Developing and Validating a Questionnaire on EFL Teachers' Actual Integration of ICT into their Classes at Vietnamese Higher Education

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Abstract

This study focuses on developing and validating a questionnaire to assess the integration of ICT by EFL teachers in higher education settings in Vietnam. Twenty EFL teachers from three language institutes participated in semi-structured interviews, generating 20 questionnaire items. Qualitative content analysis of the interview data provided insights into EFL teachers' perspectives on ICT integration. Additionally, a document analysis and literature review informed the questionnaire development. A total of 150 EFL teachers were selected to validate the questionnaire by completing the items. Exploratory Factor Analysis identified the underlying constructs of ICT integration. Grounded in the SAMR model, the investigation explored the perceived effectiveness of ICT and identified obstacles to optimal utilization in the EFL classroom. The findings contribute to understanding ICT integration in EFL teaching, informing improvements in language education practices at Vietnamese higher education institutions.

Keywords: *Exploratory Factor Analysis, EFL Teachers' Actual Integration of ICT, Questionnaire, SAMR Model*

Introduction

The age of globalization has witnessed a significant shift in communication patterns across developed and developing nations, with English emerging as the dominant language for education, science, and business. This trend has fueled a remarkable increase in English-language learners in countries like Vietnam, where proficiency in English is seen as indispensable for regional and international information exchange, business transactions, employment prospects, and securing scholarships (Vu, 2018). Concurrently, Information and Communications Technology (ICT) has played a crucial role in the process of globalization,

serving as a catalyst for economic growth and transformation in nations that have effectively embraced its potential (Singh & Siddiqui, 2023).

The term ICT refers to a broad range of technological tools and resources that are used for various purposes such as communication, creation, organisation, storage, dissemination, utilisation, and management of information or knowledge (Mohamed & Ntu, 2023). According to Ramzan et al. (2023), ICT encompasses a diverse range of tools and resources that are utilised for the purpose of generating, distributing, communicating, and managing information. Fu (2013) and Mishra (2020) highlight that ICT contains computers, the internet, online databases, and digital delivery systems such as radios, televisions, projectors, software, hardware, as well as other related services and applications such as video conferencing and distance schooling. These technologies have witnessed widespread usage in the contemporary educational landscape, resulting in transformative changes across disciplines, markets, societies, and professional development (Dzakpasu & Adorn, 2017). Consequently, leveraging diverse ICT capabilities in education is imperative to foster an enhanced education system encompassing infrastructure development, elevating teacher professionalism, nurturing human resources, and advancing student quality (Zhao et al., 2023).

A multitude of scholarly investigations have underscored the beneficial effects associated with the integration of ICT in education, especially within the realm of English Language Teaching (ELT). The utilisation of technology, such as online learning applications, mobile learning applications, game applications, and social media platforms, has been demonstrated to support language learners in their acquisition of the English language (Anggraini & Cahyono, 2020; Blume, 2019; Lambton-Howard et al., 2020). The advantages of ICT integration into ELT encompass the enhancement of vocabulary proficiency, reading velocity, accurate utilisation of English articles, as well as the refinement of speaking and listening abilities (Kao, 2020; Masrai & Milton, 2018; Nguyen & Stracke, 2020). Nevertheless, it is important to acknowledge that certain mobile applications may possess constraints in fostering the development of reading and writing abilities (Sad et al., 2020). Furthermore, ICT promotes active autonomous learning, enhances learners' confidence, and creates authentic language environments (Azmi, 2017; Çakici, 2016). Nevertheless, the effective integration of ICT necessitates sufficient training for teachers and meticulous pedagogical preparation that includes clearly stated goals (Azmi, 2017; Imawan & Ashadi, 2019).

In the developing countries, such as Vietnam, research undertaken has provided evidence of the advantages of ICT for educators and students. These benefits include enhanced student involvement, the ability to tailor subjects to specific contexts, and time efficiency for teachers (Dang et al., 2013; Pham et al., 2018). Furthermore, the utilisation of computer-assisted language learning (CALL) has demonstrated efficacy in the enhancement of students' listening abilities. Moreover, contemporary technology and the internet have contributed to the advancement of reading and writing proficiencies (Nguyen, 2019; Pham & Usaha, 2015). ICT has proven to be a significant tool in various aspects of language learning, such as vocabulary expansion, pronunciation practise, and cultural comprehension (Dang & Nguyen, 2014; Karras, 2016).

Several studies have examined the actual use of ICT by EFL teachers and the integration of technology into language instruction. Ariani et al. (2024) focused on the use of iPads as a pedagogical tool among EFL teachers in Indonesia. The research employed both quantitative

and qualitative methods, including surveys and interviews. It found that while some participants utilized iPads for instructional purposes, others did not engage in such practices.

Similarly, Jude et al. (2014) conducted a study on the limited integration of ICT in instructional practices at Makerere University. They utilized a mixed-methods approach and employed the SAMR model to analyze the level of technology integration. The study revealed a predominance of substitution-level activities, indicating a lack of transformative integration.

