UNIVERSITY OF SZEGED

DOCTORAL SCHOOL OF EDUCATION

PROGRAM OF LEARNING AND INSTRUCTION

DIGITAL LITERACY OF ENGLISH AS A FOREIGN LANGUAGE
STUDENTS AND TEACHERS IN THE CONTEXT OF VIETNAMESE UNIVERSITIES

PHD DISSERTATION SUMMARY

NGUYEN THUY LAN ANH

SUPERVISOR: ASSOC.PROF. DR. HABIL. ANITA HABÓK

SZEGED, HUNGARY, 2024

INTRODUCTION

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 teachers and students 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 made national projects on English education with the integration of technology. Thus, Vietnamese higher educational institutions have invested and provided more facilities for students to take part in e-learning, blended learning, or flipped learning and to collaborate and interact with one another on digital platforms while creating additional resources. However, student and teacher digital literacy (DL) is a big concern because the investment of technologies in education is only effective if they are digitally competent to integrate technology in the teaching and learning process. In the Vietnamese educational context, few studies have attempted to evaluate student and teacher DL levels while DL is known to greatly affect 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, and its results should provide insights regarding the direction of ICT integration.

THEORETICAL BACKGROUND

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.

RESEARCH METHODOLOGY

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:

Sub-study one

The first study validates the computer-assisted language learning (CALL) 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).

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, 2022a).

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

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).

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).

Data analysis

The study employs exploratory factor analysis, confirmatory factor analysis, measurement variance analysis, Rasch model analysis, and structural equation modeling as the main types of data analysis.

FINDINGS OF EMPIRICAL STUDIES

Sub-study one. 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

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, 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.

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

This 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 MOET 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 do not have many chances to apply technologies in the classroom, and the curriculum's focus point is on 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.

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

This sub-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 on the basis of the names of the components suggested by the perceived DL questionnaire and conducted the multidimensional Rasch measurement to confirm the four components of the DL test items though the omitted three test 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.

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

This sub-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 and Scherer, 2019). However, no consensus exists on this issue in different contexts, and individual DL levels depend on various personal and environmental factors.

GENERAL CONCLUSION

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.

REFERENCES

Aesaert, K., Voogt, J., Kuiper, E., & van Braak, J. (2017). Accuracy and bias of ICT self-efficacy: An empirical study into students' over- and underestimation of their ICT competences. *Computers in Human Behavior*, *75*, 92–102. https://doi.org/10.1016/j.chb.2017.05.010

Alakpodia, O. N. (2014). Gender differences in computer use skill among students of school of health technology, Ufuoma, Delta State. *International Journal of Digital Library Services, 1142*(4), 1–11.

Alavi, S. M., Borzabadi, D., & Dashtestani, R. (2016). Computer literacy in learning academic English: Iranian EAP students' and instructors' attitudes and perspectives. *Teaching English with Technology, 16*(4), 56–77.

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education, 47*(4), 373–398. https://doi.org/10.1016/j.compedu.2004.10.013

Ajzen, I. (2005). *Attitudes, personality, and behavior* (2nd ed.). Open University Press.

Aydin, M. (2021). Does the digital divide matter? Factors and conditions that promote ICT literacy. *Telematics and Informatics*, *58*, 101536. https://doi.org/10.1016/j.tele.2020.101536

Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 3–38). Hemisphere publishing Corp.

Buerger, S., Kroehne, U., Koehler, C., & Goldhammer, F. (2019). What makes the difference? The impact of item properties on mode effects in reading assessments. *Studies in Educational Evaluation*, *62*(April), 1–9. https://doi.org/10.1016/j.stueduc.2019.04

Calvani, A., Fini, A., Ranieri, M., & Picci, P. (2012). Are young generations in secondary school digitally competent? A study on Italian teenagers. *Computers & Education, 58*(2),797–807. https://doi.org/10.1016/j.compedu.2011.10.004

Danner, R. B., & Pessu, C. O. A. (2013). A survey of ICT competencies among students in teacher preparation programmes at the university of Benin, Benin city, Nigeria. *Journal of Information Technology Education: Research*, *12*(1), 33–49. https://doi.org/10.28945/1762

Dashtestani, R., & Hojatpanah, S. (2020). Digital literacy of EFL students in a junior high school in Iran: Voices of teachers, students and ministry directors. *Computer Assisted Language Learning,* 1–31. https://doi.org/10.1080/09588221.2020.1744664

Do, V.H., Nguyen, T.K.D., Bui, T.T., Nguyen, T.K.L., Dao, M.Q., Dong, D.H., Bui, T.A.T., Bui, T.T.H., Tran, T.T.V., Trinh, K.V. (2021). *Khung năng lực số dành cho sinh viên*. Retrieved from https://ussh.vnu.edu.vn/vi/news/khoa-hoc/ra-mat-khung-nang-luc-so-danh-cho-sinh-vien-20961.html.

