVR, …)	1	2	3	4
25. Trò chơi từ vựng	1	2	3	4
26. Từ điển	1	2	3	4
27. Các chương trình chỉnh sửa văn bản (Ms Word, …)	1	2	3	4
28. Vlog (nhật ký bằng video để mô tả sự việc hoặc sự kiện)	1	2	3	4

APPENDIX B
EFL STUDENTS' ASSESSMENT OF DIGITAL LITERACY
(TRANSLATED INTO ENGLISH)
(Sub-study 3)

Dear student,

Digital technology has recently become an essential element which impacts the success of learning English as a Foreign Language (EFL), and students' level of Digital Literacy (DL) plays a significant role in using technologies to facilitate the language learning acquisition. We would like to invite you to take part in the research which aims to investigate Vietnamese's DL in EFL context. The assessment takes about 30 minutes. The collected data is only used for research purposes.

Thank you for your participation! We wish you success in your academic career. The assessment includes 3 main parts, as follows:

Part 1. Demographic information

Part 2. Digital Literacy Self-Assessment

Part 3. Digital Literacy Test

Part 1. Demographic information

Please answer the following questions about you.

1. Your gender: ❒ Male   ❒ Female
2. Your age: …
3. Your major: …

4. Your year in college/ university?
   ❒ Freshman
   ❒ Sophomore
   ❒ Junior
   ❒ Senior

5. How long have you used digital technologies for English learning?
   ❒ Never or less than 1 year
   ❒ 1-3 years
   ❒ 3-5 years
   ❒ ≥ 5 years

6. How often do you use digital devices for English learning in these places? Please tick (√) the option that applies to you.

	Several times a day	Every day	Almost every day	A few times each week	Less than once a week or never
At home	❒	❒	❒	❒	❒
At school	❒	❒	❒	❒	❒

7. What types of digital devices do you use in these places for English learning? Please tick (√) the option that applies to you.

	Desktop computer	Portable computer	Tablet devices	Smart phone	None
At home	❒	❒	❒	❒	❒
At school	❒	❒	❒	❒	❒

8. How long have you been learning English? Please tick (√) the option that applies to you.

❒ Less than 1 year
❒ 1-3 years
❒ 4-6 years
❒ More than 7 years

9. What is your current level of English? (According to Common European Framework of Reference for Languages)? Please tick (√) the one that applies to you.

❒ Beginner   ❒ Upper intermediate
❒ Elementary   ❒ Advanced
❒ Intermediate   ❒ Proficiency

10. Have you ever joined any ICT courses? Please tick (√) the one that applies to you.

❒ Yes   ❒ No

Part 2. Digital Literacy Self-Assessment

Please rate the following statements.

Statement	Disagree	Partly disagree	Partly agree	Agree
1. I am able to complete the English knowledge or skill assessment on digital learning platforms (e.g., Kahoot, Nearpod, Google forms, etc.).	1	2	3	4
2. I am able to create multi-media English presentation with sounds/pictures/videos on digital tools (e.g., MS PowerPoint, Sway, Prezi, Canva, etc.).	1	2	3	4
3. I am able to create content for English writing assignment on digital tools (e.g., MS Word, MS Excel, Canvas, etc.).	1	2	3	4
4. I am able to record and edit video/audio for English speaking tasks on digital tools to produce digital content (e.g., Flipgrid, YouTube, etc.).	1	2	3	4
5. I am able to practice and expand my English vocabulary by using digital technology. (e.g., Quiz let, Words with friends, etc.).	1	2	3	4
6. I am able to browse, search and filter information from the English digital resources. (e.g., Google scholar, Scopus, Wiki, etc.).	1	2	3	4
7. I am able to store and retrieve English learning materials on	1	2	3	4

digital devices and platforms.				
8. I am able to upload English files to digital devices and learning management platforms.	1	2	3	4
9. I am able to add subtitles for English listening videos on digital tools (e.g., YouTube, etc.).	1	2	3	4
10. I am able to use drawing, painting and graphic programs for English language digital content creation (e.g., Canva, Adobe Photoshop, Microsoft Paint, etc.)	1	2	3	4
11. I am able to use some programming software to create the digital content for English learning (e.g., Scratch, etc.).	1	2	3	4
12. I am able to communicate with English teachers and classmates via digital tools (e.g., Zoom, Skype, MS Teams, etc.).	1	2	3	4
13. I am able to share information (documents/videos/audios/images) to English teachers and classmates via digital learning platforms (e.g., Gmail, MS Teams, Zoom, Canvas, etc.).	1	2	3	4
14. I am able to collaborate with my classmates to complete groupwork tasks on digital platforms. (e.g., Google Slides, SharePoint, Google Docs, etc.).	1	2	3	4
15. I am able to participate in online community through the use of digital devices and services.	1	2	3	4
16. I am able to protect my personal information when using digital tools for English learning.	1	2	3	4
17. I am able to avoid online threats (internet harassment, privacy violations, cyberbullying, etc.) when using digital devices for English learning (e.g., Zoom, Facebook, etc.).	1	2	3	4
18. I am able to protect digital devices by using antivirus software (e.g., Avast, Kaspersky, etc.).	1	2	3	4
19. I am able to change account passwords for internet service or websites (e.g., Email, etc.).	1	2	3	4
20. I am able to access a number of English language learning resources (e.g., British council, TEDx program, BBC Learning English, etc.)	1	2	3	4
21. I am able to self update digital skills to facilitate English language learning.	1	2	3	4
22. I am able to recognize digital trends to learn English on digital platforms and resources.	1	2	3	4
23. I am able to recognize opportunities to learn English on digital platforms and resources.	1	2	3	4

Part 3. Digital Literacy Test

Please select one answer for each of the following questions.

Question 1: Lan is on an online lesson. The teacher sends her the link to join the live lecture on Nearpod. After that, the teacher asks Lan and her classmates to do a gap-filling task to check their understanding. To do the task, what should Lan do?
A. Type the correct answers in the blanks
B. Drag and drop the words in the bottom to the blanks
C. Copy the word in the bottom and paste to the blanks
D. All are correct.
E. I don't know.

Question 2. How can you insert an online video in PowerPoint 2013?

A. Go to **Insert/ Video/ This device/ Choose the video/ Open**

B. Go to **Insert/ Video/ Stock video /Upload video**

C. Go to **Insert/ Video/ Online videos/ Indicate the address/ Insert**

D. Both A and C are correct.

E. I don't know.

Question 3. When working on Microsoft PowerPoint, themes can be selected under

    A.   Draw Tab

    B.   Design Tab

C. Transitions Tab
D. Animations Tab
E. I don't know.
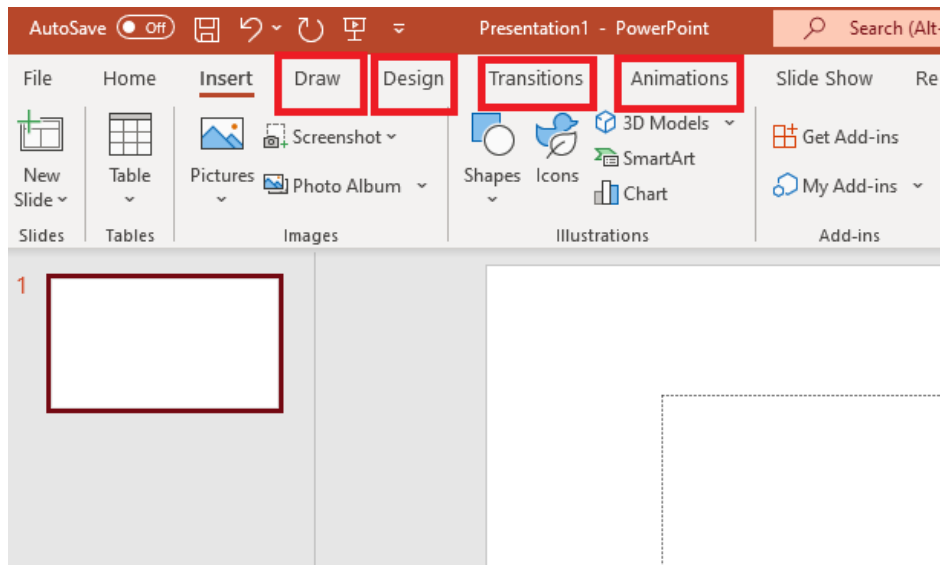
Question 4. Lan is preparing a presentation for her English class. How can she save it?
A. Click on icon 1
B. Click on icon 2
C. Press Ctrl+ S
D. A & C are correct.
E. I don't know.
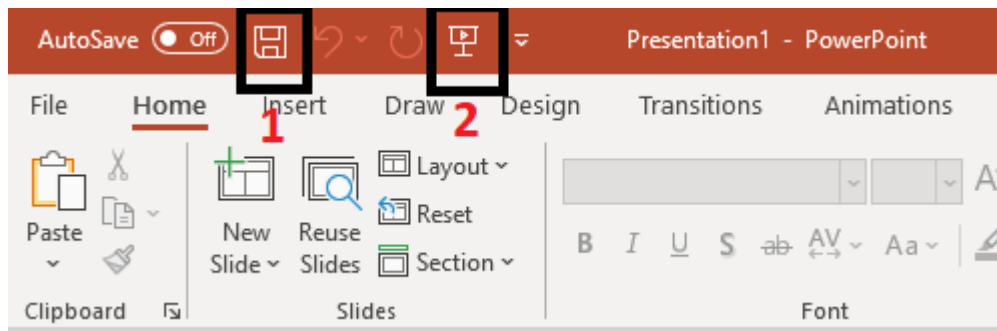
Question 5. Lan is reviewing her PowerPoint presentation. How can she start to slide show it?
A. Click on icon 1
B. Press F5
C. A & B are correct.
D. Click on icon 2
E. I don't know.

Question 6. When doing an assignment on Microsoft Word, you can hyperlink the file by:
  A. Press Ctrl+K
  B. Press Ctrl+Shift+K
  C. Hyperlinks command from insert menu
  D. Both A & C are correct.
  E. I don't know.

Question 7. When working on an English assignment in Microsoft Word, how can you correct spelling and grammar errors if the spelling and grammar tool cannot identify the error?
  A. Spelling and grammar command from Tools menu
  B. Options command from Tools menu
  C. Press F7
  D. All are correct.
  E. I don't know.

Question 8. Lan needs to upload her English speaking task from the desktop (the picture on the right) to a cloud drive (the picture on the left). What can she do to upload the file?
  A. Select New/ Choose Upload a file
  B. Drag and drop the file to the cloud drive environment
  C. Click the right mouse on the cloud drive environment/ Upload a file
  D. All are correct.
  E. I don't know.
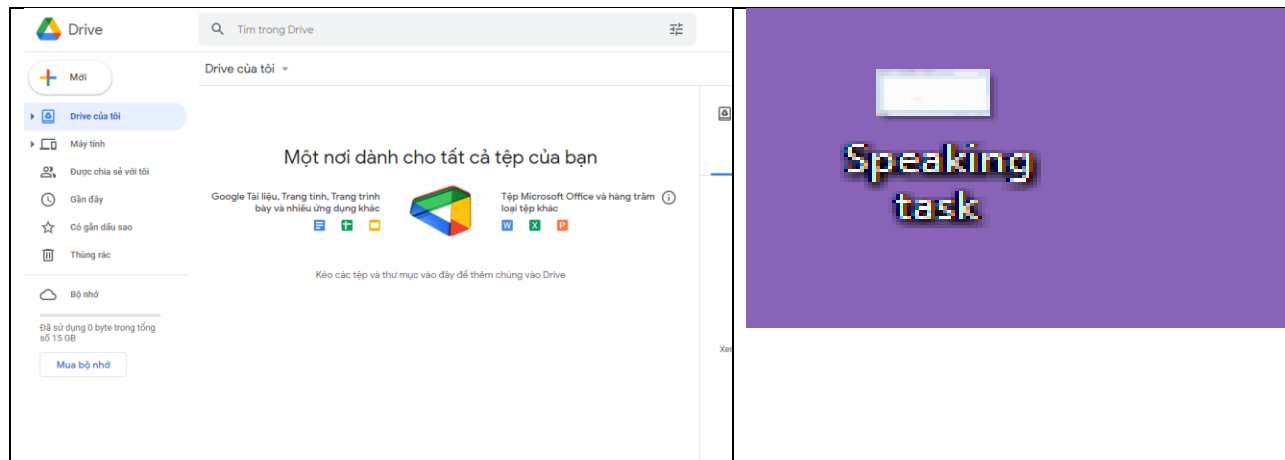
Question 9. On YouTube, which button includes the function of shortening a video?
  A. Create the video
  B. Share the video
  C. Download the video
  D. Save the video
  E. I don't know.
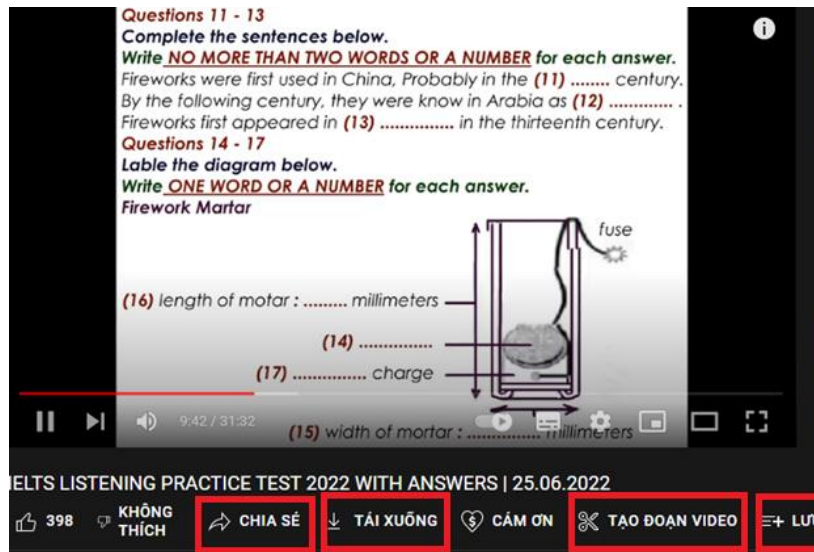
Question 10. Arrange the steps to subtitle a video on your YouTube channel content: From the left menu, select Subtitles (1), Sign in YouTube Studio (2), Click Add language and select your language (3), Select the video (4), Under subtitles, click Add (5).

    A.   (2) (1) (4) (3) (5)
    B.   (1) (2) (4) (3) (5)
    C.   (1) (2) (5) (4) (3)
    D.   (2) (4) (1) (3) (5)
    E.   I don't know.
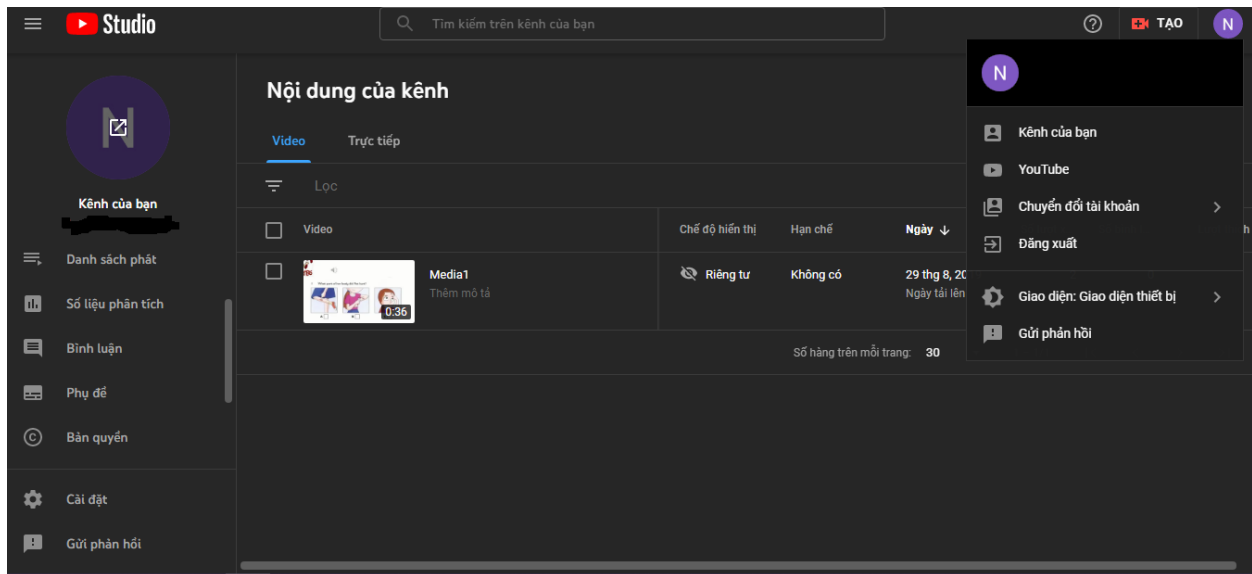
Question 11. When designing a story on Scratch for creating an English story, what is the function of the yellow button?