The SAMR (Substitution, Augmentation, Modification, Redefinition) model, developed by Puentedura in 2006, has gained significant recognition and utilization in the field of educational technology. This model is a valuable framework for evaluating and integrating technology in educational settings (Bearman et al., 2022; Nguyen & Habók, 2023). According to Bicalho et al. (2022), this enables educators to evaluate their utilisation of technology and their capacity to innovate conventional work through the integration of novel instruments. Educators can advance through various stages of technology integration by implementing gradual modifications in the design and implementation of technology-based learning (Ong & Annamalai, 2023). The primary objective of integrating technology is to rethink the pedagogical practises and educational experiences by harnessing novel technological advancements to achieve tasks that were previously unattainable without the aid of technology. The SAMR model offers guidance in moving from basic substitution to redefining learning tasks and from enhancement to transformation, exploring the vast possibilities technology brings to education (Puentedura, 2012).

The SAMR model serves as a pivotal guide for educators in navigating the complexities of integrating technology within educational settings. It offers a structured approach to enhancing teaching and learning through technology, delineating a pathway for educators to transform their pedagogical practices (Tlili et al., 2022). This model is instrumental in evaluating the degree of technological incorporation in classrooms and has been widely adopted as a metric for analyzing educators' application of technology in instructional processes (Nabilah & Rozimela, 2023). Originating from the work of Puentedura (2006), the SAMR framework aids educators in critically examining their approach to technology in pedagogy. Characterized by its hierarchical structure, the SAMR model delineates four distinct stages that assist educators in the selection, implementation, and assessment of technological tools and resources in educational contexts.

At the initial stage of Substitution within the SAMR model, technology acts as a direct replacement for traditional educational tools and methodologies, without fundamentally altering the teaching process (Puentedura, 2006). This stage is exemplified by the adoption of digital documents in lieu of paper, the preference for digital texts over conventional textbooks, and the utilization of digital presentation tools such as PowerPoint in place of traditional blackboards or whiteboards. The essence of Substitution is the direct exchange of analog methods with digital alternatives, including the transition from physical to electronic books and the shift from manual to digital presentation methods (Jarvis, 2023; Jude et al., 2014; Puentedura, 2010, 2012).

Progressing to the Augmentation phase, the SAMR model posits that technology not only substitutes but also enhances educational practices with added functionalities (Puentedura, 2006). In this context, learners leverage technological resources like online dictionaries, digital study aids, and the vast expanse of the Internet for independent research, thereby enriching

their academic experience. The integration of interactive elements such as hyperlinks, audio, and video into student presentations further exemplifies this stage, aiming to deepen engagement and understanding. Consensus among scholars highlights that Augmentation amplifies the educational process through advanced technological tools, facilitating a more effective and engaging learning environment (Jarvis, 2023; Jude et al., 2014; Puentedura, 2010, 2012).

At the modification level, technology starts to change how tasks are completed, leading to transformative learning experiences (Puentedura, 2006). Students can share presentations and collaborate with peers, receive feedback, create podcasts as revision resources, and engage in online discussions through blogs or virtual classrooms. Modification entails utilizing textual, visual, and audio tools to facilitate collaborative knowledge construction (Jarvis, 2023; Jude et al., 2014; Puentedura, 2010, 2012).

In the culminating stage of Redefinition within the SAMR framework, technology acts as a catalyst for transformative educational practices, facilitating activities that were hitherto unattainable (Puentedura, 2006). This level is characterized by the innovative application of technology to visualize and interpret narrative and structural elements of texts, thereby fostering transformative learning experiences. For instance, students can collaborate with peers from other schools or countries through publicly accessible online platforms to develop a story or use Google Earth to connect with people from a chosen location for interviews and research (Jarvis, 2023; Jude et al., 2014; Puentedura, 2010, 2012).

The extant instrument grounded in the SAMR model, as conceptualized by Puentedura (2006), falls short of delivering an exhaustive evaluation of the nuanced stages of ICT integration (Ngo, 2016). Within the Vietnamese higher education landscape, characterized by a predominant teacher-centric pedagogical culture and the pivotal role of educators, there exists a paucity of empirical investigations into the tangible deployment of ICT resources in EFL settings (Dang et al., 2013; Hoang, 2016; Pham et al., 2018). This scenario underscores an imperative to bridge these research voids by devising an enhanced questionnaire that meticulously delineates the EFL educators' actual utilization of ICT in the Vietnamese higher educational milieu. The objective of crafting a detailed questionnaire informed by the SAMR framework is to shed light on the prevailing dynamics of technological integration in this context, thereby informing subsequent pedagogical strategies and professional development endeavors.

Consequently, the principal inquiries of this research endeavor are articulated as follows:

RQ1: What are the main components of the SAMR questionnaire development on EFL teachers' actual use of ICT?

RQ2: Does the SAMR Questionnaire that has been designed adequately address concerns regarding its reliability and validity?

Method

The following steps were implemented to develop and validate the questionnaire on the legitimate integration of ICT. In the first phase, a set of interviews was carried out with educators who specialize in teaching EFL. The objective of these interviews was to develop an initial collection of items for the measurement instrument. Following this, a comprehensive examination of the relevant academic literature was undertaken to explore the practical

application of ICT by educators in their teaching approaches. Additionally, existing assessment tools were taken into account to explore the various approaches employed by teachers in incorporating ICT into their teaching practices.

