EFL UNIVERSITY STUDENTS' SELF-DIRECTED LANGUAGE LEARNING WITH ICT: A STRUCTURAL EQUATION MODELLING APPROACH*

APRENDIZAGEM INDEPENDENTE DE INGLÊS POR ESTUDANTES UNIVERSITÁRIOS USANDO TIC: UMA ABORDAGEM DE MODELAGEM DE EQUAÇÕES ESTRUTURAIS

APRENDIZAJE INDEPENDIENTE DE INGLÉS POR ESTUDIANTES UNIVERSITARIOS UTILIZANDO LAS TIC: UN ENFOQUE DE MODELOS DE ECUACIONES ESTRUCTURALES

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Abstract: The growth of information and communication technology (ICT) can enhance students' self-directed language learning (SDLL). Language learning in online settings have determined positive correlations between self-directed learning behaviour and academic achievement. This study was conducted to examine factors influencing self-directed language learning with ICT. A quantitative design was applied, which involved 1,022 pre-service teachers of English department from nine universities in Indonesia. A questionnaire was employed to collect the data, and the proposed hypotheses were examined using PLS-SEM. The PLS-SEM analysis demonstrated that the attitude towards the use of ICT mediates the influence of ICTSE, OCSE, FC, and SN on SDLLICT. The results indicated that students' attitude is the most significant variable in enhancing self-directed language learning through ICT. The study's findings are useful for both learners and educators in leveraging ICT for self-directed language learning. Students must be equipped with ICT literacy and positive attitudes towards using ICT in English language learning activities. Teachers should also be equipped with ICT skills in order to provide learning experiences that are customized to students' needs and preferences in today's digital world. Furthermore, this study provides significant implications for educators and policy makers in providing ICT infrastructure that meets the students' needs.

1

Keywords: English as a Foreign Language; English Language Learning; ICT; Self-Directed Language Learning; Structural Equation Modeling

Resumo: O crescimento das tecnologias de informação e comunicação (TIC) pode potencializar a aprendizagem independente de línguas pelos alunos. Esta pesquisa teve como objetivo examinar os fatores que influenciam essa aprendizagem com o uso das TIC. Um projeto quantitativo foi realizado com a participação de 1.022 estudantes de inglês em nove universidades da Indonésia. Para a coleta de dados, foram utilizados questionários, e a análise foi realizada por meio da técnica PLS-SEM. Os resultados indicaram que as atitudes dos alunos mediam a influência de fatores como ICTSE, OCSE, FC e SN na aprendizagem autodirigida com TIC (SDLLICT). Os achados revelaram que a atitude dos alunos é a variável mais significativa para melhorar a aprendizagem de línguas de forma autodirigida. Esses resultados são valiosos tanto para alunos quanto para educadores, pois ressaltam a importância de um conhecimento adequado sobre TIC e uma atitude positiva em relação ao seu uso nas atividades de aprendizagem de inglês. Além disso, os professores devem possuir habilidades em TIC para oferecer experiências de aprendizagem personalizadas. A pesquisa também apresenta implicações importantes para educadores e formuladores de políticas no que diz respeito à criação de infraestruturas de TIC que atendam às necessidades dos estudantes.
Palavras-chave: Inglês como uma língua estrangeira; Aprendizagem da Língua Inglesa; TIC; Aprendizagem independente de idiomas; Modelagem de equações estruturais.

Resumen: El crecimiento de la tecnología de la información y la comunicación (TIC) puede potenciar la independencia de los estudiantes en el aprendizaje de idiomas. Este estudio se llevó a cabo para investigar los factores que influyen en el aprendizaje autónomo de idiomas mediante el uso de las TIC. Se aplicaron métodos cuantitativos, involucrando a 1.022 estudiantes de inglés de nueve universidades en Indonesia. La recolección de datos se realizó a través de cuestionarios, y el análisis se llevó a cabo utilizando PLS-SEM. Los resultados revelaron que la actitud de los estudiantes es la variable más significativa en la mejora del aprendizaje autodirigido de idiomas a través de las TIC. Este hallazgo es valioso tanto para alumnos como para educadores en su intento de aprovechar las TIC en el aprendizaje de idiomas. Para maximizar el uso de estas tecnologías, los estudiantes deben poseer conocimientos adecuados sobre TIC y mantener actitudes positivas hacia su aplicación en el aprendizaje del inglés. Asimismo, los profesores deben estar capacitados en TIC para ofrecer experiencias de aprendizaje personalizadas que se ajusten a las necesidades de los estudiantes en la era digital. La investigación también proporciona recomendaciones para que educadores y responsables políticos desarrollen infraestructuras TIC adecuadas.
Palabras claves: Inglés como lengua extranjera; Aprendizaje del Idioma Inglés; TIC; Aprendizaje independiente de idiomas; Modelización de ecuaciones estructurales.