    A.   Change the character's outfit
    B.   Change the character's name
    C.   Change the story background
    D.   Change the character's voice
    E.   I don't know.
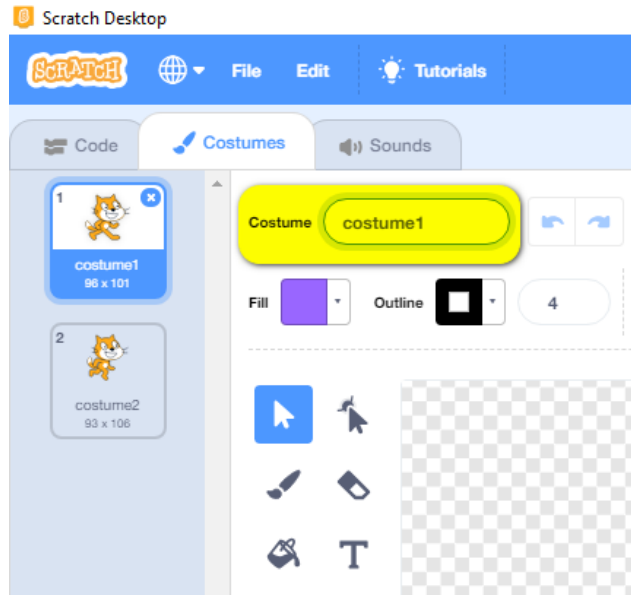
Question 12. On Scratch, which command block allows you to hide or show the character?
- A. Motion
- B. Looks
- C. Sound
- D. Events
- E. I don't know.
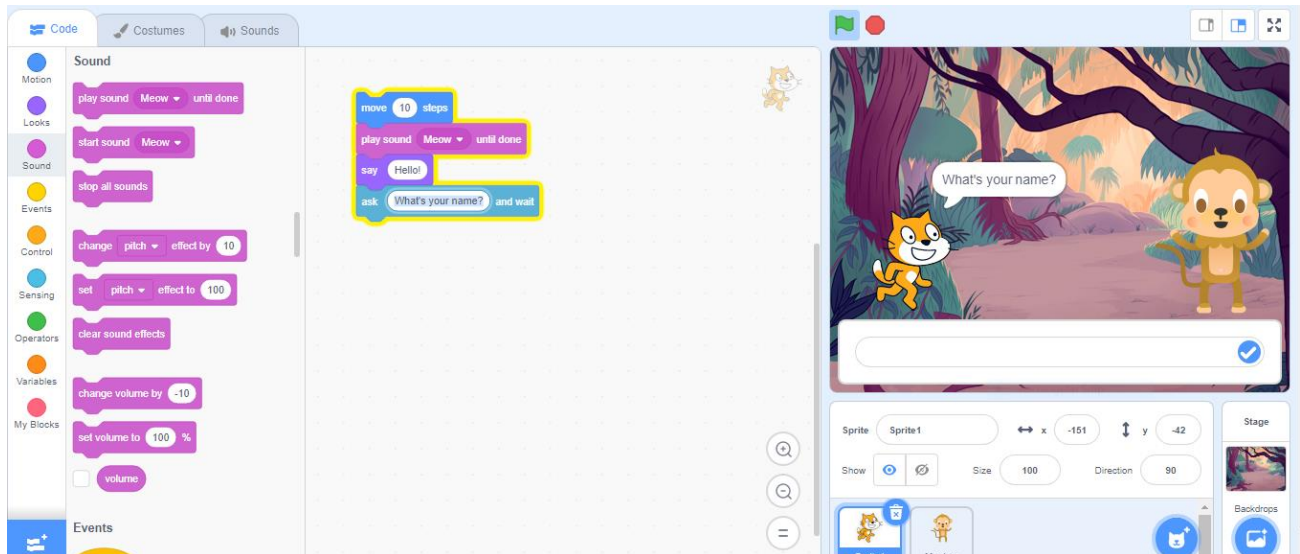
Question 13. In Microsoft Paint, what do you use the icon 3 for?
- A. Drawing
- B. Change font color
- C. Typing messages
- D. Erasing
- E. I don't know.

Question 14. In MS Access 2007, what is the meaning of this function?
- A. To run from Access
- B. To run/ test Query
- C. To run a form
- D. To run an input mask
- E. I don't know.

Question15. When searching information on Google, which of the following is the right option to search for an exact phrase?
- A. + British holidays
- B. (British holidays)
- C. "British holidays"
- D. /British holidays/
- E. I don't know.

Question 16. Hoa uploaded her English speaking file to a cloud drive. Right-click on the uploaded file via the teacher's email. Order the steps to share her file with her teacher: Click on Send (1), Right-click on the uploaded file (2), Click on Share (3), Type the teacher's email (4).
- A. (1), (2), (3), (4)
- B. (2), (3), (4), (1)
- C. (2), (4), (1), (3)

D. (2), (3), (1), (4)
E. I don't know.
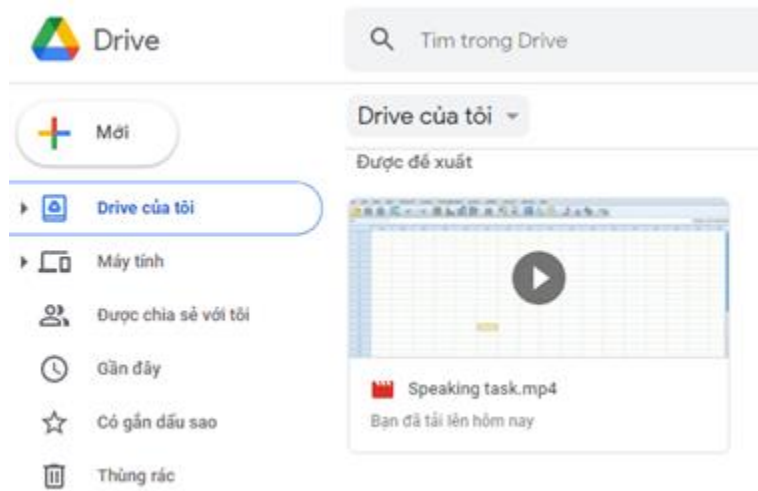
Question 17. During the online English class on Skype, the teacher raises a question about an important issue and would like you to collect the ideas of the class. What icon can you use to create a poll on Skype?
   A. Number 1
   B. Number 2
   C. Number 3
   D. Number 4
   F. I don't know.
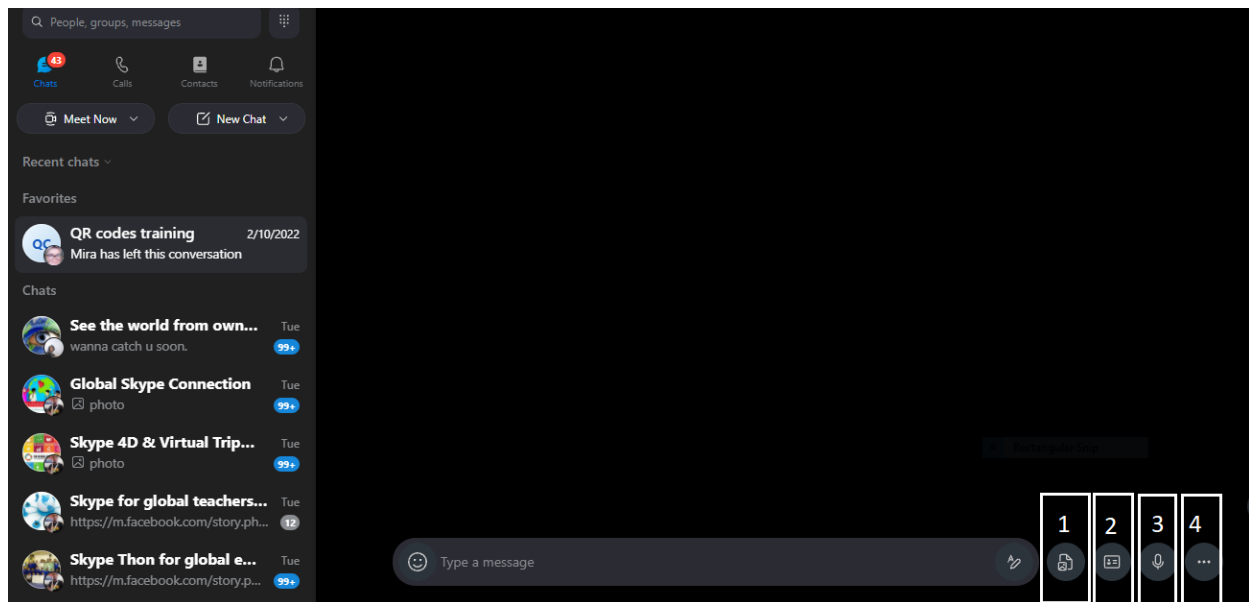
Question 18. How can an accidentally deleted slide in a Google slides presentation be recovered?
   A. Click the Undo icon on the toolbar
   B. Press Ctrl + Z keys
   C. Use revision history to restore the previous version
   D. All are correct.
   E. I don't know.
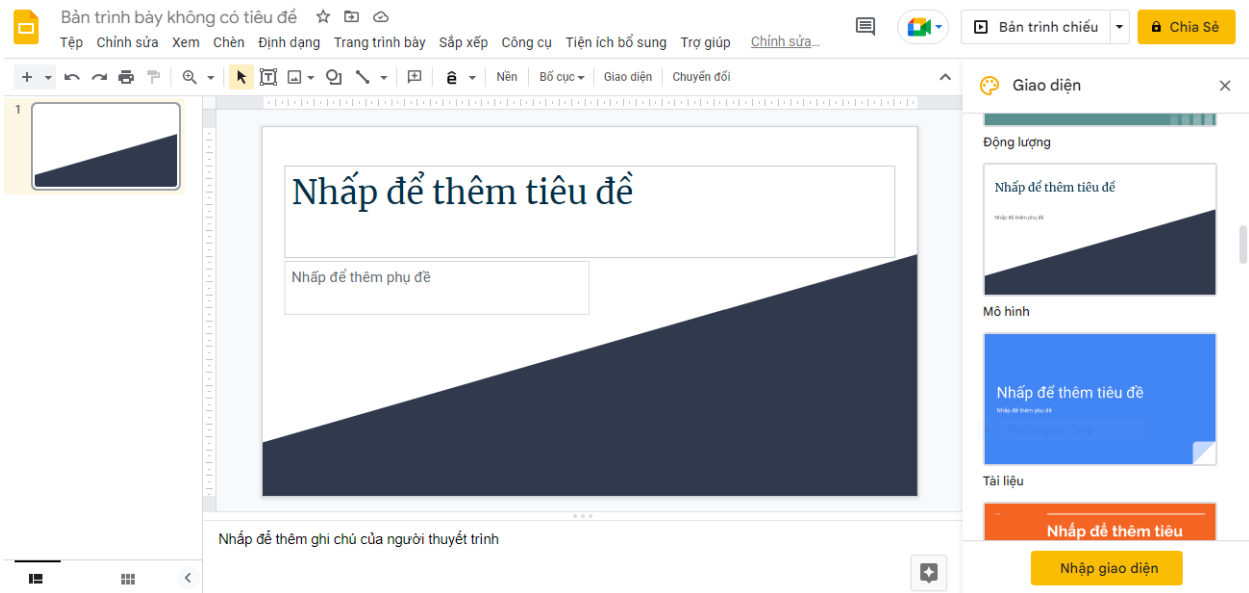
Question 19. On Google slides, which icon can help to add comments to the slides?

- A. Number 1
- B. Number 2
- C. Number 3
- D. Number 4
- E. I don't know.
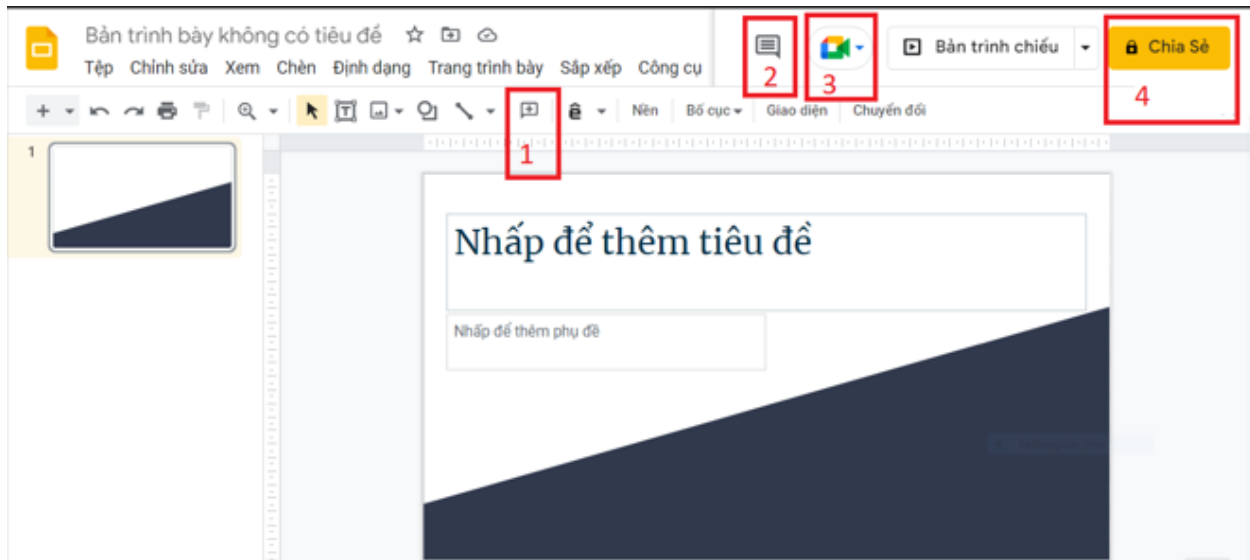
Question 20. You need to create a group of English learning students on Facebook. Which icon has the function to create the group?

- A. Number 1
- B. Number 2
- C. Number 3
- D. Number 4
- E. I don't know.
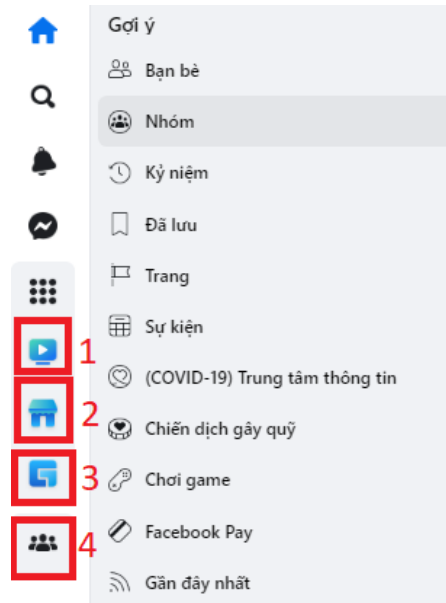
Question 21. Some English learning websites or online learning services use a security process known as two-step authentication. Choose the image that represents two-step authentication.
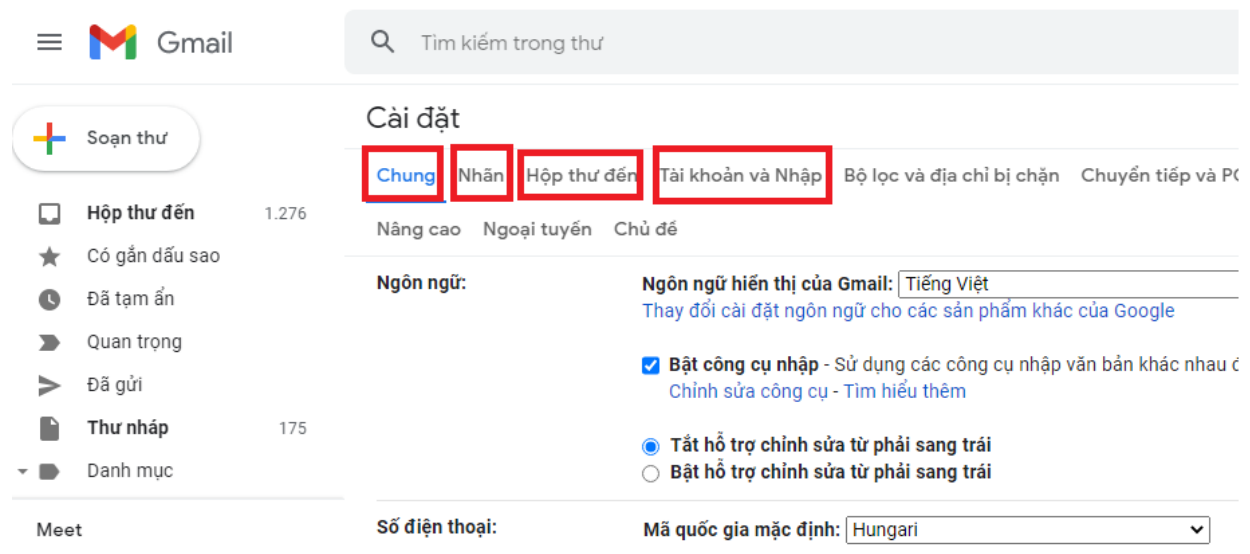
- A. Image 1
- B. Image 2
- C. Image 3
- D. Image 4
- E. I don't know.

| 1 | 2 |

Confirm your Security Image and Keyword Username: Not Me Security Image: Keyword: **Enter Your Password** Password Password is case-sensitive Log In	**Please answer your security questions.** These questions help us verify your identity. Who was your best childhood friend? Answer In which city did your mother and father meet? Answer Forgot your answers? Send reset security info email to dxxx@mac.com ▸
3	**4**

Question 22. Which tabs can help you change the password in Gmail?
  A. Settings/ General
  B. Settings/ Labels
  C. Settings/ Inbox
  D. Settings/ Accounts and Import
  E. I don't know.