Ehrlinger, J., Johnson, K., Banner, M., Dunning, D., & Kruger, J. (2008). Why the unskilled are unaware: Further explorations of (absent) self-insight among the incompetent. *Organizational Behavior and Human Decision Processes*, *105*(1), 98–121. https://doi.org/10.1016/j.obhdp.2007.05.002

Guillén-Gámez, F. D., & Mayorga-Fernández, M. J. (2020). Identification of variables that predict teachers' attitudes toward ICT in higher education for teaching and research: A study with regression. *Sustainability*, *12*(4). https://doi.org/10.3390/su12041312

Habók, A., & Nagy, J. (2017). ICT tool usage of language and non/language majors: Outcomes and conclusions of self-developed questionnaire. In L. G. Chova, A. L. Martinez, & I. C. Torres (Eds.), *INTED 2017: 11th international technology, education and development conference* (pp. 9050). International Association of Technology, Education and Development (IATED).

Hatlevik, O. E., Throndsen, I., Loi, M., & Gudmundsdottir, G. B. (2018). Students' ICT self-efficacy and computer and information literacy: Determinants and relationships. *Computers & Education*, *118*, 107–119. https://doi.org/10.1016/j.compedu.2017.11.011

Kim, H. S., Ahn, S. H., & Kim, C. M. (2019). A new ICT literacy test for elementary and middle school students in Republic of Korea. *Asia-Pacific Education Researcher, 28*(3), 203–12. https://doi.org/10.1007/s40299-018-0428-8

Kevin, W. H. (2022). To measure is to know … or not. *LEUKOS*, *18*(2), 103. https://doi.org/10.1080/15502724.2022.2029086

Law, N., Woo, D., de la Torre, J., & Wong, G. (2018). *A global framework of reference on digital literacy skills for indicator 4.4.2*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000265403.

Lazonder, A. W., Walraven, A., Gijlers, H., & Janssen, N. (2020). Longitudinal assessment of

digital literacy in children: Findings from a large Dutch single-school study. *Computers & Education, 143*, 103681. https://doi.org/10.1016/j.compedu.2019.103681

Mabayoje, M. A., Isah, A., Bajeh, A. O., & Oyekunle, R. A. (2015). An assessment of ICT literacy among secondary school students in a rural area of Kwara State, Nigeria: A community advocacy approach. *Covenant Journal of Informatics and Communication Technology, 3*(1), 40–53.

Meelissen, M. (2008). Computer attitudes and competencies among primary and secondary school students. In J. Voogt, & G. Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 381–395). Springer.

Nagy, J., & Habók, A. (2018). Attitudes and behaviors related to individual and classroom practices: An empirical study of external and internal factors of ICT use. *Libri*, *68*(2), 113–123. https://doi.org/10.1515/libri-2017-0099

Ng, W. (2012). Can we teach digital natives digital literacy ?. *Computers & Education*, *59(*3), 1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016

Nguyen, T.L.A., & Habók, A. (2022a). 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. *Heliyon*, *8(*6), e09743 https://doi.org/10.1016/j.heliyon.2022.e09743

Nguyen, T.L.A., & Habók, A. (2022b). Digital literacy of EFL students: An empirical study in Vietnamese universities. *Libri*, *72*(1), 53–66. https://doi.org/10.1515/libri-2020-0165

Peled, Y. (2021). Pre-service teacher's self-perception of digital literacy: The case of Israel. *Education and Information Technologies, 26*, 2879–2896. https://doi.org/10.1007/s10639-020-10387-x

Shopova, T. (2014). Digital literacy of students and its improvement at the university. *Journal on Efficiency and Responsibility in Education and Science*, *7*(2), 26–32. https://doi.org/10.7160/eriesj.2014.070201

Siddiq, F., & Scherer, R. (2019). Is there a gender gap? A meta-analysis of the gender differences in students' ICT literacy. *Educational Research Review*, *27*, 205–217. https://doi.org/10.1016/j.edurev.2019.03.007

Son, J.B., Robb, T., & Charismiadji, I. (2011). Computer literacy and competency: A survey of Indonesian teachers of English as a foreign language. *Computer-Assisted Language*

Learning Electronic Journal (CALL-EJ), *12*(1), 26–42.

Son, J.-B., S.-S. Park, and M. Park. (2017). Digital literacy of language learners in two different contexts. *JALT CALL Journal 13*(2), 77–96, https://doi.org/10.29140/jaltcall.v13n2.213

Porat, E., Blau, I., & Barak, A. (2018). Measuring digital literacies: Junior high-school students' perceived competencies versus actual performance. *Computers & Education*, *126*, 23–36. https://doi.org/10.1016/j.compedu.2018.06.030

Potosky, D., & Bobko, P. (2001). A model for predicting computer experience from attitudes toward computers. *Journal of Business and Psychology, 15*(3), 391–404. https://doi.org/10.1023/a:1007866532318

Teo, T. (2006). Attitudes toward computers: A study of post-secondary students in Singapore. *Interactive Learning Environments*, *14*(1), 17–24. https://doi.org/10.1080/10494820600616406

van Deursen, A. J. A. M., Görzig, A., Van Delzen, M., Perik, H. T. M., & Stegeman, A. G. (2014). Primary school children's internet skills: A report on performance tests of operational, formal, information, and strategic internet skills. *International Journal of Communication*, *8*, 1343–1365.

van Deursen, A. J. A. M., Helsper, E. J., & Eynon, R. (2015). Development and validation of the internet skills scale (ISS). *Information, Communication & Society*, *19*, 804–823.