1. INTRODUCTION

Self-directed learning (SDL) has been demonstrated to be an essential aspect of 21st-century education. SDL supports student autonomy and engagement in their learning process, giving them a leadership role and positioning the educator as a facilitator or guide of that learning rather than a simple transmission of knowledge. Tekkol & Demirel (2018) define SDL as an essential ability and believe that higher education should focus greater

attention on instructional strategies to improve SDL. Memorization and repetition of information, which may become obsolete in the near future, will not prepare students for the challenges of the twenty-first century workplace. Students in the twenty-first century should be allowed to take control of their own lifelong learning. They must also be able to successfully communicate and engage with others, think creatively, and critically, as well as overcome previously unsolved problems while continually adapting to new technology (Artman & Crow, 2022; Hadiyanto et al., 2021).

SDL is a method to education in which students recognise responsibility for their own learning process (Bosch et al., 2019; Mentz et al., 2019). Students that actively participate in and control their own learning process are known as self-directed learners. These learners have the opportunity to select their own learning objectives, strategies, and resources in order to achieve their goals. Self-directed learning is viewed as a means for students to stay up with the quickly changing technological culture of the twenty-first century, when traditional teacher-centered learning settings and rote learning no longer give sufficient solutions. Teachers, as facilitators of learning, have to constantly explore ways for students, as self-directed learners, to actively participate in their own learning in order to prepare them for their future (Bosch et al., 2019; Damrow & Faye, 2022).

Another issue of SDL is that it remains difficult for instructors and facilitators to build a successful SDL environment that also incorporates technology (Payne, 2021). SDL researchers use many ideas to grasp the essence of SDL. SDL can be characterised in three ways: as a personal attribute, a process, or a design feature of the learning environment. The level of self-direction is highly reliant on learners' personal traits necessary for SDL, including abilities and attributes linked to self-management, self-monitoring, self-control, and motivation (Fisher et al., 2001; Garrison, 1997). Learners should have the requisite personal traits for SDL at some level, since the degree to which learners have these SDL characteristics determines the extent of their control over their own learning. Self-directed learning is a strategy for learning that encourages students to actively participate in the learning process in order to develop higher-order thinking abilities such as critical thinking, problem solving, and reasoning. A self-directed learner should be able to effortlessly and skillfully acquire new information (what) and manage the learning process (how) for the rest of his or her life (Mentz & Bailey, 2019).

One approach to addressing the issues of self-directed language learning is to integrate technology for language learning. When referring to self-directed language learning (SDLL) through the use of technology, it includes any ICT devices and digital learning environment to promote self-directed in language learning. All of these environments have one feature: the utilisation of some type of technological device in language acquisition. The capabilities of ICT may provide learners with opportunity to experience and improve the SDLL process. For instance, the ability to access a wide range of information and resources; store, capture, manipulate, and display information, as well as communicate with peers and online experts can enable students to use ICT in identifying learning needs, choosing learning content and resources, and also evaluating the learning outcomes. SDLL with ICT is the use of ICT technologies for learning experiences that allow learners to organise, implement, and evaluate their own language learning (Lai et al., 2022).

Some previous studies reported that the usage of ICT contributes in improving SDLL. Yan & Singh (2023) found that the use of technology associated with independent learning. They found that utilising mobile phones to study a language acts as a moderator

in the link between self-management and beliefs about how their language abilities are improving. Besides, Sumuer (2018) found that the usage of ICT impacts students' judgements on SDL practices by allowing them to access a variety of information and resources, identify and assess materials, pursue their interests, and engage with experts and peers. In addition, Zhang & Pérez-Paredes (2019) found that learners' use of mobile technologies such as smartphone, email, social media, and Internet positively increased their levels of SDL. Furthermore, Yavuzalp & Bahcivan (2021) reported that the students' preparation for e-learning had an impact on their self-directed abilities, contentment, and academic performance.

To response the current issue on SDLL with technology, particularly in the context of EFL university students in Indonesia, the researcher views a need for further investigation into students' self-directed language learning with ICT. To take benefit from ICT for SDLL, it is necessary to fully comprehend the variables that promote and enable SDLL through ICT. Such evidence would enable learners, teachers, or instructional designers to use suitable scaffolding tactics for successful SDLL using technology. Some researchers emphasised the necessity for more studies that investigate aspects impacting SDL through the use of ICT (Lai et al., 2022; Pan & Shao, 2020). Although studies have largely focused on the impact of technology use on SDL, there is minimal study on the determining variables affecting SDLL with ICT. As a result, it is essential to understand the factors influencing the use of ICT for improving SDLL. Therefore, the purpose of this study is to investigate the determinants of ICT use for SDLL by posing guiding research questions; How well do SDLL readiness, Attitude towards ICT, online communication self-efficacy, ICT self-efficacy, facilitating condition, and subjective norm predict SDLL with ICT of EFL university students?