Question 23. On Zoom, which icon includes the function to restrict participants from starting a video?
  A. Number 1
  B. Number 2
  C. Number 3
  D. Number 4
  E. I don't know.
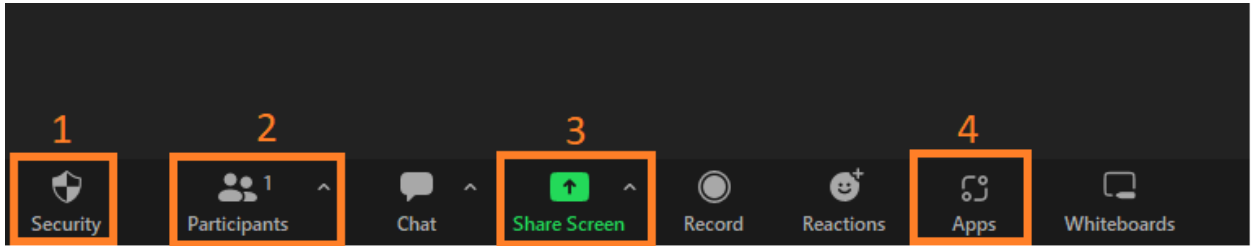
Question 24. Order the steps for scanning antivirus when you are using antivirus software.

Select the files that need to be scanned (1), Wait while the program scans, and the result is reported (2), Choose an antivirus program (3), Scan the selected file/ document (4).

    A. (1) (2) (4) (3)
    B. (1) (3) (2) (4)
    C. (2) (1) (4) (3)
    D. (3) (1) (4) (2)
    E. I don't know.

Question 25. Lan practices her English listening through a You Tube channel every day to prepare for her IELTS exam. Which icon will help her stay updated with this channel's latest videos?

A. Save
B. Share
C. Subscribe
D. Participate
E. I don't know.
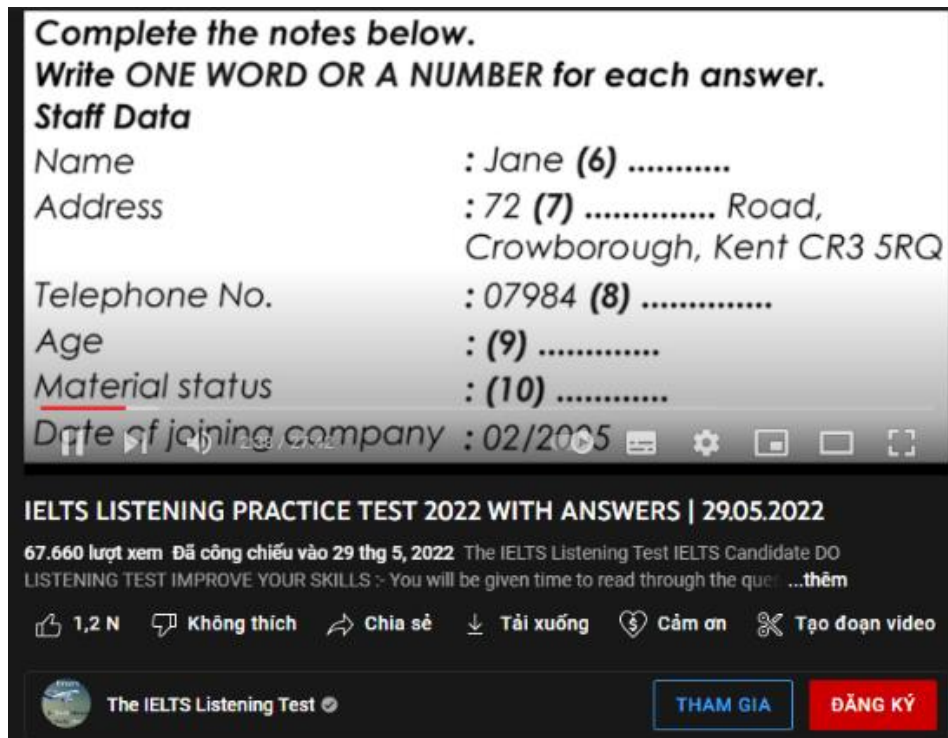
Question 26. In an English learning group on Facebook, where can you find the uploaded documents in the group?

    A. Tab 1
    B. Tab 2

C. Tab 3
D. Tab 4
E. I don't know.
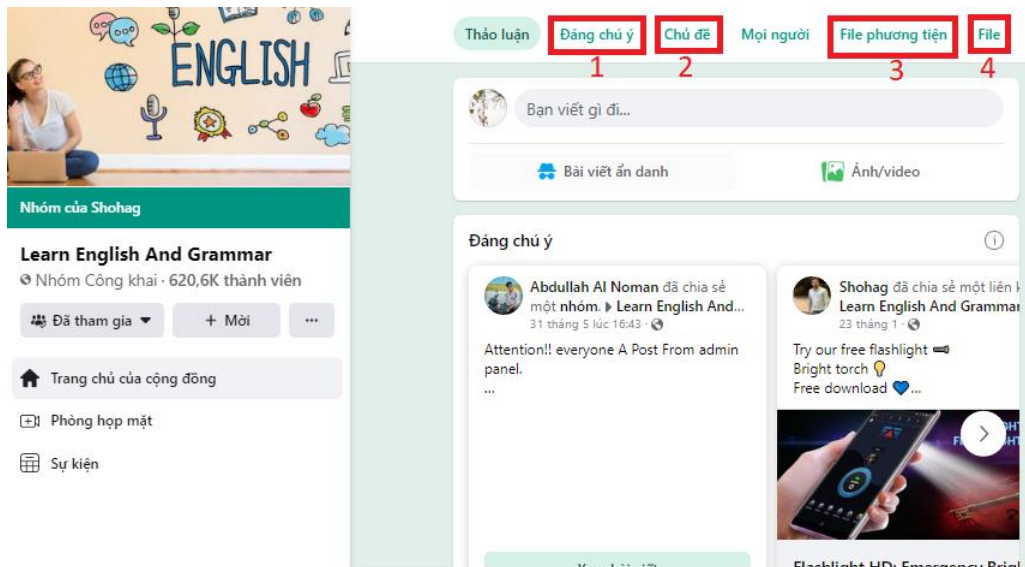
Question 27. TikTok is one of the trendy digital technologies recently and the application is widely used by the youth. TikTok is also applied to create English speaking short videos. Indicate the steps to create a video on this platform by ordering the pictures below.
   A. (1) (3) (2) (4)
   B. (2) (3) (4) (1)
   C. (3) (1) (2) (4)
   D. (2) (4) (3) (1)
   E. I don't know.

| **(1) Save/ Share the video** | **(2) Tap create the video** |

(3) Add music/sound/ description	**(4) Choose the length of your video**
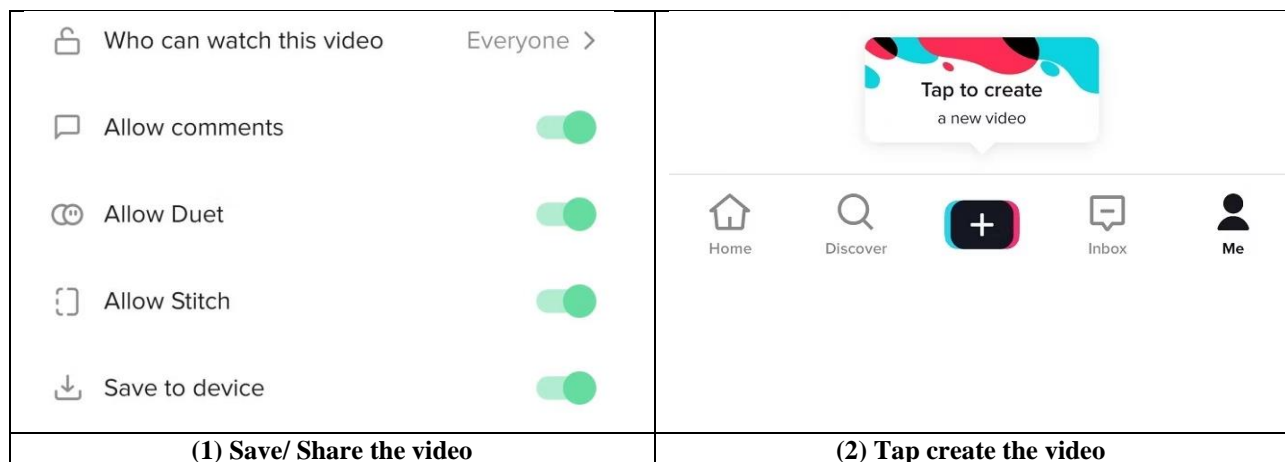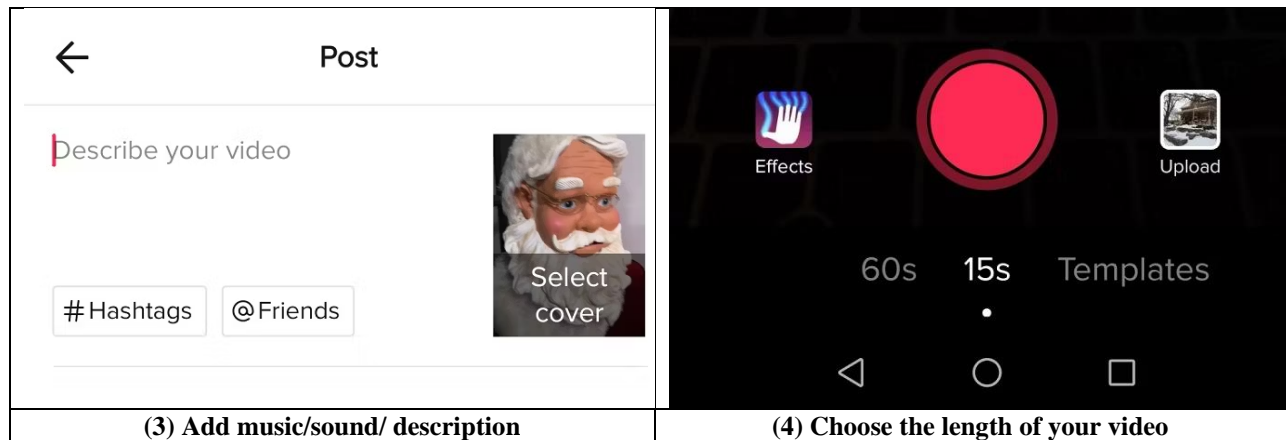
Question 28. On the Canvas Instructor English learning platform, which icon can you select to keep up to date with a target topic discussion?

    A.   Number 1
    B.   Number 2
    C.   Number 3
    D.   Number 4
    E.   I don't know.
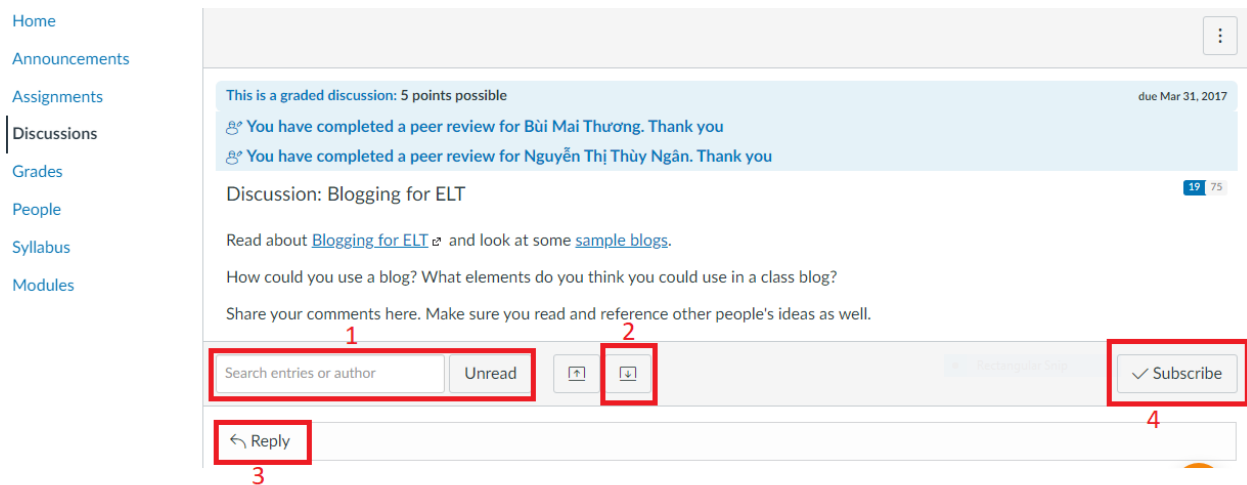
Thank you for your cooperation!

NĂNG LỰC KĨ THUẬT SỐ CỦA SINH VIÊN TRONG VIỆC ỨNG DỤNG CNTT VÀO HỌC TẬP MÔN TIẾNG ANH

Doctoral School of Education

University of Szeged

H-6722 Szeged, Petőfi Sándor sgt. 30-34. Hungary

Các em vui lòng nhập mã đăng nhập và chọn nút **NEXT** để bắt đầu khảo sát!

Mã đăng nhập: _____

Next

NĂNG LỰC KĨ THUẬT SỐ CỦA SINH VIÊN TRONG VIỆC ỨNG DỤNG CNTT VÀO VIỆC HỌC TẬP MÔN TIẾNG ANH

Các em sinh viên thân mến!

Công nghệ ngày nay đã trở thành một yếu tố quan trọng có tầm ảnh hưởng tới sự thành công của việc học ngoại ngữ, và năng lực sử dụng kĩ thuật số của các em sinh viên có vai trò quyết định tới việc ứng dụng CNTT để nâng cao trình độ tiếng Anh. Bài khảo sát dưới đây nhằm tìm hiểu về năng lực kĩ thuật số của sinh viên Việt Nam trong việc sử dụng công nghệ cho mục đích học tập môn tiếng Anh. Bài khảo sát sẽ mất khoảng 30 phút để hoàn thành và dữ liệu sẽ chỉ được sử dụng cho mục đích nghiên cứu.

Cảm ơn sự hợp tác của các em. Chúc các em học tập tốt và thành công!

Next

Phần 1. Thông tin cá nhân

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Giới tính của em: ○ Nam   ○ Nữ

Tuổi: [＿＿＿]

Chuyên ngành: [＿＿＿＿＿＿＿＿＿＿＿＿＿＿＿]

Hiện tại em là sinh viên … ?   ○ Năm nhất   ○ Năm hai   ○ Năm ba   ○ Năm tư

Em đã sử dụng CNTT để học tiếng Anh bao lâu rồi ?
○ Chưa bao giờ hoặc ít hơn 1 năm   ○ 1-3 năm   ○ 3-5 năm   ○ ≥ 5 năm

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Em có thường xuyên sử dụng CNTT để học tiếng Anh không? Hãy chọn vào ô phù hợp với em.

	Vài lần một ngày	Mọi ngày	Hầu hết mọi ngày	Vài lần một tuần	Ít hơn 1 lần/ tuần hoặc không bao giờ
Ở nhà	○	○	○	○	○
Ở trường	○	○	○	○	○

Em sử dụng các loại thiết bị CNTT nào để học tiếng Anh. Hãy chọn vào ô phù hợp với em.