Research Context

The integration of ICT into EFL teaching has become a pivotal aspect of educational reform worldwide, particularly in the context of Vietnamese higher education. Vietnam, like many other countries, has recognized the potential of ICT to enhance the quality of education and to prepare students for the demands of the 21st-century global workforce (Pham & Nguyen, 2020). The Vietnamese government has initiated several policies aimed at incorporating ICT into teaching and learning processes across all levels of education (MOET, 2018).

In the realm of higher education, the push towards ICT integration is part of a broader strategy to internationalize education and improve the English language proficiency of graduates, which is seen as crucial for Vietnam's economic integration and competitiveness on the global stage (Le, 2020). This strategy aligns with the National Foreign Language Project 2020, which aims to substantially improve the English language skills of teachers and students by leveraging modern technologies (MOET, 2020).

Despite the government's efforts and the growing recognition of ICT's importance in education, the actual integration of these technologies into EFL teaching in Vietnamese universities presents a complex picture. Studies have indicated that while there is a high level of ICT availability in many higher education institutions, the effective use of these technologies in EFL classrooms is still limited (Nguyen & Bui, 2016). Factors contributing to this situation include teachers' varying levels of ICT competence, pedagogical beliefs, and the availability of institutional support and resources (Pham & Ho, 2019).

Moreover, the rapid evolution of ICT tools and platforms necessitates continuous professional development for teachers to keep abreast of new technologies and to integrate them effectively into their pedagogical practices (Vo & Nguyen, 2020). The COVID-19 pandemic has further underscored the importance of ICT in education, as remote teaching and learning have become the norm, challenging teachers to adapt quickly to new modes of instruction (Nhi & Nhan, 2022).

Given this context, understanding the actual integration of ICT by EFL teachers in Vietnamese higher education institutions is crucial. It involves not only assessing the availability and use of technological tools but also exploring the pedagogical approaches that underpin their use in language instruction. This study aims to develop and validate a questionnaire that can accurately capture the multifaceted nature of ICT integration in EFL classrooms, providing insights into both the extent of use and the pedagogical considerations that influence it.

Instrument Development

In alignment with the methodological principles outlined by Domyei (2010) for crafting questionnaires that exhibit robust validity and reliability, the initial phase of qualitative data collection involved conducting semi-structured interviews. These interviews were meticulously designed, drawing upon an extensive review of the existing literature and informal dialogues with domain experts and practitioners. The construction of the interview

protocol was informed by the seminal works of Jude et al. (2014) and Flores & Adlaon (2022), with the aim of delving into the utilization of ICT by EFL instructors within their pedagogical practices (see Appendix A). Additionally, the research methodology encompassed a thorough analysis of documentary evidence and an in-depth review of the scholarly literature pertinent to the integration of ICT in EFL instruction. This approach facilitated a holistic understanding of the various dimensions relevant to the study and enabled a critical evaluation of the research instruments employed.

Interviews

The formulation of the research tool was initiated through semi-structured interviews with a cohort of 20 EFL educators, selected from a trio of language institutions. Prior to conducting the interviews, informed consent was duly obtained from all participants, who expressed their willingness to engage in the study. The interviews were meticulously designed to probe into the application of ICT by EFL teachers at tertiary institutions in Vietnam. To ensure the selection of participants with pertinent experience in ICT-enhanced teaching, a strategic sampling approach, as delineated by Dornyei (2007), was employed. It is crucial to note that the recruitment of participating educators was achieved through a randomized procedure from a broader pool of 150 EFL teachers. Given certain logistical constraints, some interviews were conducted via remote means to accommodate educators who were otherwise unable to attend in person. For the purpose of detailed analysis, each interview was audio-recorded.

The interpretative analysis of these interviews yielded an initial array of 20 raw items, which laid the groundwork for the subsequent development of a questionnaire aimed at capturing the real-life deployment of ICT by EFL educators. The qualitative analysis entailed a deep dive into the interview transcripts, involving multiple readings to gain a thorough understanding, grasp the conveyed insights, and identify recurring patterns. Following the initial coding phases, the research team embarked on a comprehensive data examination to draw insights. To bolster the content validity of the derived questionnaire items, the expertise of a six-member panel was solicited, consisting of three ELT scholars and three statisticians, each bringing a wealth of knowledge in areas such as foreign language instruction, educational technology, pedagogy, and language assessment. This panel's feedback was instrumental in refining the item wording, resolving ambiguities, and eliminating multi-faceted questions. The relevance of ICT integration in the questionnaire was affirmed by the experts, highlighting its utility in gauging the varied extents of ICT application by EFL teachers. The study's questionnaire adopted a five-point Likert scale, ranging from "strongly disagree" to "strongly agree," enabling respondents to articulate their concurrence or dissent regarding statements related to their ICT usage in educational settings.

Document Analysis

As part of the instrument development process, additional steps were taken to incorporate a document analysis and literature review. This was deemed essential to ensure a comprehensive design. Existing instruments that focused on the integration of ICT were thoroughly examined to understand their structure, content, appropriateness of the items, and psychometric properties (Budiman et al., 2018; Flores & Adlaon, 2022; Hamilton et al., 2016; Jude et al., 2014).