This study serves as a guide for scholars who are interested in conducting a study in similar research interest on self-directed language learning with ICT. The second group to benefit is policymakers, such as government or curriculum education centres, who are in responsible of identifying determinants of ICT use for self-directed language learning. The third category includes students and instructors who are the main users of ICT for SDLL during the teaching and learning process. Finally, organisations and institutions in which EFL university students utilise ICT for self-directed language learning.

2. METHODOLOGY
2.1 Research Design
This study employed a quantitative research methodology to investigate the determinants of ICT use for self-directed language learning in the context of foreign language learning in Indonesia. Specifically, the researchers utilized a survey design, which allowed for the collection and numerical analysis of data to describe trends, attitudes, or opinions within a given population (Cresswell, 2014). The data was then analyzed using partial least squares - structural equation modeling (PLS-SEM), a causal-predictive approach that is well-suited for handling the nuances of the research model, such as multivariate normality, measurement scales, sample size, and model complexity (Hair et al., 2019). This analytic technique enabled the researchers to examine the determinants of ICT use for self-directed language learning and test the proposed research hypotheses. The PLS-SEM method was chosen over traditional covariance-based SEM (CBSEM) approaches due to its advantages in dealing with the specific characteristics of the data and research model.

2.2. Participants

This current research performed a survey of pre-service teachers of English departments at nine universities in Indonesian. This survey gathered responses from (n=1,022) respondents. Table 1 contains a thorough analysis of respondents' demographic information as well as other data on their ownership of ICT devices and time spent using ICT for self-directed language learning.

Table 1.
Respondent's Demographic Information

	Number	Percentage
Gender		
Female	774	75.7%
Male	248	24.3%
Class Enrolment		
1st Year Students	270	26.4%
2nd Year Students	247	24.2%
3rd Year Students	220	21.5%
4th Year Students	220	21.5%
5th Year Students	65	6.4%
ICT Devices Ownership	1,022	100%
Period of Using ICT for Language Learning		
<1 hour per day	215	21.1%
1-2 hours per day	351	34.3%
2-3 hours per day	168	16.4%
3-4 hours per day	109	10.7%
4-5 hours per day	64	6.3%
>5 hours per day	115	11.2%

Source: The Authors (from survey responses)

In terms of gender, 774 (75.7%) respondents were female, while 248 (24.3%) were male. The disparity in the number of female and male respondents is due to the fact that female students dominate the majority of the English department students. Around 25% of respondents participated in both their first and second years in the English language department, while 21.5% enrolled in their third and fourth year, and the rest 6.4% enrolled in their fifth year of English department. An additional significant data is that 100% of respondents owned ICT devices (e.g., Laptop, smartphone, or both). Furthermore, the majority of respondents spend their time to use ICT for language learning not more than 2 hours per day.

2.3. Instrumentation

The questionnaire is divided into two sections and has 41 questions. The first section comprised 8 questions pertaining to demographic and situational information including institution affiliation, gender, academic years, ICT devices ownership, and activity in using ICT for SDLL. The second section includes 7 constructs with 33 items and is designed based on research questions and some previous relevant studies, consisting of ICT self-efficacy, online communication self-efficacy, facilitating conditions, attitudes towards ICT, subjective norms, SDLL readiness, and SDLL with ICT. Respondents were asked to indicate their level of agreement or disagreement with each statement. The Likert scale has four potential replies, ranging from strongly disagree (1) to strongly agree (4). Table 2 describes constructs and items of the research instrument.

The validity of the questionnaire was assured by its design, which had been developed based on previous literature study and expert judgement. Two technology-enhanced language learning (TELL) experts evaluated the questionnaire's content validity in in-person discussions to guarantee the relevance and quality of all items in the questionnaire. The questionnaire's layout, size, and language translation have all been changed. Because the respondents were pre-service teachers (ranging from Year 1 to Year 5) with various levels of English proficiency, a three-step adaptation technique; forward translation, review, and reverse translation, was utilised to develop a credible Indonesian version of the questionnaire.

Table 2.
Research Instrument

Constructs	Items
ICT Self-Efficacy (ICTSE)	1. I know how to use ICT devices on my own.
	2. I can easily learn how to use a new platform or application of ICT.
	3. I feel confident in my knowledge and skills on how to use ICT.
Online Communication Self-Efficacy (OCSE)	4. I know how to use online communication tools (e.g. email, online discussion forum, social media, etc.) to effectively communicate with others.
	5. I feel confident in expressing my point of view in online discussion.
	6. I feel confident in posting questions and/or answers in online discussions.
Facilitating Conditions (FC)	7. Guidance was available to me on the use of ICT for English language learning.
	8. Specialized instruction concerning the use of ICT for English language learning available to me.
	9. ICT infrastructures for English language learning are available to me.