	Máy tính cố định	Máy tính xách tay	Máy tính bảng	Điện thoại thông minh	Không dùng thiết bị nào
Ở nhà	○	○	○	○	○
Ở trường	○	○	○	○	○

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Em đã học tiếng Anh bao lâu rồi? Hãy chọn vào ô phù hợp với em.

Trình độ tiếng Anh hiện tại của em (Theo Khung tham chiếu châu Âu)? Hãy chọn vào ô phù hợp với em.

- Ít hơn 1 năm
- 1-3 năm
- 4-6 năm
- ≥ 7 năm

- Người mới bắt đầu
- Sơ cấp
- Trung cấp 1
- Trung cấp 2
- Cao cấp 1
- Cao cấp 2

Em từng tham gia khóa học CNTT nào chưa ? Hãy chọn ô phù hợp với em.

- Có
- Không

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Phần 2. Tự đánh giá năng lực số

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể hoàn thành các bài kiểm tra kiến thức và kĩ năng trên các hệ thống học tập online (ví dụ: Kahoot, Nearpod, Google forms, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể tạo các bài thuyết trình sử dụng âm thanh, hình ảnh, videos trên các nền tảng số (ví dụ: MS PowerPoint, Sway, Prezi, Canva, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể sáng tạo các nội dung hoặc hoàn thành các bài tập về kĩ năng Viết trên các nền tảng số (ví dụ: MS Word, MS Excel, Canvas, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể thu âm và chỉnh âm thanh/ video cho các bài tập về kĩ năng Nói (ví dụ: Flipgrid, YouTube. ...).	○ 1	○ 2	○ 3	○ 4

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể thực hành và mở rộng vốn từ vựng tiếng Anh của mình bằng cách sử dụng công nghệ kỹ thuật số (ví dụ: Quizlet, Words with friends, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể duyệt, tìm kiếm và lọc thông tin từ các tài nguyên kỹ thuật số tiếng Anh (ví dụ: Google Scholar, Scopus, Wiki, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể lưu trữ và truy xuất tài liệu học tiếng Anh trên các thiết bị và nền tảng kỹ thuật số (ví dụ: Google drive, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể tải các tệp tiếng Anh lên các thiết bị kỹ thuật số và các nền tảng quản lý học tập (ví dụ: Google drive, MS Teams, ...).	○ 1	○ 2	○ 3	○ 4

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể thêm phụ đề cho các video nghe tiếng Anh trên các công cụ kỹ thuật số (ví dụ: YouTube, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể sử dụng các chương trình vẽ, hội họa và đồ họa để tạo nội dung kỹ thuật số bằng tiếng Anh (ví dụ: Canva, Adobe Photoshop, Microsoft Paint, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể sử dụng một số phần mềm lập trình để tạo nội dung kỹ thuật số cho việc học tiếng Anh (ví dụ: Scratch, CoSpaces Edu, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể giao tiếp với giáo viên tiếng Anh và bạn học thông qua các công cụ kỹ thuật số (ví dụ: Zoom, Skype, MS Teams, ...).	○ 1	○ 2	○ 3	○ 4

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể chia sẻ thông tin (tài liệu / video / âm thanh / hình ảnh) cho giáo viên tiếng Anh và bạn học thông qua các nền tảng học tập kỹ thuật số (ví dụ: Gmail, MS Teams, Zoom, Canvas, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể cộng tác với các bạn cùng lớp để hoàn thành các nhiệm vụ nhóm trên nền tảng kỹ thuật số (ví dụ: Google Slides, SharePoint, Google Docs, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể tham gia vào cộng đồng trực tuyến thông qua việc sử dụng các thiết bị và dịch vụ kỹ thuật số (ví dụ: Facebook, Skype, ...).	○ 1	○ 2	○ 3	○ 4
Em có thể bảo vệ thông tin cá nhân của mình khi sử dụng các công cụ kỹ thuật số để học tiếng Anh.	○ 1	○ 2	○ 3	○ 4

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể tránh được các mối đe dọa trực tuyến (quấy rối trên internet, vi phạm quyền riêng tư, bắt nạt trên mạng, ...) khi sử dụng các thiết bị kỹ thuật số để học tiếng Anh (ví dụ: Zoom, Facebook, ...).	1	2	3	4
Em có thể bảo vệ các thiết bị kỹ thuật số bằng cách sử dụng phần mềm chống vi-rút (ví dụ: Avast, Kaspersky, ...).	1	2	3	4
Em có thể thay đổi mật khẩu tài khoản cho dịch vụ internet hoặc các trang web (ví dụ: Gmail, Canvas,...).	1	2	3	4
Em có thể truy cập một số tài nguyên học tiếng Anh (ví dụ: Hội đồng Anh, chương trình Tedx, BBC Learning English, ...).	1	2	3	4

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Hãy cho các phản hồi phù hợp với các nhận xét dưới đây.

	Không đồng ý	Không đồng ý một phần	Đồng ý một phần	Đồng ý
Em có thể tự cập nhật các kỹ năng kỹ thuật số để hỗ trợ việc học tiếng Anh.	1	2	3	4
Em có thể nhận ra các xu hướng kỹ thuật số để học tiếng Anh trên các nền tảng và tài nguyên kỹ thuật số.	1	2	3	4
Em có thể nhận ra cơ hội học tiếng Anh trên các nền tảng và tài nguyên kỹ thuật số.	1	2	3	4

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Phần 3. Bài kiểm tra năng lực kĩ thuật số

Hãy chọn một đáp án cho các câu hỏi sau.

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Lan và các bạn học sinh khác đang tham gia lớp học online trên Nearpod. Giáo viên giao nhiệm vụ cho cả lớp làm bài tập điền từ để kiểm tra kiến thức của các em. Để hoàn thành nhiệm vụ này, Lan phải làm gì?

- A. Điền đáp án vào ô trống
- B. Kéo thả các từ ở phía dưới vào ô trống
- C. Copy các từ ở phía dưới và dán vào ô trống
- D. Tất cả các đáp án đều đúng
- E. Em không biết
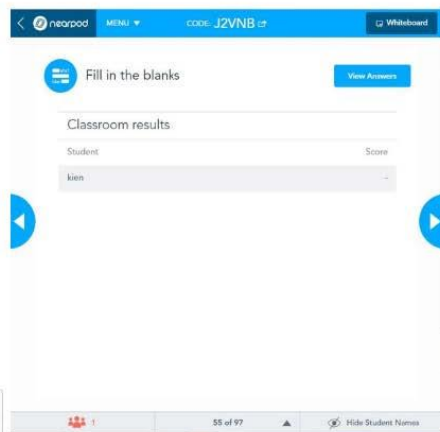
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Làm cách nào em có thể chèn video trực tuyến vào PowerPoint 2013?

- A. Chọn Insert/Video/This device/ Chọn the video/Mở
- B. Chọn Insert/Video/Stock videos/Tải lên video
- C. Chọn Insert/Video/Online videos/Dán địa chỉ/ Click vào Insert
- D. A & C đều đúng
- E. Em không biết

Back   Next
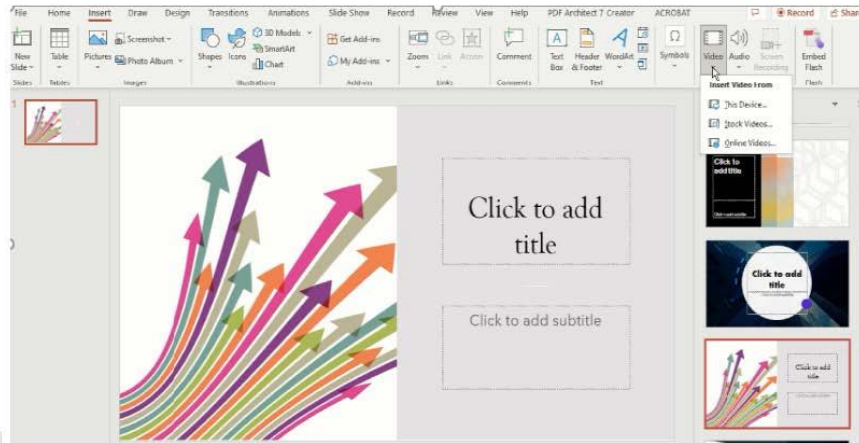
Khi làm việc trên Microsoft PowerPoint, các chủ đề có thể được chọn dưới:

- A. Tab Vẽ (Draw)
- B. Tab thiết kế (Design)
- C. Tab Chuyển tiếp (Transition)
- D. Tab Hoạt ảnh (Animation)
- E. Em không biết
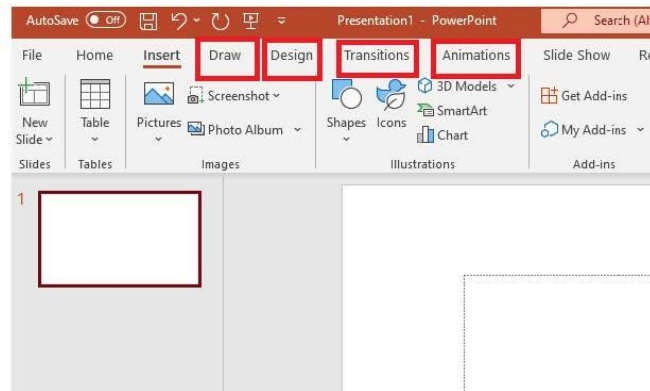
Back   Next

Lan đang chuẩn bị một bài thuyết trình cho lớp học tiếng Anh của mình. Làm thế nào để bạn ấy có thể lưu bài thuyết trình đó ?

- ○ A. Nhấp vào biểu tượng 1
- ○ B. Nhấp vào biểu tượng 2
- ○ C. Nhấn Ctrl + S
- ○ D. A & C đều đúng
- ○ E. Em không biết
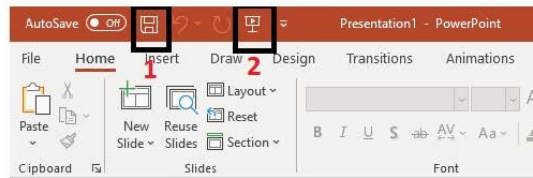
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Lan đang thực hành bài thuyết trình PowerPoint của mình. Làm thế nào để bạn ấy có thể bắt đầu trình chiếu nó?

- ○ A. Nhấp vào biểu tượng 1
- ○ B. Nhấn F5
- ○ C. B & D đúng
- ○ D. Nhấp vào biểu tượng 2
- ○ E. Em không biết

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Khi làm bài tập Viết trên Microsoft Word, em có thể liên kết tệp bằng cách:

- A. Nhấn Ctrl + K

- B. Nhấn Ctrl + Shift + K

- C. Dùng lệnh liên kết (Hyperlink) từ menu

- D. A & C đều đúng

- E. Em không biết

Khi làm một bài tập tiếng Anh trên Microsoft Word, làm thế nào em có thể sửa lỗi chính tả và ngữ pháp nếu công cụ chính tả và ngữ pháp không thể kiểm tra lỗi?

- A. Dùng lệnh chính tả và ngữ pháp (spelling and grammar) từ menu

- B. Dùng lệnh tùy chọn (Options) từ menu

- C. Nhấn F7

- D. Tất cả các đáp án đều đúng

- E. Em không biết

Lan cần tải bài tập nói tiếng Anh của mình từ máy tính để bàn (hình bên phải) lên Google Drive (hình bên trái). Bạn ấy có thể tải tệp lên bằng cách nào?

- A. Chọn Mới / Chọn Tải lên tệp
- B. Kéo và thả tệp vào môi trường Google Drive
- C. Nhấp chuột phải vào môi trường Google Drive / Tải lên tệp
- D. Tất cả đều đúng
- E. Em không biết

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Trên YouTube, nút nào có chức năng cắt ngắn video?

- A. Tạo đoạn video
- B. Chia sẻ
- C. Tải xuống
- D. Lưu
- E. Em không biết

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Sắp xếp các bước để làm phụ đề cho một video trên nội dung kênh YouTube của em: Từ menu bên trái, chọn *Phụ đề* (1), Đăng nhập YouTube Studio (2), Nhấp vào *Thêm ngôn ngữ* và chọn ngôn ngữ của em (3), Chọn video (4), Dưới phụ đề, nhấp vào *Thêm* (5).

- A. (2) (1) (4) (3) (5)
- B. (1) (2) (4) (3) (5)
- C. (1) (2) (5) (4) (3)
- D. (2) (4) (1) (3) (5)
- E. Em không biết
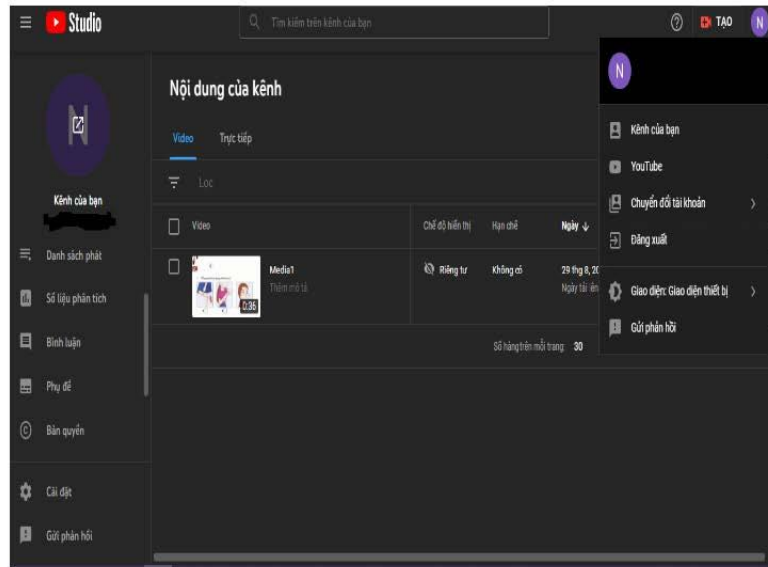
Back   Next

Khi thiết kế trên Scratch để tạo một câu chuyện tiếng Anh, nút màu vàng có chức năng gì?

- A. Thay đổi trang phục của nhân vật
- B. Thay đổi tên của nhân vật
- C. Thay đổi nền câu chuyện
- D. Thay đổi giọng nói của nhân vật
- E. Em không biết
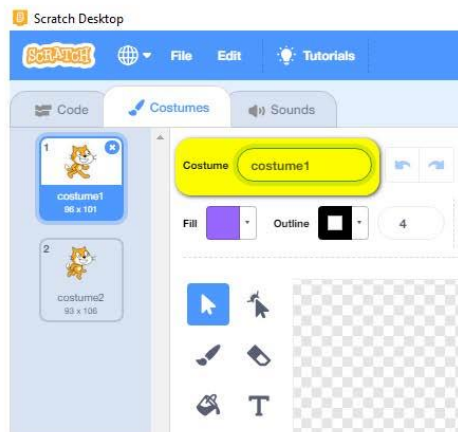
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Trên Scratch, khối lệnh nào cho phép ẩn hoặc hiện ký tự?

- A. Chuyển động (Motion)
- B. Vẻ ngoài của nhân vật (Looks)
- C. Âm thanh (Sound)
- D. Sự kiện (Events)
- E. Em không biết
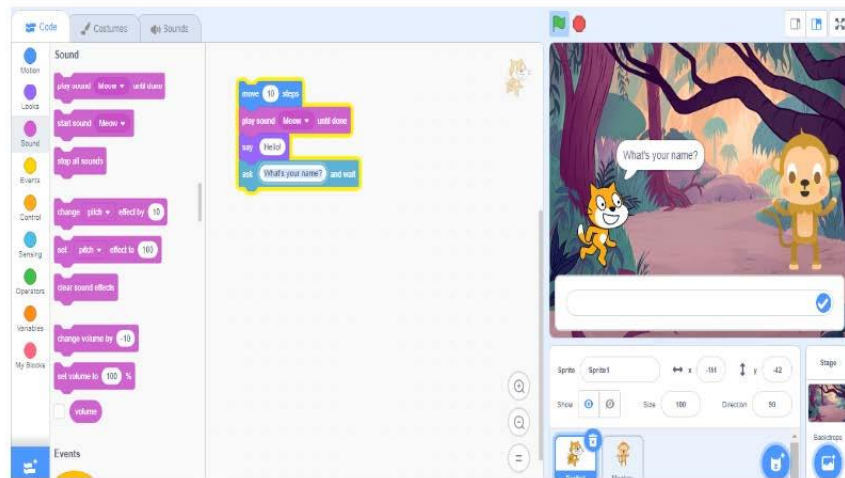
Trong Microsoft Paint, bạn sử dụng biểu tượng số 3 để làm gì?