Instrument Validation

The current study employed factor analysis, as suggested by Harman (1976), to examine the raw items in order to refine the ICT integration questionnaire. According to Harman, factor analysis facilitates the systematic classification of extensive datasets and assigns precise numerical values to individual elements inside their respective categories. The present study utilised component analysis as a statistical technique to uncover shared characteristics among the 20 original items, measuring ICT integration, ultimately resulting in their final classification.

To establish the validity of the questionnaire, a total of 150 teachers were selected as participants and were administered the raw items. Subsequently, adjustments were made to the questionnaire based on the structure of the items. The adequacy of the sampling was assessed by doing the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity. Following this, exploratory factor analysis (EFA) was utilised as a quantitative methodology to discern the principal components that had the greatest degree of shared variance, taking into account item rotations. The results of factor analysis revealed a four-factor structure for ICT integration, namely Substitution, Augmentation, Modification, and Redefinition.

To verify the questionnaire's validity, a cohort of 150 educators was enlisted to respond to the preliminary items. Based on their feedback, refinements were made to enhance the questionnaire's structure. The sample's sufficiency was evaluated through the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity, ensuring the appropriateness of the data for factor analysis. Subsequent exploratory factor analysis (EFA) was employed as a statistical technique to identify the key factors that exhibited the highest levels of common variance, with consideration given to item rotations. This analysis elucidated a four-dimensional framework for ICT integration within the educational context, encapsulating Substitution, Augmentation, Modification, and Redefinition.

Further validation was sought through confirmatory factor analysis (CFA) conducted with AMOS version 20, aimed at rigorously assessing the questionnaire's construct validity. This phase involved a detailed examination of the linkages between individual items and their respective factors, as well as the interrelations among the various factors, utilizing the data garnered from the present investigation.

Results

The central aim of this investigation was to scrutinize the existing scholarly discourse on the integration of ICT in the pedagogical approaches of EFL teachers within the Vietnamese higher education framework. Additionally, the study involved analyzing interviews with EFL teachers to develop a questionnaire that assesses their actual application of ICT in educational settings. The methodological approach for data analysis adopted by the researchers was qualitative content analysis. Initially, the audio-recorded interviews were meticulously listened to multiple times, followed by a detailed transcription process that carefully noted nuances such as pauses, intonations, and variations in speech intensity. These transcriptions were then extensively reviewed to extract significant content and discern emergent themes. This led to the coding of the data, which served as a precursor to interpretation. Drawing from the insights gleaned from the educators' articulated perspectives, the researchers crafted an initial set of 20 items for the questionnaire, which were later analyzed through factor analysis techniques. To offer a detailed

perspective, descriptive statistical analyses were conducted and the findings are delineated in Table 1.

Table 1

Raw Items of the ICT Integration Questionnaire

Items	N	Mean	Std. Deviation
SU1	150	3.65	.851
SU2	150	3.85	.992
SU3	150	3.61	1.022
SU4	150	3.57	1.025
SU5	150	3.47	.974
AU1	150	3.52	.946
AU2	150	3.407	.9973
AU3	150	3.49	.974
AU4	150	3.38	.960
AU5	150	3.49	.974
MO1	150	3.50	.939
MO2	150	3.35	.905
MO3	150	3.59	.845
MO4	150	3.58	.884
MO5	150	3.52	.857
RE1	150	3.64	.822
RE2	150	3.61	.903
RE3	150	3.51	.903
RE4	150	3.61	.842
RE5	150	3.44	.831

The findings presented in Table 1 indicate that the mean scores attributed to the teachers range between 3.35 and 3.85. With most mean scores surpassing the threshold of 3, this suggests an overall favorable inclination among the educators. Prior to the application of exploratory factor analysis (EFA), it is imperative to evaluate the sample's suitability through the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's test of sphericity.

Table 2

KMO and Barlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.826
Bartlett's Test of Sphericity	Approx. Chi-Square	1405.699
	df	190
	Sig.	.000
Extraction approach		PCA
Rotation		Varimax with Kaiser normalization
Removed items		0
Variance after rotation		68.065

Table 2 presents the Kaiser-Meyer-Olkin (KMO) measure, which attained a value of 0.826. As delineated by Tabachnick and Fidell (2007), a KMO metric surpassing 0.60 is indicative of a discernible pattern within the questionnaire, thereby validating the sample's sufficiency for the execution of exploratory factor analysis (EFA). Moreover, Bartlett's test of sphericity

registered a statistically significant outcome, with a p-value less than 0.05 (sig = 0.00), reinforcing the appropriateness of the dataset for factor analytical procedures.

Furthermore, the adoption of principal component analysis (PCA) for the extraction of factor loadings is detailed in Table 3. Factor rotation was subsequently applied, employing Varimax with Kaiser normalization to facilitate interpretability. The exploratory factor analysis undertaken on the 20 questionnaire items revealed PCA values exceeding the 0.05 threshold, culminating in a post-rotation total variance explained of 68.065%. The objective of this factor analysis was to pinpoint the principal factors with the most significant shared variance, which was accomplished by rotating the items to optimize their factor loadings. The rotated factors along with their respective loadings are systematically catalogued in Table 3.