	10. I think that the use of ICT fits well with the way I prefer to learn English.
	11. I am interested in using ICT for English language learning.
Attitude towards ICT (AICT)	12. I intend to use ICT for English language learning.
	13. I am happy to use ICT for English language learning.
	14. The use of ICT for English language learning is a positive thing.
	15. My peers believe I should utilise ICT for English language learning.
Subjective Norm (SN)	16. The instructors were helpful in using ICT for English language learning.
	17. Lecturers are available for assistance of ICT use difficulties in English language learning.
	18. I manage my time well for English language learning.
	19. I have good management skills in English language learning.
Self-Directed Language Learning Readiness (SDLLR)	20. I solve problems using a plan in English language learning.
	21. I enjoy learning new information regarding English language learning.
	22. I like to gather the facts before I make a decision in English language learning.
	23. I prefer to set my own English learning goals.
	24. I evaluate my own performance regarding English language learning.
	25. I use ICT to ask my lecturer questions on my lessons
	26. I utilise ICT to communicate my views and opinions regarding my assignments (e.g., through social media, blogs, voice-recording, multimedia storytelling, etc.).
	27. I use ICT to learn new knowledge and better comprehend what I am learning.
	28. I utilise ICT to deal with information in my learning.
Self-Directed Language Learning with ICT (SDLL-ICT)	29. I use the ICT to become better at English language skill.
	30. I use the ICT to get ideas from different websites and people to learn more about a topic.
	31. I use the ICT to help me plan the lessons that I want to study.
	32. I use the ICT to assist me identify learning resources that I do not understand
	33. I use the ICT to assist me analyse, evaluate, and synthesize the materials that I am studying.

Source: The Authors

2.4. Research Procedure

Google Forms was used to generate an online survey. The survey link was sent to respondents via the course management system and social networking (e.g., WhatsApp). Data was collected from October to December 2023. Completing the questionnaire took around 5–7 minutes, and students were informed about the aim of questionnaire and how their data would be used. Data was collected during the course process of the academic year 2023. The questionnaire was delivered to the intended 1697 pre-service teachers in the English department of nine Indonesian institutions as responses. The questionnaire had 1022 responses, for a 60.2% response rate.

2.5. Data Analysis

We classified the information received from the online questionnaire for analysing the data. The data was initially put into a Microsoft Excel spreadsheet. The data was then transmitted to the SmartPLS4 programme, which performed the measurement model and returned descriptive statistics such as mean, frequency, percentage, standard deviation, and correlation. We also checked the factor loading values for each item in the constructs to ensure that they were more than 0.70. The structural model from the SmartPLS4 programme was used to test the hypotheses at a significance level of 0.05. The impacts of each variable on ICT usage behaviour for self-directed language acquisition were examined using confirmatory factor analysis and path analysis in PLS-SEM. Before evaluating the hypothesis, we ran validity and reliability tests to meet the requirements of the analysis using PLS-SEM.

2.6. Research Model and Hypotheses

Based on the literature review and theoretical framework, this current study proposed seven constructs consist of ICT self-efficacy, online communication self-efficacy, facilitating conditions, attitude towards ICT, subjective norm, SDLL readiness, and SDLL with ICT. Figure 1 below describes the variables and the model to be proposed in this study as follows:

Figure 1.
Proposed Model
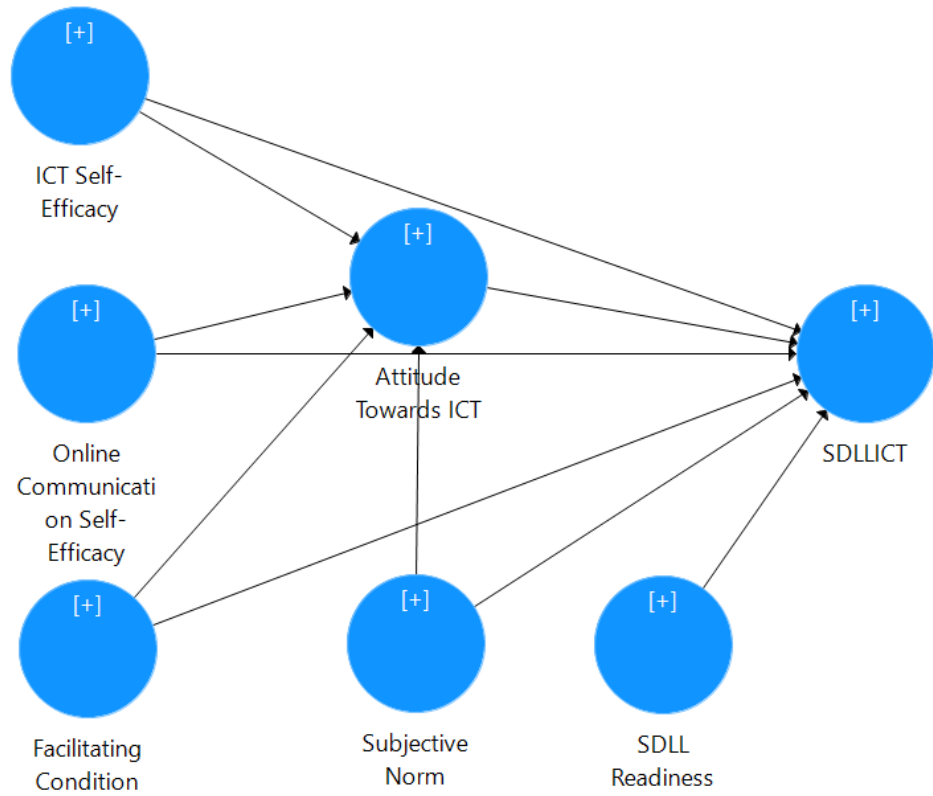
Source: The Authors (Proposed model using SmartPLS4)