- A. Vẽ
- B. Thay đổi màu phông chữ
- C. Nhập tin nhắn
- D. Tẩy xóa
- E. Em không biết

Trong MS Access 2007, chức năng này có nghĩa là gì?

- ○ A. Để khởi động
- ○ B. Để chạy / kiểm tra Truy vấn (Query)
- ○ C. Để chạy biểu mẫu
- ○ D. Để chạy dấu hiệu nhập
- ○ E. Em không biết

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Khi tìm kiếm thông tin trên Google, đáp án nào sau đây phù hợp để tìm kiếm một cụm từ chính xác?

- ○ A. + Các ngày lễ của Anh
- ○ B. (Ngày lễ của Anh)
- ○ C. "Ngày lễ của Anh"
- ○ D. / Ngày lễ của Anh /
- ○ E. Em không biết

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Hoa đã tải tệp nói tiếng Anh của mình lên một Google Drive. Bạn ấy muốn chia sẻ tệp của mình với giáo viên qua email của giáo viên. Hãy sắp xếp trình tự các bước để chia sẻ tệp: Nhấp vào Gửi (1), Nhấp chuột phải vào tệp đã tải lên (2), Nhấp vào Chia sẻ (3), Nhập email của giáo viên (4).

- A. (1), (2), (3), (4)
- B. (2), (3), (4), (1)
- C. (2), (4), (1), (3)
- D. (2), (3), (1), (4)
- E. Em không biết
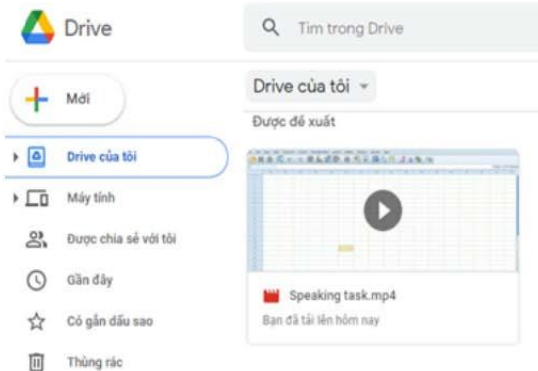
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Trong giờ học tiếng Anh trực tuyến trên Skype, giáo viên đưa ra một câu hỏi về một vấn đề quan trọng, và cô ấy muốn bạn thu thập ý kiến của cả lớp. Bạn có thể sử dụng biểu tượng nào để tạo cuộc thăm dò trên Skype?

- A. Số 1
- B. Số 2
- C. Số 3
- D. Số 4
- E. Em không biết
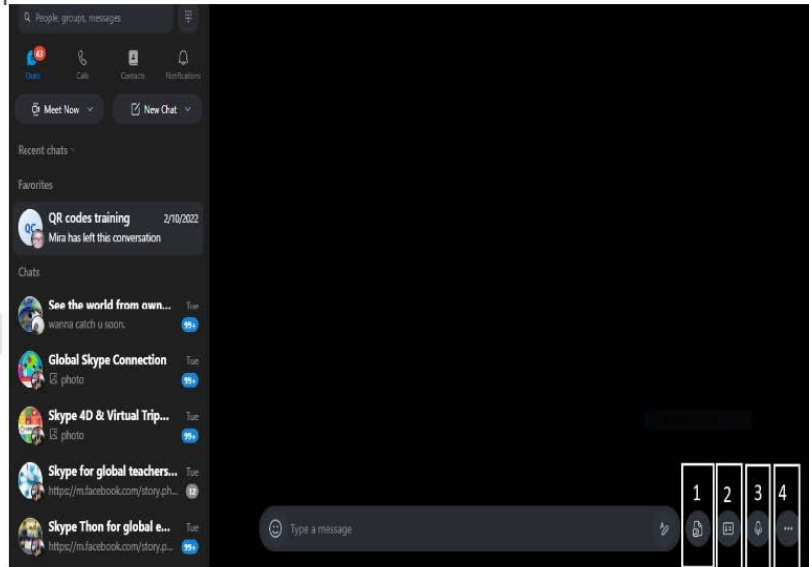
Back   Next

Làm cách nào để khôi phục một slide bị xóa vô tình trong bản trình bày Google slides?

○ **A. Nhấp vào biểu tượng Hoàn tác (Undo) trên thanh công cụ.**

○ **B. Nhấn Ctrl Z + Phím**

○ **C. Sử dụng lịch sử sửa đổi để khôi phục phiên bản trước**

○ **D. Tất cả đều đúng**

○ **E. Em không biết**
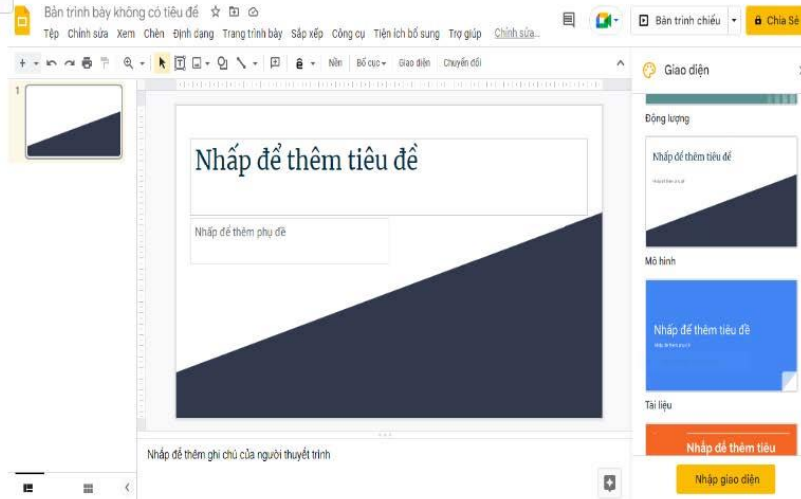
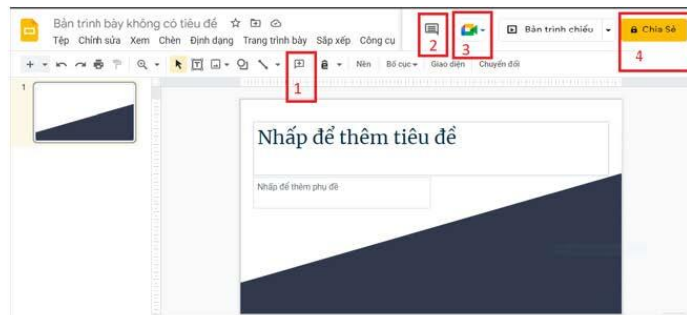Back   Next

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Trên Google slide, biểu tượng nào có thể giúp thêm chú thích vào các slide?

○ **A. Số 1**

○ **B. Số 2**

○ **C. Số 3**

○ **D. Số 4**

○ **E. Em không biết**

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Bạn cần tạo một nhóm học tiếng Anh trên Facebook. Biểu tượng nào có chức năng tạo nhóm?
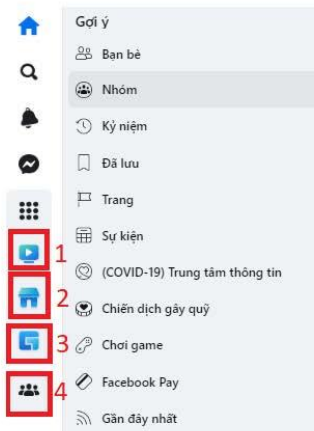
- A. Số 1
- B. Số 2
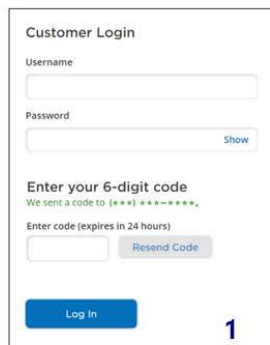- C. Số 3
- D. Số 4
- E. Em không biết

Một số trang web học tiếng Anh hoặc dịch vụ học trực tuyến sử dụng quy trình bảo mật được gọi là xác thực hai bước. Chọn hình ảnh chính xác bao gồm quy trình xác thực hai bước.
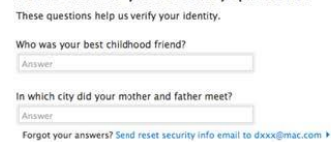
- A. Hình ảnh 1
- B. Hình ảnh 2
- C. Hình ảnh 3
- D. Hình ảnh 4
- E. Em không biết

Nhãn nào có thể giúp bạn thay đổi mật khẩu trên Gmail?

- A. Cài đặt / Chung
- B. Cài đặt / Nhãn
- C. Cài đặt / Hộp thư đến
- D. Cài đặt / Tài khoản và Nhập
- E. Em không biết

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Trên Zoom, biểu tượng nào gồm chức năng hạn chế người tham gia bắt đầu video?

- A. Số 1
- B. Số 2
- C. Số 3
- D. Số 4
- E. Em không biết

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Sắp xếp trình tự các bước để quét chống vi-rút khi bạn đang sử dụng phần mềm chống vi-rút.

Chọn các tập tin cần quét (1), Chờ trong khi chương trình quét và báo kết quả (2), Chọn chương trình diệt virus (3), Quét tập tin / tài liệu đã chọn (4).

- A.   (1) (2) (4) (3)

- B.   (1) (3) (2) (4)

- C.   (2) (1) (4) (3)

- D.   (3) (1) (4) (2)

- E.   Em không biết

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Lan luyện nghe tiếng Anh qua kênh you tube mỗi ngày để chuẩn bị cho kỳ thi IELTS. Biểu tượng nào giúp bạn ấy được cập nhật những video mới nhất trên kênh này?

- A. Tải xuống
- B. Chia sẻ
- C. Đăng ký
- D. Tham gia
- E. Em không biết

Complete the notes below.
Write ONE WORD OR A NUMBER for each answer.
Staff Data
Name   : Jane (6) ....
Address   : 72 (7) .... Road,
                    Crowborough, Kent CR3 5RQ
Telephone No.   : 07984 (8) ....
Age   : (9) ....
Material status   : (10) ....
Date of joining company : 02/2005

IELTS LISTENING PRACTICE TEST 2022 WITH ANSWERS | 29.05.2022

67.660 lượt xem Đã công chiếu vào 29 thg 5, 2022 The IELTS Listening Test IELTS Candidate DO LISTENING TEST IMPROVE YOUR SKILLS :- You will be given time to read through the que ...thêm

👍 1,2 N   👎 Không thích   ↗ Chia sẻ   ⬇ Tải xuống   💲 Cảm ơn   ✂ Tạo đoạn video

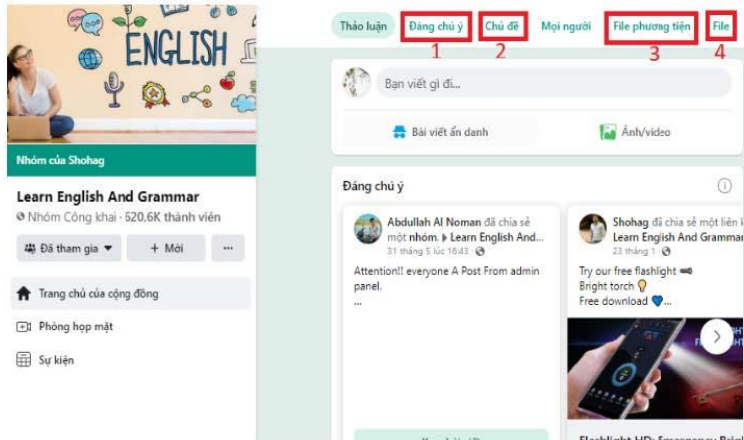The IELTS Listening Test ✓   THAM GIA   ĐĂNG KÝ

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Trong một nhóm học tiếng Anh trên Facebook, em có thể tìm tài liệu đã tải lên trong nhóm ở đâu?

- A. Biểu tượng 1
- B. Biểu tượng 2
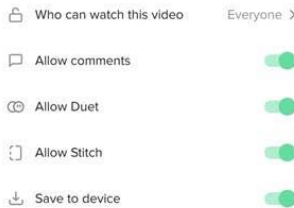- C. Biểu tượng 3
- D. Biểu tượng 4
- E. Em không biết

TikTok là một trong những công nghệ số thời thượng trong thời gian gần đây và ứng dụng đang được giới trẻ tin dùng. TikTok cũng được áp dụng để tạo các video ngắn nói tiếng Anh. Em hãy sắp xếp các bước để tạo video trên nền tảng này bằng cách sắp xếp các hình ảnh bên dưới.
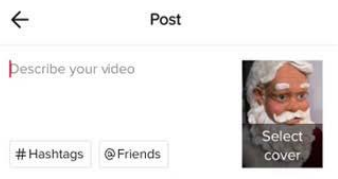
- A. (1) (3) (2) (4)
- B. (2) (3) (4) (1)
- C. (3) (1) (2) (4)
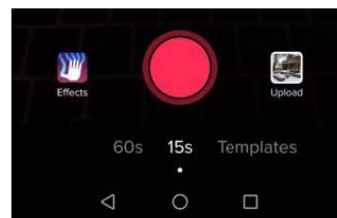- D. (2) (4) (3) (1)
- E. Em không biết

(2) Click vào Tạo video

(1) Lưu/ Chia sẻ video

(3) Thêm nhạc/ âm thanh/ mô tả

(4) Chọn độ dài cho video

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Trên nền tảng học tiếng Anh Canvas, em có thể chọn biểu tượng nào để cập nhật chủ đề muốn theo dõi?

- A. Số 1
- B. Số 2
- C. Số 3
- D. Số 4
- E. Em không biết

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APPENDIX C
RESEARCHER'S EVALUATION AND SUGGESTIONS ON THE ASSESSMENT OF DIGITAL LITERACY FOR EFL STUDENTS

Criteria for measuring content validity

Relevance	Clarity	Simplicity	Ambiguity
1 = Not relevant	1 = Not clear	1 = Not simple	1 = Doubtful
2 = Item needs some revision	2 = Item needs some revision	2 = Item needs some revision	2 = Item needs some revision
3 = Relevant but needs minor revision	3 = Clear but needs minor revision	3 = Simple but needs minor revision	3 = No doubt but needs minor revision
4 = Very relevant	4 = Very clear	4 = Very simple	4 = Meaning is clear

Part 1 – Subjective self-assessment of digital literacy

Please rate (√) the items based on the above criteria.

Items	Relevance				Clarity				Simplicity				Ambiguity				Suggestions
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Item 1																	
Item 2																	
Item 3																	
Item 4																	
Item 5																	
Item 6																	
Item 7																	
Item 8																	
Item 9																	
Item 10																	
Item 11																	
Item 12																	
Item 13																	
Item 14																	
Item 15																	
Item 16																	
Item 17																	
Item 18																	
Item 19																	
Item 20																	
Item 21																	
Item 22																	
Item 23																	

Part 2 – Digital literacy test

Items	Relevance				Clarity				Simplicity				Ambiguity				Suggestions
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Item 1																	
Item 2																	
Item 3																	
Item 4																	
Item 5																	
Item 6																	
Item 7																	
Item 8																	
Item 9																	
Item 10																	
Item 11																	
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Item 18																	
Item 19																	
Item 20																	
Item 21																	
Item 22																	
Item 23																	
Item 24																	
Item 25																	
Item 26																	

Thank you for your evaluation and suggestions!

APPENDIX D
ASSESSMENT OF EFL TEACHERS' DIGITAL LITERACY
(Sub-study 4)

Part 1. Demographic information

Question 1. **Are you...?**

○ Male

○ Female

Question 2. **What is your age?**

○ under 25

○ 25-29

○ 30-39

○ 40-49

○ 50-59

○ 60 or more

Question 3. **How long have you been using digital technologies in teaching?**

○ 1-5 years

○ 6-10 years

○ 11-15 years

○ 16-20 years

○ 20 years or more

Question 4. **How well does your work environment meet the following criteria?**

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
Interactive whiteboards, projectors, or similar presentation media are available in the rooms in which I teach.	○	○	○	○	○
Many of my colleagues use digital media in their courses.	○	○	○	○	○

Question 5. **Which digital tools have you or your students already used for teaching and learning?**

☐ Presentation software

☐ Software for digital posters, mind maps, and planning tools

☐ Video playback software/ Audio playback software

☐ Blogs or wikis

☐ Video/Audio editing software	☐ Others	
☐ Online learning platforms	☐ I have not yet used any digital tools in class.	
☐ Quiz creation software/ Polling software		
☐ Interactive apps or games		

Question 6. **How would you describe yourself and your private use of digital technologies?**

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
I find it easy to work with computers and other technical equipment.	○	○	○	○	○
I use the internet extensively and competently.	○	○	○	○	○
I am open and curious about new apps, programs, resources.	○	○	○	○	○
I am a member of various social networks.	○	○	○	○	○

Question 7. **How well does your work environment meet the following criteria?**

	strongly disagree	disagree	neither agree nor disagree	agree	strongly agree
The department promotes the integration of digital technologies in teaching.	○	○	○	○	○
The department invests in updating and improving the technical infrastructure.	○	○	○	○	○
The department provides the necessary technical support.	○	○	○	○	○
Students have access to digital devices.	○	○	○	○	○
The internet connection of the department is reliable and fast.	○	○	○	○	○
The department supports the development of my digital competence, e.g. through continuous professional development activities.	○	○	○	○	○

Part 2. Self-report digital literacy

Question 1. **I use different digital channels to communicate with EFL learners and colleagues whenever appropriate** (e.g., emails, blogs, instant messaging, the department's website, apps).