Table 3

Cronbach's Alpha, Questionnaire Components, Items, and Factor Loadings

Items	Constructs	Component				
		1	2	3	4	5
		Cronbach's Alpha = 0.778				
AU1	Augmentation	0.820				
AU2		0.774				
AU3		0.818				
AU4			0.803			
AU5			0.732			
		Cronbach's Alpha = 0.762				
MO1	Modification		0.823			
MO2			0.768			
MO3					0.695	
MO4					0.681	
MO5					0.651	
		Cronbach's Alpha = 0.784				
RE1	Redefinition				0.817	
RE2				0.815		
RE3				0.829		
RE4				0.678		
RE5				0.806		
		Cronbach's Alpha = 0.729				
SU1	Substitution					0.848
SU2						0.913
SU3						0.714
SU4			0.721			
SU5			0.777			

After conducting exploratory factor analysis (EFA), Table 3 demonstrates the emergence of four distinct components for the ICT integration questionnaire. Notably, all items exhibit loading coefficients above 0.50, ensuring their strong association with the respective components. The final version of the ICT integration questionnaire comprises a total of 20 items, as presented in Appendix B.

The evaluation of the internal consistency for the constructed questionnaire was conducted using Cronbach's alpha coefficient. As illustrated in Table 3, the reliability coefficients for the various dimensions of the ICT integration questionnaire fluctuate between 0.729 and 0.784. These values denote a satisfactory degree of reliability, reflecting the coherence of the items within each segment of the ICT integration questionnaire (Pallant, 2016). In the context of this investigation, the dimensions identified and delineated in Table 3 are categorized into distinct groups, namely Substitution, Augmentation, Modification, and Redefinition.

Table 4

*Total Variance and Eigenvalues for the Questionnaire Components of ICT Integration*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Total	% of Variance	Cumulative %
1	6.316	31.578	31.578	6.316	31.578	3.368	16.842	16.842
2	2.241	11.205	42.783	2.241	11.205	2.804	14.022	30.864
3	2.082	10.411	53.194	2.082	10.411	2.71	13.551	44.415
4	1.686	8.43	61.624	1.686	8.43	2.458	12.288	56.703
5	1.288	6.441	68.065	1.288	6.441	2.272	11.362	68.065

Table 4 delineates the eigenvalues and the proportion of variance explained by each of the five dimensions within the ICT integration questionnaire. The analysis reveals that the eigenvalues and the explained variances across the six categories are within similar ranges, demonstrating a consistent distribution. The absence of marked differences in the eigenvalues and variances across these dimensions reinforces the conceptual foundation for incorporating these specific components into the ICT integration questionnaire.

Confirmatory Factor Analysis

To finalize the validation procedure, this research utilized confirmatory factor analysis (CFA) through the application of AMOS software. The purpose of CFA is to identify latent variables and assess their interrelationships. Educational researchers are advised to utilize CFA when developing and validating a new scale (Gallagher & Timothy, 2013). The following figure depicts the CFA outcomes obtained in this study.

Figure 1

The Confirmatory Factor Analysis Results
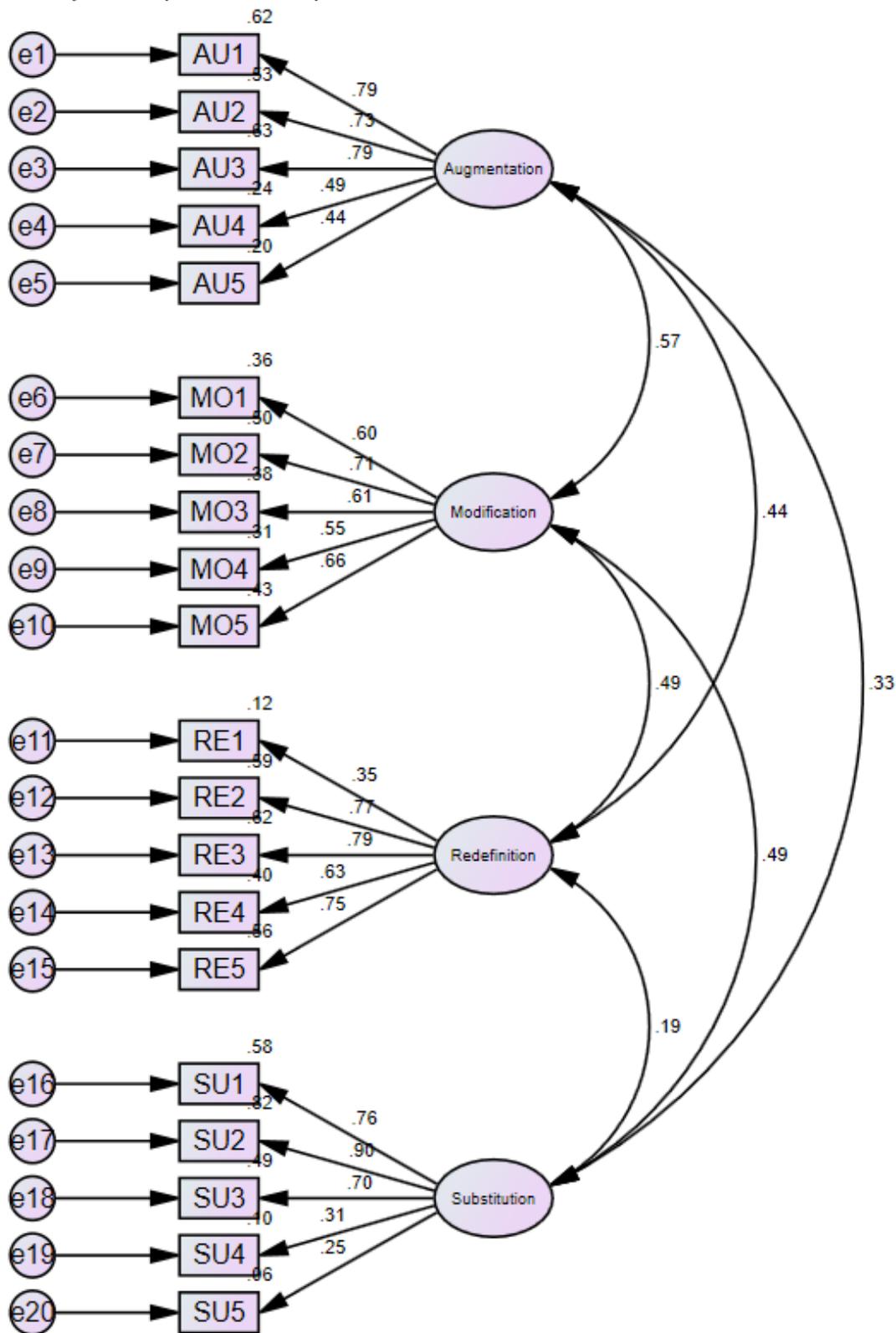
The findings of the CFA are illustrated in Figure 1, where the focus was on delineating and quantifying the subscales pertinent to the effective integration of ICT in the pedagogical approaches of EFL educators. The CFA was executed utilizing AMOS software, version 20. A