Table 3 below describes the hypotheses in this study. There are ten hypotheses have been examined in this current study.

Table 3.
Proposed Hypotheses of the study

No.		Hypotheses
H1	Ho	There is no a significant effect of ICTSE on SDLLICT
	Ha	There is a significant effect of ICTSE on SDLLICT
H2	Ho	There is no a significant effect of ICTSE on Attitude
	Ha	There is a significant effect of ICTSE on Attitude
H3	Ho	There is no a significant effect of OCSE on SDLLICT
	Ha	There is a significant effect of OCSE on SDLLICT
H4	Ho	There is no a significant effect of OCSE on Attitude
	Ha	There is a significant effect of OCSE on Attitude
H5	Ho	There is no a significant effect of FC on SDLLICT
	Ha	There is a significant effect of FC on SDLLICT
H6	Ho	There is no a significant effect of FC on Attitude
	Ha	There is a significant effect of FC on Attitude
H7	Ho	There is no a significant effect of SN on SDLLICT
	Ha	There is a significant effect of SN on SDLLICT
H8	Ho	There is no a significant effect of SN on Attitude
	Ha	There is a significant effect of SN on Attitude
H9	Ho	There is no a significant effect of Attitude on SDLLICT
	Ha	There is a significant effect of Attitude on SDLLICT
H10	Ho	There is no a significant effect of SDLLR on SDLLICT
	Ha	There is a significant effect of SDLLR on SDLLICT

Source: The Authors

3. RESULTS
3.1. Descriptive Statistics

In this part, we present the descriptive statistic for each construct. Table 4 shows the various values of variance, mean, standard deviation, skewness, and kurtosis. All means are more than the median, ranging from 3.097 to 3.477. It is significant to note that the standard deviations fall between 0.526 and 0.667, showing a small spread around the average. Furthermore, the values of skewness and kurtosis might be employed as normality testing data. Normal data is defined as having an absolute value within ±1. The findings of this study indicated that the survey was pretty regularly distributed in all constructs. However, the PLS approach reduces this issue. Additionally, Kline's (2016) rule of thumb suggests that absolute values of Skewness < 3 and Kurtosis < 10 are acceptable.

Table 4.
Descriptive Statistics

	Mean	Loadings	Standard deviation	Excess kurtosis	Skewness	Cramér-von Mises test statistic
AICT1	3.305	0.827	0.565	-0.043	-0.186	25.194
AICT2	3.294	0.857	0.527	-0.597	0.161	29.499
AICT3	3.333	0.830	0.526	-0.840	0.135	28.848
AICT4	3.419	0.765	0.539	-1.077	-0.125	26.141
FC1	3.154	0.773	0.622	0.218	-0.288	22.268
FC2	3.283	0.767	0.611	0.313	-0.428	21.624
FC3	3.174	0.767	0.667	0.095	-0.433	18.430
FC4	3.215	0.753	0.571	-0.161	-0.058	25.734
ICTSE1	3.477	0.763	0.564	-0.545	-0.518	24.489
ICTSE2	3.263	0.831	0.558	0.298	-0.140	27.048
ICTSE3	3.295	0.813	0.577	-0.236	-0.193	23.935
OCSE1	3.233	0.744	0.558	-0.149	-0.020	26.895
OCSE2	3.163	0.860	0.641	0.015	-0.317	20.210
OCSE3	3.168	0.841	0.663	-0.109	-0.362	18.351
SDLLICT1	3.152	0.684	0.631	0.884	-0.483	23.055
SDLLICT2	3.192	0.723	0.582	0.391	-0.201	25.684
SDLLICT3	3.299	0.740	0.567	-0.034	-0.185	25.137
SDLLICT4	3.340	0.711	0.548	-0.318	-0.106	26.377
SDLLICT5	3.329	0.772	0.547	-0.719	-0.010	26.389
SDLLICT6	3.295	0.786	0.524	-0.618	0.182	29.856
SDLLICT7	3.270	0.773	0.554	-0.079	-0.058	26.987
SDLLICT8	3.290	0.767	0.553	-0.546	-0.001	26.350
SDLLICT9	3.292	0.793	0.567	-0.198	-0.146	25.015
SDLLR1	3.134	0.752	0.621	0.421	-0.319	22.978
SDLLR2	3.097	0.762	0.645	0.680	-0.444	22.386
SDLLR3	3.146	0.797	0.604	0.766	-0.344	25.032
SDLLR4	3.303	0.716	0.540	-0.622	0.064	27.654
SDLLR5	3.177	0.777	0.572	0.228	-0.108	26.588
SDLLR6	3.206	0.787	0.561	0.097	-0.050	27.285
SDLLR7	3.137	0.838	0.639	0.212	-0.331	21.102
SN1	3.256	0.842	0.599	0.012	-0.280	22.588
SN2	3.269	0.869	0.576	-0.338	-0.126	24.260
SN3	3.221	0.801	0.594	0.648	-0.337	24.56