○ I do not use digital communication channels.

○ I use basic digital communication channels, e.g. e-mail, instant messaging.

○ I identify different digital solutions to communicate.

○ I combine different communication channels, e.g. e-mail, instant messaging, or the education organisation's website.

○ I analyse and assess the communication channels to choose the ones I consider most effective for my communication purpose.

○ I reflect on, programme and adapt my communication strategies.

○ I confidently plan my digital communication strategy using a variety of digital technologies.

Question 2. **I use digital technologies to work together with colleagues inside and outside my educational organization**.

○ I do not collaborate with other colleagues.

○ I sometimes exchange materials and ideas with colleagues, e.g. via e-mail or videoconference.

○ Among colleagues, we work together in collaborative environments or use shared drives.

○ I exchange ideas, experiences and materials, also with colleagues outside my organisation, e.g. in an online professional network.

○ I experiment with new tools for online collaboration with colleagues inside and outside my institution.

○ I jointly create materials with other [educators] in an online network.

○ I jointly create, reuse and share materials with other educators in an online network.

Question 3. **I actively develop my digital competence for teaching.**

○ I do not work on my digital competence for teaching.

○ I improve my digital competence for teaching through reflection and experimentation.

○ I use a range of resources to develop my digital competence for teaching.

○ I validate my online teaching practices with the support of a network of colleagues.

○ I discuss with colleagues how to use digital technologies to innovate and improve my educational practice.

○ I register and attend different digital competence development courses, online or face-to-face, for improving my teaching practices.

○ I lead in teaching innovation using digital technologies in my institution.

Question 4. **I am aware of and participate in online training opportunities** (e.g., English online courses, MOOCs, webinars, virtual conferences relating to EFL education).

○ This is something that I have not yet considered.

○ Not yet, but I am interested in undertaking some training.

○ I have participated in online training once or twice.

○ I have tried out various online training opportunities.

○ I participate in all kinds of online training that could help me improve my teaching skills.

○ I design and offer online training for my colleagues in my institution.

○ I am professionally certified in the use of different technologies for teaching and learning.

Question 5. **I use different internet sites and search strategies to find and select a range of different digital English teaching and learning resources (***e.g., electronic dictionaries, video, computer-assisted pronunciation training).*

○ I do not know how to use the internet to search for useful resources.

○ I am able to use the internet to search for useful resources.

○ I use search engines and educational/resource platforms to find relevant resources.

○ I evaluate and select resources on the basis of their suitability for my learners' group.

○ I compare resources using a range of relevant criteria, e.g. reliability, quality, fit, design, interactivity, appeal.

○ I collaborate with colleagues on the sharing of suitable resources and search strategies.

○ I take the lead on fostering the use of digital resources in my institution.

Question 6. **I create my own digital English teaching resources and modify existing ones to adapt them to my needs** (*e.g., English speaking videos, English vocabulary games).*

○ I do not create my own digital resources.

○ I search on the internet and use different types of educational resources.

○ I create digital presentations but do not know how to do much more than that.

○ I test and validate different types of resources.

○ I create different types of digital resources.

○ I adapt digital resources and share them with others using content distribution platforms.

○ I adapt, use, share and even create more complex, interactive resources, such as videos, online multiple-choice tests, virtual reality apps, etc.

Question 7. **I effectively protect sensitive content** (e.g., exams, students' grades, personal data).

○ I do not need to do that, because the institution takes care of this.

○ I avoid storing personal data electronically.

○ I protect personal data but rarely change passwords.

○ I password protect personal data and occasionally change passwords.

○ I protect personal data, by combining hard-to-guess passwords with frequent password changes and software updates.

○ I review my practices of personal data protection from time to time, by checking their efficacy and replacing them whenever necessary.

Question 8. **I carefully consider how, when and why to use digital technologies in English teaching, to ensure that they are used with added value.**

○ I do not or only rarely use technology in the classroom.

○ I make basic use of available equipment, e.g. digital whiteboards, projectors or virtual learning environments if teaching online.

○ I use a variety of digital resources and tools in my teaching.

○ I try out different teaching methods depending on the digital technologies I choose.

○ I select and test different teaching approaches aiming to find the ones that work best for me.

○ I developed my own tested portfolio of activities, technologies and teaching methods.

○ I use digital tools to implement innovative pedagogic strategies.

Question 9. **I follow learners' activities and interactions in the English collaborative online environments we use.**

○ I do not use digital environments with my learners.

○ I do not follow learners' activities in the online environments we use.

○ I follow learners' activities in the online environments we use and their discussions.

○ I analyse my learners' online activity using appropriate methods and tools, but do not intervene.

○ I analyse and intervene on my learners' online activities (e.g. discussions) with motivating or corrective comments.

○ I encourage the participation of the learners in online activities by prompting questions.

○ I redirect the online activity of the learners' whenever I sense it is not working or I foresee problems.

Question 10. **When learners work in groups, I use digital technologies to help them learn and effectively accomplish English course tasks.**

○ I do not know how to integrate digital technologies into collaborative learning activities.

○ I integrate digital technologies into collaborative learning activities.

○ I identify opportunities and implement tasks for learners to work collaboratively in order to search for information online or to present their results in digital formats.

○ I structure course activities that require learners to work collaboratively in groups, using the Internet to find information and presenting their results in digital formats.

○ I design course tasks that require learners to use collaborative online environments to exchange evidence and debate.

○ I design course tasks that require learners to use collaborative online environments to co-create and share knowledge.

○ I design curriculum activities that require the use of digital technologies to enhance collaborative learning and the co-creation and sharing of knowledge.

Question 11. **I use digital technologies to allow students to plan, document and monitor their English learning themselves (***e.g., quizzes for self-assessment, ePortfolios for documentation and showcasing, online diaries/blogs for reflection).*

○ Not possible in my work environment.

○ I encourage learners to reflect on their learning, but not with digital technologies.

○ I use, for example, quizzes for self-assessment or a course blog.

○ I use a variety of digital tools to allow learners to plan, document or reflect on their learning.

○ I integrate different digital tools to allow learners to plan, monitor and reflect on their progress.

○ I selectively choose the best digital tools to integrate in my teaching, after testing them with different learning tasks and cohorts of learners.

○ I develop apps or digital games to engage learners in their own learning.

Question 12. **I use digital assessment formats to monitor student English learning progress.**

○ I do not follow learners' progress.

○ I do follow learners progress regularly, but not with digital means.

○ I use a digital tool, e.g. a quiz/blog/activity delivery records, to review learners' progress.

○ I use a variety of digital tools to review learners' progress.

○ I integrate the use of a variety of digital tools to monitor learners' progress.

○ I selectively choose the best digital tools and test them to use with learners, for assessment, to monitor progress.

○ I develop my own apps and digital tools for progress monitoring and/or assessment purposes.

Question 13. **I analyse all data (information) available to me to timely identify students who need additional support.**

   ○ These types of learners' information are not available to me and/or it is analysed by someone else in my institution.

   ○ I analyse academically relevant information, e.g. learners' grades.

   ○ I also consider information on learner activity and behaviour, to identify the learners who need additional support.

   ○ I screen all available evidence to identify learners who need additional support.

   ○ I analyse learners' information and intervene in a timely manner.

   ○ I help learners analyse their own performance information and other data in order to seek help whenever they feel they need it.

   ○ I encourage learners to not only analyse their own performance data but also to set their own learning goals.

Question 14. **I use digital technologies to provide effective feedback.**

   ○ Feedback is not necessary in my work environment.

   ○ I do provide feedback to learners, but not in digital format.

   ○ I assess the benefit of using digital ways to provide feedback and do it whenever appropriate (e.g. automatic scores in online quizzes, comments or 'likes' in online environments).

   ○ I use a variety of digital ways of providing feedback to enhance my non-digital feedback practices.

   ○ I combine digital approaches to provide feedback.

   ○ I selectively choose the best digital tools for feedback, after testing them with different cohorts of learners.

   ○ I develop my own apps or digital tools to provide feedback to learners.

Question 15. **When I create digital English assignments for learners I take into account and address potential practical or technical difficulties** (*e.g., equal access to digital devices and resources interoperability and conversion problems lack of digital skills).*

   ○ My learners do not have problems with using digital technology.

   ○ I adapt the task so as to minimize difficulties.

   ○ I discuss possible obstacles with learners and outline solutions.

   ○ I adapt the task, discuss solutions and provide alternative ways for completing the task.

   ○ I select and choose tools that are inclusive and take into account the accessibility needs of certain learners.

   ○ I select and choose tools that are accessible and inclusive, as well as in open source formats to allow for greater customisation for your learners.

Question 16. **I use digital technologies to offer students personalised learning opportunities** (*e.g., I give different students different digital tasks to address individual learning needs, preferences and interests).*

   ○ In my work environment, all learners are required to do the same activities, irrespective of their level.

   ○ I provide learners with recommendations of additional resources.

   ○ I provide optional digital activities for those who are advanced or lagging behind.

   ○ Whenever possible, I use digital technologies to offer differentiated learning opportunities.

   ○ I adapt my teaching to link to learners' individual learning needs, preferences and interests.

   ○ I counterbalance personalisation with collaborative learning techniques to enhance the learning process.

   ○ I help learners to set goals and plan the activities they feel they need to improve their learning.

Question 17. **I use digital technologies for students to actively participate in English classes.**

○ It is not possible to actively involve learners in class or with online learning.

○ I do involve learners actively in class, but not with digital technologies.

○ When teaching, I use motivating stimuli, e.g. videos, animations.

○ My learners engage with digital media, e.g. electronic worksheets, games, collaborative networks.

○ My learners use digital technologies to investigate, discuss and create knowledge.

○ I help learners not only to create but also present and share the knowledge they create.

○ I help learners to not only create but also present and share the knowledge they create using appropriate open licenses.

Question 18. **I teach students how to assess the reliability of English information.**

○ This is not possible in my subject or work environment.

○ I remind them that not all online information is reliable.

○ I teach them how to discern reliable and unreliable sources.

○ I discuss with learners how to verify the accuracy of information.

○ I discuss with learners how information is generated and can be distorted.

○ I discuss with learners how can they adapt and produce information that is free of misinformation, bias and manipulation.

○ We discuss how information is generated, how it can be distorted and identify misinformation and bias.

Question 19. **I set up English course tasks which require learners to use digital tools communicate and collaborate with each other or with an outside audience.**

○ This is not possible in my subject or work environment.

○ Learners are occasionally required to communicate or collaborate online.

○ I encourage learners to use digital communication and cooperation among each other.

○ I encourage learners to use digital ways to communicate and to cooperate with each other and with an external audience.

○ I structure and set course tasks and assignments that allow learners to slowly expand their skills.

○ I set up course tasks and assignments that enable learners to co-create knowledge with their colleagues at the same time helping them set rules for communication and cooperation.

○ I encourage learners to further develop their communication skills by involving an external audience as co-creators of knowledge.

Question 20. **I set up course tasks which require students to create English digital content** (*e.g., videos, audios, photos, digital presentations, blogs, wikis).*

○ I do not know how to do it.

○ I do not implement this type of activity with my learners because they do not have enough digital skills.

○ Sometimes, for fun and motivation.

○ My learners create digital content as an integral part of their study.

○ This is an integral part of their learning and I structure the course tasks and assignments in order to increase the level of difficulty to further develop their skills.

○ I encourage learners to create digital content at the same time to identify openly licensed content which can be reused.

○ I encourage learners to create digital content, identify openly licensed content which can be reused and apply licenses to share their own content.

Question 21. **I teach students how to behave safely and responsibly online.**

○ This is not possible in my subject or work environment.

○ I inform them that they have to be careful with relaying personal information online.

○ I explain the basic rules for safely and responsibly acting in online environments.

○ We discuss and agree on rules of conduct.

○ I facilitate learners' use of social rules in the different digital environments we use.

○ I help learners to spot and assess misconduct in digital environments so that they can be critical of the online environments.

○ I teach learners how to spot and assess misconduct online and routes for reporting it should they feel personally offended or attacked.

Question 22. **I encourage students to use digital technologies creatively to solve concrete problems** (*e.g., to overcome obstacles or challenges emerging in the learning process).*

○ This is not possible with my learners, in my work environment.

○ I create opportunities to foster learners' digital problem solving.

○ I do it whenever an opportunity arises.

○ I create opportunities for them to experiment with technological solutions to problems.

○ I integrate opportunities for creative digital problem solving.

○ I make sure to create inclusive opportunities for digital problem solving, so all learners can benefit.

○ Apart from creating opportunities for learners to use their digital problem-solving skills, I let them spot these opportunities arising themselves.

Question 23. **I self-learn and self-update digital skills to facilitate my English digital teaching.**

○ I don't know how to self-learn and self-update my digital skills.

○ I am able to search for digital courses to update my skills.

○ I can search for digital courses to update my skills from various resources.

○ I evaluate and select the most appropriate and relevant courses to update my skills from different resources and platforms.

○ I compare resources using a range of relevant criteria and select the most appropriate digital courses matching my skill level and needs.

○ I collaborate with colleagues on self-learning and self-updating digital skills from various resources and platforms.

○ I take the lead in self-learning and self-updating digital skills.

Question 24**. I recognize digital trends in English teaching.**

○ It is not necessary to keep up-to-date with digital trends in my teaching environment.

○ I search on the internet and am able to notice digital trends in teaching.

○ I recognize the most updated digital trends in teaching.

○ I recognize and evaluate various digital trends in teaching.

○ I select the appropriate digital trends in teaching from different resources.

○ I adapt digital trends in teaching to update my teaching methods.

○ I take the lead in selecting and adapting digital trends in teaching.

Question 25. **I recognize opportunities to teach English on digital platforms and resources.**

○ It is not necessary to teach English using digital platforms in my teaching environment.

○ I avoid teaching English electronically through digital platforms and resources.

○ I select different digital platforms and resources to teach when needed.

○ I select and adapt different digital platforms and resources to teach when necessary.

○ I create opportunities to teach through various digital platforms and resources.

○ I create and adapt digital platforms and resources for teaching.

○ I take the lead in creating and adapting digital platforms and resources for my teaching.

Part 3. Interview questions

Question 1. **Demonstrate the use of digital channels to work with learners/colleagues?**

Question 2. **Demonstrate the use of digital technologies to find/select/create language learning resources?**

Question 3. **Demonstrate the use of digital technologies in a selected lecture?**

Question 4. **Demonstrate the use of digital technologies for learners' language assessment?**

Question 5. **Demonstrate the use of digital technologies to empower learners and facilitate their digital competence?**

Question 6. **Demonstrate how you update your digital skills (by using websites/evidence from training courses, etc.)?**

NĂNG LỰC SỐ CỦA GIẢNG VIÊN NGOẠI NGỮ

Phần 1. Thông tin cá nhân

Câu hỏi 1. **Giới tính của thầy/cô?**

- ⊙ Nam
- ⊙ Nữ

Câu hỏi 2. **Tuổi của thầy/cô?**

- ⊙ dưới 25 tuổi
- ⊙ 25-29 tuổi
- ⊙ 30-39 tuổi
- ⊙ 40-49 tuổi
- ⊙ 50-59 tuổi
- ⊙ 60 tuổi trở lên

Câu hỏi 3. **Thầy/cô đã sử dụng công nghệ số trong giảng dạy được bao lâu rồi?**

- ⊙ 1-5 năm
- ⊙ 6-10 năm
- ⊙ 11-15 năm
- ⊙ 16-20 năm
- ⊙ trên 20 năm

Câu hỏi 4. **Môi trường làm việc của thầy/cô đáp ứng các tiêu chí sau như thế nào?**

	hoàn toàn không đồng ý	không đồng ý	trung lập	đồng ý	hoàn toàn đồng ý
Bảng trắng tương tác, máy chiếu hoặc phương tiện thuyết trình có sẵn trong các phòng thầy/cô giảng dạy.	⊙	⊙	⊙	⊙	⊙
Nhiều đồng nghiệp của thầy/cô sử dụng phương tiện kỹ thuật số trong các khóa dạy của họ.	⊙	⊙	⊙	⊙	⊙

Câu hỏi 5. **Thầy/cô và sinh viên của thầy/cô đã sử dụng những công cụ kỹ thuật số nào để dạy và học?**

- ☐ Các phần mềm thuyết trình
- ☐ Các phần mềm xem video/nghe âm thanh
- ☐ Các phần mềm tạo video/ âm thanh
- ☐ Các nền tảng dạy và học online
- ☐ Các phần mềm tạo câu hỏi/ bình chọn
- ☐ Các phần mềm dành cho áp phích kỹ thuật số, bản đồ tư duy và công cụ lập kế hoạch
- ☐ Blog hoặc kiwi
- ☐ Các công cụ khác
- ☐ Tôi chưa sử dụng các công cụ kĩ thuật số nào.