critical preliminary step involved assessing the model's goodness-of-fit metrics to ascertain the confirmatory factor analysis model's adequacy. The application of these indices, as outlined by Kline (2015), serves to determine the congruence of the theoretical model with the observed data. The model fit indices selected for this study indicate a commendable alignment of the hypothesized model with the empirical data. These indices include the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI), Tucker-Lewis Index (TLI), and the chi-square to degrees of freedom ratio (CMIN/DF). According to the benchmarks set by Hu and Bentler (1999), both the CFI and NFI values should exceed 0.90 for a model to be considered suitable. Furthermore, Hair et al. (2013) suggest that a TLI value above 0.90, a CMIN/DF ratio below 3, and an RMSEA value under 0.08 are indicative of a good fit. The specific goodness-of-fit indices for the proposed model in this research are detailed in the following table.

Table 5
The Goodness-of-Fit Indices Results

Model fit	TLI	RMSEA	NFI	CFI	CMIN/DF
Values	0.912	0.053	0.997	0.965	2.635

Table 5 delineates the fit indices for the model under consideration, all of which fall within the acceptable parameters. The chi-square to degrees of freedom ratio (CMIN/DF) stands at 2.635, comfortably below the maximum acceptable limit of 3. The Comparative Fit Index (CFI) is reported at 0.965, while the Normed Fit Index (NFI) and the Tucker-Lewis Index (TLI) are recorded at 0.997 and 0.912, respectively, each surpassing the minimum benchmark of 0.9. Additionally, the Root Mean Square Error of Approximation (RMSEA) is determined to be 0.053, which is beneath the upper limit of 0.08. These metrics collectively affirm the robustness of the model's fit to the data, validating its use in the analysis.

Figure 1 illustrates the outcomes from the CFA applied to the questionnaire, which is segmented into six subscales. A noteworthy aspect of these results is that all items across the subscales exhibit factor loadings greater than 0.3, reflecting a commendable level of construct quality. This study's application of CFA was aimed at elucidating the interrelations among the model's subscales. The analysis confirmed that all items maintained meaningful and statistically significant inter-item correlations.

Discussion

In the realm of EFL teaching within Vietnamese higher education, the integration of ICT stands as a pivotal area of exploration, given its profound implications for pedagogical practices and learning outcomes. This study's endeavor to develop and validate a questionnaire aimed at dissecting the actual integration of ICT by EFL teachers is both timely and critical, especially in light of the rapid technological advancements and the increasing emphasis on digital literacy in the global educational landscape.

The genesis of this study is rooted in the recognition of a discernible gap within the existing body of literature, which, while extensive, has not sufficiently delved into the nuanced dynamics of ICT integration specific to the Vietnamese EFL context. Prior research, including seminal works by Jude et al. (2014) and Puentedura (2010, 2012), has laid the groundwork by

offering broad insights into ICT integration across diverse educational settings. However, these studies often fall short of capturing the unique challenges and opportunities presented by the Vietnamese higher education system, such as linguistic barriers, cultural attitudes towards technology, and the level of institutional support available for ICT initiatives (Le, 2020; Nguyen & Bui, 2016). Building on these insights, the development of the questionnaire was informed by a thorough review of both global and local literature, emphasizing the need for a tool that evaluates not just the use but the pedagogical integration of ICT, considering the prevalent traditional teaching methods in Vietnam (Nguyen, 2021).