Source: The Authors (Data analysis using SmartPLS4)

3.2 Construct Validity and Reliability

The outer model runs an exploratory study to determine the scale of reliability and construct validity. This study uses the reliability criteria proposed by Fornell and Larcker (1981), Chin (1998), and Hair et al. (2019). First, all indicator of factor loadings should be substantial and more than 0.5. Factor loadings should be at least 0.7 with a t-statistic greater than ± 1.96 at 5% level. Finally, the composite reliability should exceed 0.7. Table

5 shows the main indicators employed in the measurement model. It demonstrates that the factor loadings derived by SmartPLS4 are meaningful at the 5% level. Furthermore, all items use the rule of thumb of 0.5 for indicator reliability and 0.7 for standardised factor loadings. According to Hair et al. (2019), the acceptable Cronbach's alpha value is determined on the type of research. It is an exploratory analysis, and the author specifies 0.7 as the minimum acceptable Cronbach's alpha.

Table 5.
Construct Validity and Reliability

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
AICT	0.839	0.849	0.892	0.673
FC	0.768	0.775	0.850	0.586
ICTSE	0.723	0.723	0.844	0.644
OCSE	0.748	0.745	0.857	0.667
SDLLICT	0.903	0.904	0.921	0.564
SDLLR	0.890	0.894	0.914	0.603
SN	0.788	0.796	0.876	0.702

Source: The Authors (Data analysis using SmartPLS4)

3.3. Discriminant Validity

Table 6 displays the discriminant validity. The discriminant validity was tested using the Fornell & Larcker criteria. The square root of any construct value in bold is significantly bigger than the correlation coefficients in the same row or column, demonstrating excellent discriminant validity of the external and internal constructs. AICT has a score of 0.820, FC has a score of 0.765, ICTSE has 0.803, OCSE has 0.817, SDLLICT has 0.751, SDLLR has 0.776, and SN has 0.838. Each construct has a value greater than 0.7, indicating that all the constructs are valid.

Table 6.
Discriminant Validity

	AICT	FC	ICTSE	OCSE	SDLLICT	SDLLR	SN
AICT	**0.820**						
FC	0.516	**0.765**					
ICTSE	0.408	0.485	**0.803**				
OCSE	0.344	0.625	0.476	**0.817**			
SDLLICT	0.491	0.547	0.459	0.485	**0.751**		
SDLLR	0.422	0.496	0.366	0.553	0.648	**0.776**	
SN	0.468	0.620	0.383	0.556	0.592	0.607	**0.838**

Source: The Authors (Data analysis using SmartPLS4)

3.4. Structural Model

When the measurement model assessment is complete, the next step in reviewing PLS-SEM results is to examine the structural model. The structural model indicates the strength of estimates between variables or constructs. Structural models in PLS-SEM may estimate complicated models with multiple components and indicators. Structural model assessment seeks to anticipate the link between latent variables or constructs. Standard assessment criteria that should be examined include the coefficient of determination (R^2) and the statistical significance and relevance of the path coefficients (Hair et al., 2019).

The R^2 coefficient reflects the variation explained by each endogenous construct and hence represents the model's explanatory ability. The R^2 statistic is also known as in-sample predictive power. The R^2 scale goes from 0 to 1, with higher values indicating stronger explanatory power. As a guideline, R^2 values of 0.67, 0.33 and 0.19 can be considered substantial, moderate and weak (Chin, 1998). R^2 value of AICT is 0.332, it means that the Attitude towards ICT construct that can be explained by the variables in it is 33.2%, the rest is explained by other variables outside the one under study. Overall, SDLLICT construct that can be explained by the variables in it is 54.1%, with the remaining 45.9% explained by variables other than the one under investigation.

Figure 2 indicates the significance of the path coefficient of each indicator and construct. All of the indicators have a significance value 0.000 (<0.05), it indicates that the relationship between indicators and the constructs is significance, except for OCSE towards SDLLICT with the significance value 0.685 (>0.05).