☐ Ứng dụng hoặc trò chơi tương tác

Câu hỏi 6. Thầy/cô mô tả việc sử dụng công nghệ kỹ thuật số của bản thân như thế nào?

	hoàn toàn không đồng ý	không đồng ý	trung lập	đồng ý	hoàn toàn đồng ý
Tôi thấy làm việc với máy tính và các thiết bị kỹ thuật số khác thật dễ dàng.	○	○	○	○	○
Tôi sử dụng Internet nhiều và thành thạo.	○	○	○	○	○
Tôi cởi mở và tò mò về các ứng dụng, chương trình, tài nguyên số mới.	○	○	○	○	○
Tôi là thành viên của nhiều mạng xã hội khác nhau.	○	○	○	○	○

Câu hỏi 7. Môi trường làm việc của thầy/cô đáp ứng các tiêu chí sau đến mức nào?

	hoàn toàn không đồng ý	không đồng ý	trung lập	đồng ý	hoàn toàn đồng ý
Trường/ khoa thúc đẩy việc tích hợp các công nghệ kỹ thuật số trong giảng dạy.	○	○	○	○	○
Trường/ khoa đầu tư cập nhật, cải thiện cơ sở kĩ thuật số.	○	○	○	○	○
Trường/ khoa cung cấp hỗ trợ kỹ thuật cần thiết.	○	○	○	○	○
Sinh viên có thể truy cập vào các thiết bị kỹ thuật số.	○	○	○	○	○
Kết nối internet của trường/ khoa đáng tin cậy và nhanh chóng.	○	○	○	○	○
Trường/ khoa hỗ trợ phát triển năng lực kỹ thuật số của tôi, ví dụ: thông qua các hoạt động phát triển chuyên môn.	○	○	○	○	○

Part 2. Năng lực kĩ thuật số

Câu hỏi 1. Tôi sử dụng các kênh kỹ thuật số khác nhau để liên lạc với sinh viên và đồng nghiệp (ví dụ: email, blog, tin nhắn, trang web của khoa, ứng dụng).

○ Tôi không sử dụng các kênh liên lạc kỹ thuật số.

○ Tôi sử dụng các kênh liên lạc kỹ thuật số cơ bản, ví dụ: e-mail, tin nhắn.

○ Tôi sử dụng các kênh liên lạc kỹ thuật số khác nhau để giao tiếp.

○ Tôi kết hợp các kênh liên lạc kỹ thuật số khác nhau để giao tiếp, ví dụ: e-mail, tin nhắn, hoặc trang web của tổ chức giáo dục.

○ Tôi phân tích và đánh giá các kênh giao tiếp để chọn ra những kênh mà tôi cho là hiệu quả nhất cho mục đích

giao tiếp của mình.

○ Tôi đánh giá, lập trình và điều chỉnh các chiến lược giao tiếp của mình.

○ Tôi tự tin lập kế hoạch chiến lược truyền thông kỹ thuật số của mình bằng nhiều công nghệ kỹ thuật số.

Câu hỏi 2. Tôi sử dụng công nghệ kỹ thuật số để làm việc cùng với các đồng nghiệp trong và ngoài tổ chức giáo dục của mình.

○ Tôi không hợp tác với các đồng nghiệp khác.

○ Đôi khi tôi trao đổi tài liệu và ý tưởng với đồng nghiệp, ví dụ: qua e-mail hoặc cuộc gọi trực tuyến.

○ Tôi và các đồng nghiệp làm việc cùng nhau trong môi trường cộng tác hoặc sử dụng bộ nhớ dùng chung.

○ Tôi trao đổi ý tưởng, kinh nghiệm và tài liệu với các đồng nghiệp bên ngoài tổ chức của tôi, ví dụ: trong một mạng lưới chuyên nghiệp trực tuyến.

○ Tôi thử nghiệm các công cụ mới để cộng tác trực tuyến với các đồng nghiệp trong và ngoài tổ chức của mình.

○ Tôi cùng tạo tài liệu với các giảng viên khác trên mạng trực tuyến.

○ Tôi cùng tạo, tái sử dụng và chia sẻ tài liệu với các giảng viên khác trên mạng trực tuyến.

Câu hỏi 3. Tôi tích cực phát triển năng lực kỹ thuật số của mình để giảng dạy.

○ Tôi không dùng đến năng lực kỹ thuật số để giảng dạy.

○ Tôi cải thiện năng lực kỹ thuật số của mình để giảng dạy thông qua phản hồi và thử nghiệm.

○ Tôi sử dụng nhiều nguồn tài nguyên để phát triển năng lực kỹ thuật số của mình cho việc giảng dạy.

○ Tôi phát triển phương pháp giảng dạy trực tuyến của mình với sự hỗ trợ của mạng lưới đồng nghiệp.

○ Tôi thảo luận với các đồng nghiệp về cách sử dụng công nghệ kỹ thuật số để đổi mới và cải thiện hoạt động giảng dạy.

○ Tôi đăng ký và tham dự các khóa học phát triển năng lực kỹ thuật số khác nhau, trực tuyến hoặc trực tiếp, để cải thiện phương pháp giảng dạy.

○ Tôi dẫn đầu việc đổi mới giảng dạy bằng cách sử dụng công nghệ kỹ thuật số trong trường/khoa của mình.

Câu hỏi 4. Tôi biết và tham gia vào các cơ hội đào tạo trực tuyến (ví dụ: các khóa học tiếng Anh trực tuyến, MOOCs, hội thảo/ hội nghị trực tuyến liên quan đến giảng dạy ngoại ngữ).

○ Đây là điều mà tôi vẫn chưa xem xét.

○ Chưa, nhưng tôi muốn tham gia một số khóa đào tạo.

○ Tôi đã tham gia đào tạo trực tuyến một hoặc hai lần.

○ Tôi đã thử nhiều cơ hội đào tạo trực tuyến khác nhau.

○ Tôi tham gia tất cả các loại hình đào tạo trực tuyến có thể giúp tôi cải thiện kỹ năng giảng dạy của mình.

○ Tôi thiết kế và cung cấp chương trình đào tạo trực tuyến cho các đồng nghiệp trong cơ sở của mình.

○ Tôi được chứng nhận chuyên nghiệp về việc ứng dụng công nghệ vào giảng dạy.

Câu hỏi 5. Tôi sử dụng các trang web và chiến lược tìm kiếm khác nhau để tìm và chọn lọc các tài nguyên dạy và học tiếng Anh sử dụng công nghệ số (ví dụ: từ điển điện tử, video, khóa đào tạo phát âm có sự hỗ trợ của máy tính).

○ Tôi không biết cách sử dụng internet để tìm kiếm các tài nguyên hữu ích.

○ Tôi có thể sử dụng Internet để tìm kiếm các tài nguyên hữu ích.

○ Tôi sử dụng các công cụ tìm kiếm và nền tảng giáo dục để tìm các tài nguyên có liên quan.

○ Tôi đánh giá và lựa chọn các nguồn tài liệu trên cơ sở phù hợp với sinh viên của mình.

○ Tôi so sánh các tài nguyên bằng cách sử dụng nhiều tiêu chí liên quan, ví dụ: độ tin cậy, chất lượng, sự phù hợp, thiết kế, tính tương tác, sự hấp dẫn.

○ Tôi cộng tác với các đồng nghiệp về việc chia sẻ các nguồn tài nguyên và chiến lược tìm kiếm phù hợp.

○ Tôi đi đầu trong việc thúc đẩy việc sử dụng các nguồn tài nguyên kỹ thuật số trong tổ chức của mình.

Câu hỏi 6. Tôi tạo tài nguyên giảng dạy tiếng Anh kỹ thuật số của riêng mình và sửa đổi những tài nguyên hiện có để điều chỉnh chúng cho phù hợp với nhu cầu của tôi (ví dụ: video nói tiếng Anh, trò chơi từ vựng tiếng Anh).

○ Tôi không tạo tài nguyên kỹ thuật số của riêng mình.

○ Tôi tìm kiếm trên internet và sử dụng các loại tài nguyên giáo dục khác nhau.

○ Tôi tạo các bài thuyết trình kỹ thuật số nhưng không biết cách làm nhiều hơn thế.

○ Tôi kiểm tra và xác nhận các loại tài nguyên khác nhau.

○ Tôi tạo ra nhiều loại tài nguyên kỹ thuật số khác nhau.

○ Tôi điều chỉnh các tài nguyên kỹ thuật số và chia sẻ chúng với các giảng viên khác bằng cách sử dụng nền tảng chia sẻ trực tuyến.

○ Tôi điều chỉnh, sử dụng, chia sẻ và thậm chí tạo ra các tài nguyên tương tác, phức tạp hơn, chẳng hạn như video, bài kiểm tra trắc nghiệm trực tuyến, hay ứng dụng thực tế ảo.

Câu hỏi 7. Tôi bảo vệ hiệu quả nội dung và thông tin quan trọng (ví dụ: bài kiểm tra, điểm của học sinh, dữ liệu cá nhân).

○ Tôi không cần phải làm việc đó vì trường/khoa sẽ lo việc này.

○ Tôi tránh lưu trữ dữ liệu cá nhân bằng điện tử.

○ Tôi bảo vệ dữ liệu cá nhân nhưng hiếm khi thay đổi mật khẩu.

○ Tôi đặt mật khẩu bảo vệ dữ liệu cá nhân và thỉnh thoảng thay đổi mật khẩu.

○ Tôi bảo vệ dữ liệu cá nhân bằng cách kết hợp các mật khẩu khó đoán với việc thay đổi mật khẩu và cập nhật phần mềm thường xuyên.

○ Tôi xem xét các biện pháp bảo vệ dữ liệu cá nhân của mình bằng cách kiểm tra tính hiệu quả của chúng và thay thế chúng bất cứ khi nào cần thiết.

Câu hỏi 8. Tôi cân nhắc kỹ lưỡng cách thức, thời điểm và lý do sử dụng công nghệ kỹ thuật số trong giảng dạy tiếng Anh để đảm bảo sự hiệu quả và phù hợp.

○ Tôi không hoặc hiếm khi sử dụng công nghệ trong lớp học.

○ Tôi tận dụng cơ bản các thiết bị có sẵn, ví dụ: bảng trắng kỹ thuật số, máy chiếu hoặc môi trường học tập trực tuyến nếu dạy học trực tuyến.

○ Tôi sử dụng nhiều nguồn tài nguyên và công cụ kỹ thuật số trong việc giảng dạy của mình.

○ Tôi thử các phương pháp giảng dạy khác nhau tùy thuộc vào công nghệ kỹ thuật số mà tôi chọn.

○ Tôi lựa chọn và thử nghiệm các phương pháp giảng dạy khác nhau nhằm tìm ra phương pháp phù hợp nhất với mình.

○ Tôi đã phát triển danh mục hoạt động dạy học kết hợp với công nghệ và phương pháp giảng dạy thử nghiệm của riêng mình.

○ Tôi sử dụng các công cụ kỹ thuật số để đổi mới việc giảng dạy.

Câu hỏi 9. Tôi theo dõi các hoạt động học và tương tác của sinh viên trong môi trường trực tuyến cộng tác bằng tiếng Anh mà chúng tôi sử dụng.

○ Tôi không dạy học trong môi trường trực tuyến.

○ Tôi không theo dõi hoạt động học của sinh viên trong môi trường trực tuyến mà chúng tôi sử dụng.

○ Tôi theo dõi hoạt động học và tương tác của sinh viên trong môi trường trực tuyến mà chúng tôi sử dụng.

○ Tôi phân tích hoạt động học trực tuyến của sinh viên bằng các phương pháp và công cụ thích hợp nhưng không can thiệp.

○ Tôi phân tích và can thiệp vào các hoạt động học trực tuyến của sinh viên (ví dụ: thảo luận) bằng các nhận xét mang tính động viên hoặc chỉnh sửa.

○ Tôi khuyến khích sự tham gia của sinh viên vào các hoạt động học trực tuyến bằng cách đặt câu hỏi gợi ý.

○ Tôi thay đổi hoạt động học trực tuyến của sinh viên bất cứ khi nào tôi cảm thấy nó không hoạt động hoặc tôi thấy trước có vấn đề.

Câu hỏi 10. Khi sinh viên làm việc theo nhóm, tôi sử dụng công nghệ kỹ thuật số để giúp các em học và hoàn thành các nhiệm vụ của khóa học tiếng Anh một cách hiệu quả.

○ Tôi chưa biết cách tích hợp công nghệ số vào hoạt động học tập hợp tác.

○ Tôi tích hợp công nghệ kỹ thuật số vào các hoạt động học tập hợp tác.

○ Tôi xác định các cơ hội và nhiệm vụ để sinh viên làm việc theo nhóm nhằm tìm kiếm thông tin trực tuyến hoặc trình bày kết quả của họ dưới dạng kỹ thuật số.

○ Tôi tổ chức các hoạt động của khóa học yêu cầu sinh viên hợp tác làm việc theo nhóm, sử dụng Internet để tìm thông tin và trình bày kết quả dưới dạng kỹ thuật số.

○ Tôi thiết kế các nhiệm vụ khóa học yêu cầu sinh viên sử dụng môi trường cộng tác trực tuyến để thảo luận.

○ Tôi thiết kế các nhiệm vụ khóa học yêu cầu sinh viên sử dụng môi trường cộng tác trực tuyến để cùng sáng tạo và chia sẻ kiến thức.

○ Tôi thiết kế các hoạt động trong chương trình giảng dạy yêu cầu sử dụng công nghệ kỹ thuật số để tăng cường học tập hợp tác cũng như đồng sáng tạo và chia sẻ kiến thức.

Câu hỏi 11. Tôi sử dụng công nghệ kỹ thuật số để cho phép sinh viên tự lập kế hoạch, ghi chép và theo dõi việc học tiếng Anh của mình (ví dụ: các câu hỏi để tự đánh giá, ePortfolio để làm tài liệu và giới thiệu, nhật ký/blog trực tuyến để phản ánh).

○ Không thể thực hiện được trong môi trường làm việc của tôi.

○ Tôi khuyến khích sinh viên tự theo dõi và đánh giá về việc học của mình, nhưng không phải bằng công nghệ kỹ thuật số.

○ Tôi sử dụng các câu hỏi để sinh viên tự đánh giá hoặc viết nật ký về khóa học.

○ Tôi sử dụng nhiều công cụ kỹ thuật số khác nhau để cho phép sinh viên lập kế hoạch, ghi chép hoặc tự đánh giá việc học của mình.

○ Tôi tích hợp các công cụ kỹ thuật số khác nhau để cho phép sinh viên tự lập kế hoạch và theo dõi sự tiến bộ.

○ Tôi chọn lọc những công cụ kỹ thuật số tốt nhất để tích hợp vào hoạt động giảng dạy của mình sau khi thử nghiệm chúng với các nhiệm vụ học tập và nhóm sinh viên khác nhau.

○ Tôi phát triển các ứng dụng hoặc trò chơi kỹ thuật số để thu hút sinh viên vào quá trình học tập.

Câu hỏi 12. Tôi sử dụng các định dạng đánh giá kỹ thuật số để theo dõi sự tiến bộ của sinh viên.

○ Tôi không theo dõi sự tiến bộ của sinh viên.

○ Tôi thường xuyên theo dõi sự tiến bộ của sinh viên nhưng không phải bằng phương tiện kỹ thuật số.