Vandewaetere, M., & Desmet, P. (2009). Introducing psychometrical validation of questionnaires in CALL research: The case of measuring attitude towards CALL. *Computer Assisted Language Learning*, *22*(4), 349–380. https://doi.org/10.1080/09588220903186547

LIST OF PUBLICATIONS

1. Nguyen, T.L.A., & Habók, A. (2023). Tools for assessing teacher digital literacy: a review. *Journal of Computers in Education*, *11*(1), 305–346. https://doi.org/10.1007/s40692-022-00257-5

2. Nguyen, T.L.A., & Habók, A. (2022). 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. *Heliyon*, *8*(6), e09743. https://doi.org/10.1016/j.heliyon.2022.e09743

3. Nguyen, T.L.A., & Habók, A. (2022). Digital literacy of EFL students: An empirical study in Vietnamese universities. *Libri*, 72(1), 53–66. https://doi.org/10.1515/libri-2020-0165

4. Oo, T.Z., Nguyen, T.L.A., & Habók, A. (2021). Review of the assessment of students' language skills in English as a foreign language: knowledge, skills, and principles. *International Journal of Assessment and Evaluation*, *29*(1), 1–15. https://doi.org/10.18848/2327-7920/CGP/v29i01/1-15

5. Nguyen, T. L. A., & Habók, A. (2024). An investigation into the relationship between attitudinal and non-attitudinal variables and the utilization of digital technology: The EFL Vietnamese context. *Language Learning in Higher Education*. (in press).

6. Nguyen, T. L. A., & Habók, A. Digital literacy of English majors: Subjective versus objective assessment. (Under review).

7. Nguyen, T. L. A., & Habók, A. Are educators digitally competent? Investigating digital literacy among English as a foreign language teachers in Vietnamese universities. (Under review).

8. Nguyen, T.L.A., & Habók, A. (2022). Gender differences in EFL undergraduates' digital literacy and technology use. In Fejes, J. F. & Pásztor-Kovács, A. (Eds.), *The 18th Conference on Educational Assessment Program and Abstracts* (pp.76), Szeged, Hungary.

9. Nguyen, T.L.A., & Habók, A. (2022). An analysis of factors significantly affecting EFL students' implementation of didactic applications. In *Program Overview and Book of Abstracts: Earli Sig 6 & 7 Conference 2022* (pp. 31), Zollikofen, Switzerland.

10. Nguyen, T.L.A., Oo, T.Z., & Habók, A. (2022). A comparison of digital literacy and technology usage among undergraduates in different age cohorts. In *Jure 2022 Book of Abstracts* (pp.36), Porto, Portugal.

11. Nguyen, T.LA., & Habók, A. (2021). A study on Vietnamese undergraduates' level of digital skills and the frequency of using digital tools in the EFL context. In Tzvetomir, V. & Roumen, T. (Eds.), *International Conference on Computer Systems and Technologies' 21 (*pp. 171–175). ACM.

12. Nguyen, T.LA., & Habók, A. (2021). ICT knowledge, skills and attitude among undergraduate Vietnamese students: A comparison between freshmen and seniors. In Molnár, G. & Tóth, E. (Eds.) *The 21st National Educational Science Conference Book of Abstracts* (pp. 478), Szeged, Hungary.

13. Nguyen, T.L.A., & Habók, A. (2022). Do ICT self-efficacy beliefs predict actual digital literacy? Evidence from literature in the school context. *In ICERI2022 Proceedings* (pp. 2470–2474), Seville, Spain. http://doi.org/10.21125/iceri.2022.0618

14. Nguyen, T.L.A., & Habók, A. (2022). Psychometric validation of a questionnaire measuring Vietnamese undergraduates' attitude to technology integration in English education. In Steklács, J. & Molnár-Kovács, Z. (Eds.), *The 22nd National Educational Science Conference Book of Abstracts* (pp. 454), Pécs, Hungary.

15. Nguyen, T.L.A., & Habók, A. (2023). Psychometric properties and outcomes of a knowledge-based test to assess EFL students' digital literacy at universities. In Bajzáth, A., Csányi, K., & Győri, J. (Eds.), *The 23rd National Educational Science Conference Book of Abstracts* (pp. 340), Budapest, Hungary.