Figure 2.
Significance of the path coefficients
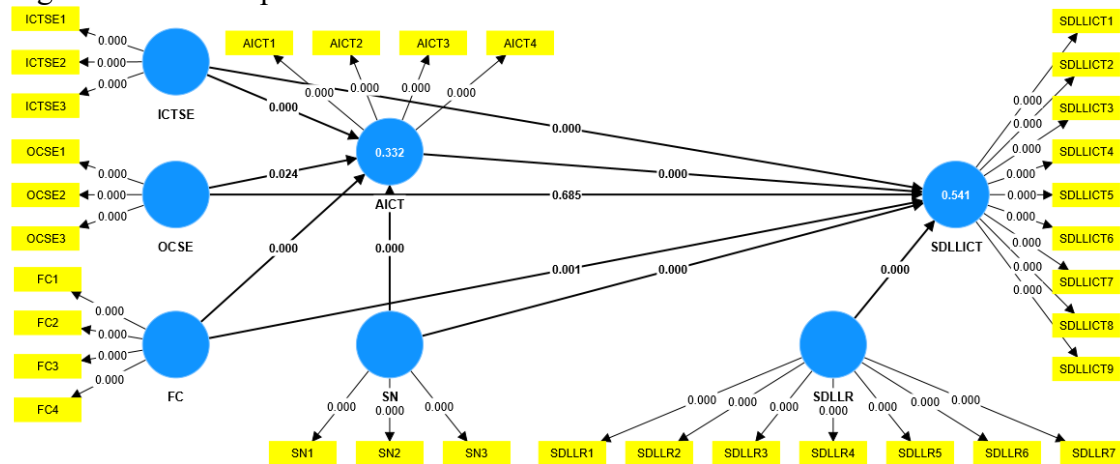
Source: Data analysis using SmartPLS4

Table 7 below displays the path coefficients of all constructs or variables. As it is possible to observe, all T-values are greater than ±1.96 at 5% level; therefore, all hypotheses except OCSE towards SDLLICT variable are empirically supported. The findings in this study revealed that: H1 ICTSE – SDLLICT with t-statistic = 5.759 and P-value = 0.000. H2 ICTSE – AICT with t-statistic = 5.754 and P-value = 0.000. H3 OCSE – SDLLICT with t-statistic = 0.405 and P-value = 0.685. H4 OCSE – AICT with t-statistic = 2.265 and P-value = 0.024. H5 FC – SDLLICT with t-statistic = 3.247 and P-value = 0.001. H6 FC – AICT with t-statistic = 8.004 and P-value = 0.000. H7 SN – SDLLICT

with t-statistic = 5.265 and P-value = 0.000. H8 SN – AICT with t-statistic = 6.092 and P-value = 0.000. H9 AICT – SDLLICT with t-statistic = 4.523 and P-value = 0.000. H10 SDLLR – SDLLICT with t-statistic = 10.985 and P-value = 0.000.

Table 7.
Hypotheses Testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Result
ICTSE -> SDLLICT	0.149	0.149	0.026	5.759	0.000	Supported
ICTSE -> AICT	0.201	0.201	0.035	5.754	0.000	Supported
OCSE -> SDLLICT	-0.013	-0.014	0.032	0.405	0.685	Not supported
OCSE -> AICT	-0.089	-0.089	0.039	2.265	0.024	Supported
FC -> SDLLICT	0.116	0.116	0.036	3.247	0.001	Supported
FC -> AICT	0.327	0.329	0.041	8.004	0.000	Supported
SN -> SDLLICT	0.179	0.179	0.034	5.265	0.000	Supported
SN -> AICT	0.238	0.237	0.039	6.092	0.000	Supported
AICT -> SDLLICT	0.130	0.129	0.029	4.523	0.000	Supported
SDLLR -> SDLLICT	0.380	0.381	0.035	10.985	0.000	Supported

Source: The Authors (Data analysis using SmartPLS4)

Based on the path analysis, 9 out of 10 hypotheses are accepted and have a significant influence between variables. Interestingly, there is no significance effect of OCSE on SDLLICT with t-statistic = 0.405 (<1.96) and P-value = 0.685 (>.05). It means that there is no influence between OCSE and SDLLICT. It indicates that the students' online communication self-efficacy does not affect the use of ICT for self-directed language learning. The use of ICT devices has become an integral part of their daily life. They use it to study, do assignments, listen to music, watch movies, even for entertainment purposes. They tend to use ICT devices to learn English whether they are confidence or not in communicating online.

The original sample value of ICTSE – SDLLICT is 0.149, it means there is a positive effect of ICTSE on SDLLICT. The higher the ICTSE, the higher the SDLLICT. This also applies to other variables with a significance level of less than 0.05. On the other hand, there is a negative effect of OCSE – AICT with original sample value -0.089, indicates that the higher the OCSE, the lower the AICT. This occurs because using ICT to learn English increases students' confidence while speaking online. Students who previously lacked confidence in speaking English will feel more at ease if they use ICT devices. As a result, students who lack confidence in online communication will have a positive attitude towards the use of ICT.