○ Tôi sử dụng một công cụ kỹ thuật số, ví dụ: Công cụ lưu trữ bài kiểm tra/blog/hoạt động để đánh giá sự tiến bộ của sinh viên.

○ Tôi sử dụng nhiều công cụ kỹ thuật số để đánh giá sự tiến bộ của sinh viên.

○ Tôi tích hợp việc sử dụng nhiều công cụ kỹ thuật số để theo dõi sự tiến bộ của sinh viên.

○ Tôi chọn lọc những công cụ kỹ thuật số tốt nhất và thử nghiệm chúng để đánh giá và theo dõi sự tiến bộ của sinh viên.

○ Tôi phát triển các ứng dụng và công cụ kỹ thuật số nhằm mục đích theo dõi và/hoặc đánh giá tiến độ.

Câu hỏi 13. Tôi phân tích tất cả thông tin có sẵn để xác định kịp thời những sinh viên cần hỗ trợ thêm.

○ Tôi không có được những loại thông tin này của sinh viên và/hoặc nó được phân tích bởi người khác trong cơ sở của tôi.

○ Tôi phân tích thông tin liên quan đến học thuật, ví dụ: điểm của sinh viên.

○ Tôi xem xét thông tin về hoạt động học và hành vi của sinh viên để xác định những sinh viên cần hỗ trợ thêm.

○ Tôi sàng lọc tất cả thông tin sẵn có để xác định những sinh viên cần hỗ trợ thêm.

○ Tôi phân tích thông tin của sinh viên và can thiệp kịp thời.

○ Tôi giúp sinh viên phân tích thông tin tiến độ học và các dữ liệu khác để tìm kiếm sự trợ giúp bất cứ khi nào các em cần.

○ Tôi khuyến khích sinh viên không chỉ theo dõi tiến độ học mà còn đặt ra mục tiêu học tập.

Câu hỏi 14. **Tôi sử dụng công nghệ kỹ thuật số để cung cấp phản hồi hiệu quả.**

○ Phản hồi là không cần thiết trong môi trường làm việc của tôi.

○ Tôi cung cấp phản hồi cho sinh viên nhưng không ở dạng kỹ thuật số.

○ Tôi đánh giá lợi ích của việc sử dụng các phương pháp kỹ thuật số để cung cấp phản hồi và thực hiện bất cứ khi nào thích hợp (ví dụ: điểm tự động trong các bài kiểm tra trực tuyến, nhận xét hoặc 'lượt thích' trong môi trường trực tuyến).

○ Tôi sử dụng nhiều cách cung cấp phản hồi kỹ thuật số khác nhau để nâng cao hoạt động phản hồi phi kỹ thuật số của mình.

○ Tôi kết hợp các phương pháp kỹ thuật số để cung cấp phản hồi.

○ Tôi chọn lọc các công cụ kỹ thuật số tốt nhất để lấy ý kiến phản hồi sau khi thử nghiệm chúng với các nhóm sinh viên khác nhau.

○ Tôi phát triển ứng dụng hoặc công cụ kỹ thuật số của riêng mình để cung cấp phản hồi cho sinh viên.

Câu hỏi 15. **Khi tạo bài tập tiếng Anh kỹ thuật số cho người học, tôi tính đến và giải quyết những khó khăn tiềm ẩn về thực tế hoặc kỹ thuật** (ví dụ: khả năng tiếp cận bình đẳng với các thiết bị và tài nguyên kỹ thuật số, khả năng tương tác cũng như các vấn đề thiếu kỹ năng kỹ thuật số).

○ Sinh viên của tôi không gặp vấn đề gì khi sử dụng công nghệ kỹ thuật số.

○ Tôi điều chỉnh nhiệm vụ học tập để giảm thiểu khó khăn.

○ Tôi thảo luận những trở ngại có thể xảy ra với sinh viên và đưa ra giải pháp.

○ Tôi điều chỉnh nhiệm vụ, thảo luận các giải pháp và đưa ra những cách khác để hoàn thành nhiệm vụ.

○ Tôi lựa chọn các công cụ mang tính toàn diện và có tính đến nhu cầu tiếp cận của một số nhóm sinh viên.

○ Tôi chọn lọc các công cụ có thể truy cập và toàn diện, cũng như ở các định dạng nguồn mở để cho phép sinh viên tùy chỉnh.

Câu hỏi 16. **Tôi sử dụng công nghệ kỹ thuật số để mang đến cho học sinh cơ hội học tập được cá nhân hóa** (ví dụ: tôi giao các nhiệm vụ kỹ thuật số khác nhau cho sinh viên để giải quyết nhu cầu, sở thích và mối quan tâm học tập của từng cá nhân).

○ Trong môi trường làm việc của tôi, tất cả sinh viên đều được yêu cầu thực hiện các hoạt động giống nhau, bất kể trình độ của họ.

○ Tôi cung cấp cho sinh viên những đề xuất về các nguồn tài liệu bổ sung.

○ Tôi cung cấp các hoạt động kỹ thuật số tùy chọn cho những sinh viên tiến bộ hoặc ở trình độ thấp hơn.

○ Bất cứ khi nào có thể, tôi sử dụng công nghệ kỹ thuật số để mang đến những cơ hội học tập khác biệt.

○ Tôi điều chỉnh việc giảng dạy của mình để phù hợp với nhu cầu, sở thích và hứng thú học tập của cá nhân sinh viên.

○ Tôi cân bằng giữa việc cá nhân hóa với các kỹ thuật học tập hợp tác để nâng cao quá trình học tập.

○ Tôi giúp sinh viên đặt ra mục tiêu và lên kế hoạch cho các hoạt động mà họ cảm thấy cần thiết để cải thiện việc học của mình.

Câu hỏi 17. Tôi sử dụng công nghệ số để sinh viên tích cực tham gia các lớp học tiếng Anh.

○ Không thể thu hút sự tham gia tích cực của sinh viên trong lớp hoặc học trực tuyến.

○ Tôi thu hút sinh viên tham gia tích cực trong lớp, nhưng không phải bằng công nghệ kỹ thuật số.

○ Khi giảng dạy, tôi sử dụng các công cụ mang đến nhiều động lực học, ví dụ: video, hoạt hình.

○ Sinh viên của tôi tương tác với phương tiện truyền thông kỹ thuật số, ví dụ: bảng tính điện tử, trò chơi, mạng cộng tác.

○ Sinh viên của tôi sử dụng công nghệ kỹ thuật số để điều tra, thảo luận và tạo ra kiến thức.

○ Tôi giúp sinh viên không chỉ sáng tạo mà còn trình bày và chia sẻ kiến thức tạo ra.

○ Tôi giúp sinh viên không chỉ tạo mà còn trình bày và chia sẻ kiến thức tạo ra bằng cách sử dụng các giấy phép mở thích hợp.

Câu hỏi 18. Tôi dạy sinh viên cách đánh giá độ tin cậy của thông tin.

○ Điều này là không thể trong chủ đề hoặc môi trường làm việc của tôi.

○ Tôi nhắc nhở sinh viên rằng không phải tất cả thông tin trực tuyến đều đáng tin cậy.

○ Tôi dạy sinh viên cách phân biệt các nguồn đáng tin cậy và không đáng tin cậy.

○ Tôi thảo luận với sinh viên cách xác minh tính chính xác của thông tin.

○ Tôi thảo luận với sinh viên về cách thông tin được tạo ra và thông tin có thể bị sai lệch như thế nào.

○ Tôi thảo luận với sinh viên về cách các em có thể điều chỉnh và tạo ra thông tin không có sự sai lệch, thiên vị và thao túng.

○ Chúng tôi thảo luận về cách thông tin được tạo ra và cách xác định thông tin sai lệch.

Câu hỏi 19. Tôi thiết lập các nhiệm vụ khóa học tiếng Anh yêu cầu sinh viên sử dụng các công cụ kỹ thuật số để giao tiếp và cộng tác với nhau hoặc với các đối tượng bên ngoài lớp học.

○ Điều này là không thể trong chủ đề hoặc môi trường làm việc của tôi.

○ Sinh viên đôi khi được yêu cầu giao tiếp hoặc cộng tác trực tuyến.

○ Tôi khuyến khích sinh viên sử dụng giao tiếp kỹ thuật số và hợp tác với nhau.

○ Tôi khuyến khích sinh viên sử dụng các phương tiện kỹ thuật số để giao tiếp và hợp tác với nhau cũng như với đối tượng bên ngoài lớp học.

○ Tôi tạo kế hoạch và đặt ra các nhiệm vụ trong khóa học cho phép sinh viên từ từ mở rộng các kỹ năng của mình.

○ Tôi thiết lập các nhiệm vụ trong khóa học để các sinh viên có thể cùng sáng tạo kiến thức, đồng thời giúp các em đặt ra các quy tắc trong giao tiếp và hợp tác.

○ Tôi khuyến khích sinh viên phát triển hơn nữa kỹ năng giao tiếp của mình bằng cách kết nối với đối tượng bên ngoài lớp học vào với vai trò là người đồng sáng tạo kiến thức.

Câu hỏi 20. Tôi thiết lập các nhiệm vụ của khóa học yêu cầu sinh viên tạo nội dung số bằng tiếng Anh (ví dụ: video, âm thanh, ảnh, bài thuyết trình kỹ thuật số, blog, wiki).

○ Tôi không biết làm thế nào để làm điều đó.

○ Tôi không thực hiện hoạt động này vì sinh viên không có đủ kỹ năng kỹ thuật số.

○ Đôi khi, để giải trí và tạo động lực cho các em.

○ Sinh viên của tôi tạo ra nội dung số như một phần không thể thiếu trong quá trình học tập.

○ Đây là một phần không thể thiếu trong quá trình học tập và tôi sắp xếp các nhiệm vụ của khóa học tăng mức độ khó nhằm phát triển hơn nữa kỹ năng của các em.

○ Tôi khuyến khích sinh viên tạo ra nội dung số cùng lúc và xác định nội dung được cấp phép mở có thể được sử dụng lại hay không.

○ Tôi khuyến khích sinh viên tạo nội dung số, xác định nội dung được cấp phép mở có thể được sử dụng lại và áp dụng giấy phép để chia sẻ nội dung của riêng họ.

Câu hỏi 21. Tôi dạy sinh viên cách cư xử an toàn và có trách nhiệm trên mạng.

○ Điều này là không thể trong chủ đề hoặc môi trường làm việc của tôi.

○ Tôi nhắc nhở các em phải cẩn thận với việc chuyển tiếp thông tin cá nhân trực tuyến.

○ Tôi giải thích các quy tắc cơ bản để hoạt động an toàn và có trách nhiệm trong môi trường trực tuyến.

○ Chúng tôi thảo luận và thống nhất về các quy tắc ứng xử.

○ Tôi tạo điều kiện thuận lợi cho sinh viên sử dụng các quy tắc xã hội trong các môi trường kỹ thuật số mà chúng tôi sử dụng.

○ Tôi giúp sinh viên phát hiện và đánh giá hành vi sai trái trong môi trường kỹ thuật số để các em có thể phòng tránh những nguy cơ tiềm ẩn từ môi trường trực tuyến.

○ Tôi dạy sinhh viên cách phát hiện và đánh giá hành vi sai trái trực tuyến cũng như các cách báo cáo hành vi đó nếu các em cảm thấy bị xúc phạm hoặc bị tấn công.

Câu hỏi 22. Tôi khuyến khích sinh viên sử dụng công nghệ kỹ thuật số một cách sáng tạo để giải quyết các vấn đề cụ thể (ví dụ: vượt qua những khó khăn về công nghệ nảy sinh trong quá trình học tập).

○ Điều này là không thể trong môi trường làm việc của tôi.

○ Tôi tạo cơ hội để thúc đẩy việc giải quyết vấn đề kỹ thuật số của sinh viên.

○ Tôi làm điều đó bất cứ khi nào có cơ hội.

○ Tôi tạo cơ hội cho các em thử nghiệm giải quyết các vấn đề công nghệ.

○ Tôi tích hợp các cơ hội để giải quyết vấn đề kỹ thuật số một cách sáng tạo.

○ Tôi đảm bảo tạo ra các cơ hội toàn diện cho việc giải quyết vấn đề kỹ thuật số để tất cả sinh viên đều có thể hưởng lợi.

○ Ngoài việc tạo cơ hội cho sinh viên sử dụng các kỹ năng giải quyết vấn đề kỹ thuật số của mình, tôi còn để các em tự phát hiện ra những cơ hội này.

Câu hỏi 23. Tôi tự học và tự cập nhật các kỹ năng kỹ thuật số để hỗ trợ việc giảng dạy tiếng Anh.

○ Tôi không biết cách tự học, tự cập nhật kỹ năng số của mình.

○ Tôi có thể tìm kiếm các khóa học kỹ thuật số để cập nhật kỹ năng của mình.

○ Tôi có thể tìm kiếm các khóa học kỹ thuật số để cập nhật kỹ năng của mình từ nhiều nguồn khác nhau.

○ Tôi đánh giá và lựa chọn các khóa học phù hợp nhất để cập nhật kỹ năng của mình từ các nguồn và nền tảng khác nhau.

○ Tôi so sánh các tài nguyên bằng cách sử dụng nhiều tiêu chí và chọn các khóa học kỹ thuật số phù hợp nhất với trình độ kỹ năng và nhu cầu của tôi.

○ Tôi cộng tác với các đồng nghiệp về việc tự học và cập nhật các kỹ năng kỹ thuật số từ nhiều nguồn và nền tảng khác nhau.

○ Tôi đi đầu trong việc tự học và tự cập nhật các kỹ năng số ở trường/ khoa.

Câu hỏi 24. Tôi nhận ra xu hướng kỹ thuật số trong giảng dạy tiếng Anh.

○ Không cần thiết phải cập nhật các xu hướng kỹ thuật số trong môi trường giảng dạy của tôi.

○ Tôi tìm kiếm trên internet và có thể nhận thấy xu hướng kỹ thuật số trong giảng dạy.

○ Tôi nhận ra những xu hướng kỹ thuật số cập nhật nhất trong giảng dạy.

○ Tôi nhận ra và đánh giá các xu hướng kỹ thuật số khác nhau trong giảng dạy.

○   Tôi chọn các xu hướng kỹ thuật số phù hợp trong giảng dạy từ các nguồn khác nhau.

○   Tôi điều chỉnh các xu hướng kỹ thuật số trong giảng dạy để cập nhật phương pháp giảng dạy của mình.

○   Tôi đi đầu trong việc lựa chọn và điều chỉnh các xu hướng kỹ thuật số trong giảng dạy ở trường/ khoa.

Câu hỏi 25. **Tôi nhận ra cơ hội dạy tiếng Anh trên nền tảng và tài nguyên kỹ thuật số.**

○   Không cần thiết phải dạy bằng nền tảng kỹ thuật số trong môi trường giảng dạy của tôi.

○   Tôi tránh việc dạy thông qua các nền tảng và tài nguyên kỹ thuật số.

○   Tôi chọn các nền tảng và tài nguyên kỹ thuật số khác nhau để giảng dạy khi cần.

○   Tôi chọn lọc và điều chỉnh các nền tảng và tài nguyên kỹ thuật số khác nhau để giảng dạy khi cần thiết.

○   Tôi tạo cơ hội giảng dạy thông qua nhiều nền tảng và tài nguyên kỹ thuật số khác nhau.

○   Tôi tạo và điều chỉnh các nền tảng và tài nguyên kỹ thuật số cho việc giảng dạy.

○   Tôi đi đầu trong việc tạo và điều chỉnh các nền tảng và tài nguyên kỹ thuật số cho việc giảng dạy của mình.

Phần 3. Câu hỏi phỏng vấn

Câu hỏi 1. **Thầy/ cô hãy minh họa việc sử dụng kênh kỹ thuật số để làm việc với sinh viên/đồng nghiệp?**

Câu hỏi 2. **Thầy/ cô hãy minh họa việc sử dụng công nghệ số để tìm/chọn/tạo tài nguyên dạy học ngôn ngữ?**

Câu hỏi 3. **Thầy/ cô hãy minh họa việc sử dụng công nghệ số trong bài giảng được chọn?**

Câu hỏi 4. **Thầy/ cô hãy minh họa việc sử dụng công nghệ số trong đánh giá ngôn ngữ của sinh viên?**

Câu hỏi 5. **Thầy/ cô hãy minh họa việc sử dụng công nghệ số để trao quyền cho sinh viên và hỗ trợ năng lực số của các em?**

Câu hỏi 6. **Thầy/ cô hãy minh họa cách thầy/cô cập nhật kỹ năng số của mình (bằng cách sử dụng các trang web/bằng chứng từ các khóa đào tạo)?**

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