The instrument developed through this study is designed to fill this gap by providing a nuanced lens through which the complexities of ICT integration in Vietnamese EFL classrooms can be examined. Unlike the generalized approach adopted in previous studies, this questionnaire is tailored to the specific context of Vietnamese higher education, thereby offering a more granular understanding of how EFL teachers integrate ICT into their teaching practices and the myriad factors that influence this integration. It encompasses a wide range of factors including teachers' ICT competencies, attitudes, perceived benefits and challenges of ICT use, and the support structures at institutional and departmental levels, aiming to provide a holistic view of the ICT integration landscape within Vietnamese higher education institutions (Nguyen, 2019). Furthermore, it addresses the critical aspects of infrastructural and technical support, as well as professional development opportunities for teachers, highlighting the importance of continuous learning and adaptation to remain proficient in the use of emerging technologies (Bui, 2022).

The findings from this study, which indicate a relatively high level of ICT integration among Vietnamese EFL teachers, resonate with and expand upon narratives from existing research. This observed high level of integration is indicative of a positive shift toward the embracement of ICT in language instruction, likely influenced by global trends towards digitalization and the Vietnamese government's educational reforms aimed at enhancing English language proficiency through technology (MOET, 2018; Pham & Ho, 2019). However, this optimistic trend is juxtaposed with the challenges unearthed by the study, such as disparities in access to technological resources, varying levels of teacher ICT competency, and institutional barriers, which echo the concerns raised by Kihoza et al. (2016) and Savignano (2017).

The robustness and comprehensive nature of the developed questionnaire underscore its validity as a research instrument. The meticulous validation process, which included expert reviews and pilot testing, ensures that the questionnaire accurately captures the multifaceted phenomenon of ICT integration in the context of Vietnamese EFL teaching. This level of rigor in instrument development is crucial for generating reliable data that can inform both academic research and practical interventions in the field of EFL education.

The implications of this study extend beyond the academic sphere, offering valuable insights for educational policymakers, curriculum designers, and institutional leaders. By elucidating the current state of ICT integration and the challenges faced by EFL teachers, the findings can guide targeted initiatives aimed at enhancing ICT competencies, improving technological infrastructure, and fostering an institutional culture that supports technology-enhanced language learning. Furthermore, the validated questionnaire can serve as a foundational tool for future research endeavors, facilitating longitudinal studies to track

changes in ICT integration practices and comparative analyses across different educational contexts.

Despite the contributions of this study, it is imperative to acknowledge its limitations and the avenues for future research it opens. The dynamic nature of technology and its integration into educational practices necessitates ongoing investigation to keep pace with emerging trends and tools. Longitudinal research could provide valuable insights into how ICT integration evolves over time in response to technological advancements, policy changes, and shifts in pedagogical paradigms. Additionally, comparative studies involving other countries in the Southeast Asian region could enrich the understanding of ICT integration in EFL teaching by highlighting cross-cultural similarities and differences.

In conclusion, this study marks a significant advancement in the field of EFL education by offering a comprehensive and contextually sensitive instrument for assessing ICT integration in Vietnamese higher education. The nuanced insights gleaned from this research not only contribute to the academic discourse on technology-enhanced language learning but also have practical implications for enhancing the quality and effectiveness of EFL teaching in the digital age. As the landscape of education continues to evolve, driven by technological innovation and global interconnectedness, research such as this plays a crucial role in ensuring that language education remains responsive to the needs and challenges of the 21st century.

Conclusion

This research has made significant strides in crafting and validating a questionnaire designed to scrutinize the actual deployment of ICT by EFL educators within Vietnamese higher education, anchored in the SAMR model's theoretical underpinnings. The investigation sought to unravel the intricate dynamics of ICT integration, focusing on both its perceived efficacy and the potential hurdles that might hinder its full exploitation in the EFL teaching milieu.

The outcomes of this study shed light on the generally positive disposition of Vietnamese EFL teachers towards integrating ICT tools in language education, highlighting a collective recognition of ICT's potential to bolster language acquisition, enhance student engagement, and facilitate a more collaborative and diverse learning environment. This acknowledgment among the teaching fraternity is indicative of a broader shift towards embracing technological solutions in education, driven by an understanding of their myriad benefits.

Nevertheless, the research also unveils several challenges that obstruct the seamless incorporation of ICT in language teaching. These include infrastructural deficits, limited access to technological tools, and gaps in teacher training programs, which collectively impede the optimal utilization of ICT resources. The identification of these barriers is pivotal, as it lays the groundwork for targeted interventions aimed at mitigating these issues and thereby augmenting the effectiveness of ICT in language education.

The study's implications transcend the documentation of empirical findings, urging a multi-faceted approach to enhance ICT integration. It calls upon policymakers, educational leaders, and stakeholders to heed these insights and initiate comprehensive strategies that encompass infrastructural enhancements, equitable resource distribution, and robust professional development initiatives tailored to elevate teachers' ICT proficiency.

Moreover, the dynamic nature of technological advancements and pedagogical strategies necessitates a continuous reevaluation and adaptation of ICT integration methodologies. Future

research could delve into the longitudinal effects of sustained professional development, investigate the conditions conducive to successful ICT integration, and evaluate the transferability of effective practices across varied educational landscapes.

In sum, this investigation contributes a critical lens through which the complexities of ICT integration in Vietnamese EFL education are examined, offering a nuanced understanding that is both academically enriching and pragmatically valuable. By addressing the challenges identified and leveraging the strengths observed, the educational sector can navigate towards a technologically advanced pedagogical paradigm that resonates with global educational trends and equips learners for the digital age. This endeavor not only enriches the academic discourse on technology-enhanced language learning but also paves the way for practical advancements in EFL education, ensuring its alignment with the evolving demands of the 21st-century educational ecosystem.

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Ethics Declarations

Competing Interests

No, there are no conflicting interests.

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Appendix A

EFL teachers' interview questions:

1. How do you integrate technology into your EFL classroom, specifically in relation to the substitution of traditional teaching tools?

2. To what extent do you utilize digital resources as a replacement for printed materials in your EFL lessons?

3. In what ways do you incorporate digital presentation tools as substitutes for traditional whiteboards or blackboards?

4. Can you provide examples of how you use digital communication tools to replace face-to-face interactions with students in certain situations?

5. How frequently do you employ technology in your EFL classroom to replace pen-and-paper assessments with online quizzes or digital exams?

6. In what manner do technology tools enhance traditional learning activities within your EFL classroom?

7. How do you encourage students to leverage digital resources to improve their vocabulary, grammar, and language skills?

8. Could you elaborate on how you incorporate multimedia elements in your lessons to enhance student comprehension and engagement?

9. How often do you utilize interactive quizzes or online platforms that provide immediate feedback to students for self-assessment and improvement?

10. How significantly do technology tools redesign learning tasks in your EFL classroom?

11. How do you foster collaboration and feedback among students using online platforms for their written work?

12. In what ways do you incorporate graphic design tools to facilitate visually appealing presentations or projects that require concise and comprehensive writing skills?

13. How do you integrate online research activities to challenge students in locating and effectively incorporating relevant information within their writing?

14. How do you provide opportunities for students to engage in multimedia storytelling through digital tools, thereby transforming their writing tasks into dynamic and engaging presentations?

15. In what ways do technology tools enable students to engage in creative tasks that were previously inconceivable within your EFL classroom?

16. How do you encourage students to create and share videos online, receiving feedback on their speaking skills from a global audience?

17. Can you elaborate on the opportunities you provide for students to participate in video conferences with native English speakers, thereby facilitating authentic speaking practices and cross-cultural interactions?

18. How do you integrate social media platforms into writing activities to foster collaborative writing experiences and encourage peer responses and comments?

19. Have you investigated the adoption of cutting-edge technologies like virtual reality (VR) or augmented reality (AR) to foster immersive language learning environments that extend beyond conventional classroom settings? If yes, please provide specific examples.

Appendix B

EFL teachers' actual integration of ICT questionnaire

The following statements address EFL teachers' actual integration of ICY into their EFL classrooms at Vietnamese higher education institutions. Please answer by putting (✓) in a box that matches your position most, according to the following scale: 1 - Strongly disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly agree

Items	1 Strongly disagree	2 Disagree	3 Neutral	4 Agree	5 Strongly agree
Substitution					
1. Technology in my EFL classroom replaces traditional teaching tools.					
2. I use digital resources instead of printed materials in my EFL lessons.					
3. I use digital presentation tools to replace whiteboards or blackboards.					
4. I use digital communication tools to replace face-to-face interactions with students in certain situations.					
5. Technology in my EFL classroom replaces pen-and-paper assessments with online quizzes or digital exams.					
Augmentation					
6. Technology tools in my EFL classroom enhance traditional learning activities.					
7. I advocate for the utilization of digital tools to enhance students' vocabulary and linguistic abilities.					
8. I incorporate technology tools for grammar and spell-checking to help students improve their writing accuracy and proficiency.					
9. I include multimedia elements in my lessons to enhance student comprehension and engagement.					
10. I use interactive quizzes or online platforms that provide immediate feedback to students for self-assessment and understanding improvement.					
Modification					
11. Technology tools in my EFL classroom significantly redesign learning tasks.					
12. I encourage students to collaborate and provide feedback using online platforms for their written work.					
13. I integrate graphic design tools for visually appealing presentations or projects that require concise and comprehensive writing skills.					

14. I incorporate online research activities to challenge students to find and effectively incorporate relevant information in their writing.

15. I provide opportunities for students to engage in multimedia storytelling through digital tools, transforming their writing tasks into dynamic and engaging presentations.

Redefinition
16. Technology tools in my EFL classroom enable students to engage in creative tasks that were previously inconceivable.

17. I encourage students to create and share videos online, receiving feedback on their speaking skills from a global audience.

18. I provide opportunities for students to participate in video conferences with native English speakers, allowing authentic speaking practices and cross-cultural interactions.

19. I integrate social media platforms into writing activities for collaborative writing experiences and peer responses/comments.

20. I employ innovative technologies, including virtual reality and augmented reality, to develop immersive language learning environments that transcend the confines of conventional classroom settings.