4. DISCUSSION

This study demonstrates that nine of 10 hypotheses were supported. ICT self-efficacy (SE) has a significant influence on self-directed language learning with ICT (SDLLICT) (t-statistics :5.759; p = .000). In this study context, The students' ICT self-efficacy can increase the use of ICT for self-directed language learning. This is similar to the finding of Pan (2020), which indicated that the relationships between ICT acceptance and ICT self-efficacy and technology-based self-directed learning. ICT self-efficacy is characterized as students' perceptions of their ability to use ICT-related devices and sites to perform learning behaviours and accomplish the intended learning objective. ICT allows students to access resources and assist them in language learning, particularly in an EFL context (Sulistiyo et al., 2022). Technology may have a direct impact on self-directed learning since it has significantly enhanced access to both information resources and online expertise (Zhu & Bonk, 2019). The capacity to access a diverse and limitless amount of content that suits their learning requirements and interests is essential for self-directed learning. These include capturing, storing, analysing, and presenting information, as well as engaging with other learners and experts around the world without layers of formality and at the push of a button (Zhang & Pérez-Paredes, 2019).

Similarly, it was informed that ICT self-efficacy (ICTSE) influences Attitude towards ICT (AICT) (t-statistics 5.754; p = .000). This finding indicates that the ICT self-efficacy of students can improve students' attitude on using ICT for learning English. This finding is consistent with Alfadda & Mahdi (2021) and Sumuer (2018) indicating that there is a positive correlation between computer self-efficacy and attitude towards ICT use for self-directed language learning. Students do need support in both the ability and intention dimensions of the self-directed use of technology for English language learning. There is a significant correlation between students' ICT self-efficacy and attitudes, as well as behavioral intention to use technology. Students believed that English learning may be more pleasurable if they incorporate ICT into the learning process, hence students' favourable attitudes towards the usage of ICT are strengthened (Kessler, 2018).

Besides, online communication self-efficacy (OCSE) significantly influences Attitude towards ICT (AICT) (t-statistics 2.265; p = .024); there is a relationship between students' online communication self-efficacy and their attitude towards the use of ICT in English language learning. This finding is consistent with Yavuzalp & Bahcivan (2021) found that online communication self-efficacy had a significant impact on students' perceived net benefits and intention to use online learning systems. This suggests that students who feel more confident in their ability to communicate effectively online are more likely to see the benefits of online learning and to intend to use online learning systems in the future. OCSE is an important factor in online learning, as it can affect students' ability to collaborate with others, participate in discussions, and seek help when needed (Sumuer, 2018).

However, there is an interesting phenomenon between online communication self-efficacy (OCSE) and self-directed language learning with ICT (SDLLICT). OCSE does not have a significant influence on SDLLICT (t-statistics = 0.405; p = .685). This finding might refer that the online communication self-efficacy variable is not related to self-directed language learning regarding the use of ICT for English learning. It indicates that the students' online communication self-efficacy does not affect the use of ICT for self-directed language learning. The finding contradicts a prior conclusion by Dogham et al.

(2022) and Sumuer (2018), informing that online learning self-efficacy has a significant influence on the students' self-directed learning towards technology. A plausible argument is that the use of ICT devices has become an integral part of students' daily life. They use it to study, do assignments, listen to music, watch movies, and other entertainment purposes. They tend to use ICT devices to learn English whether they are confidence or not in communicating online. Furthermore, tools with transformative artificial intelligence, such as ChatGPT, which is designed to produce sophisticated text that is indistinguishable from text created by humans, can be used in a variety of contexts, as can audio and video-based AI, which allows students to communicate with machines, ask questions, search for information, and engage in other entertainment activities (Dwivedi et al., 2023). Technology presents both opportunities and challenges in English education and has the potential to have positive and negative impacts on organizations, society and individuals.

From the finding, it is assumed that facilitating conditions (FC) has a significant effect on self-directed language learning with ICT (SDLLICT) (t-statistics 3.247; p = .001). It demonstrates that students consider the incorporation of ICT to be a better option to conventional face-to-face classes. Despite being considered an engaging technique for EFL education, infrastructure factors such as electricity connection, internet bandwidth, and ICT tools are believed to have an influence on the implementation of ICT for SDLL (Rahim & Chandran, 2021). This finding is congruent with Al Arif et al. (2022) who found that FC has become a significant driver for students' utilization of ICT in learning English. A probable argument might be that available infrastructures of ICT for language learning is a significant factor in improving their usage of ICT for self-directed language learning. These findings can serve as a guideline for the government and/or organisations to establish and upgrade ICT infrastructures for English language learning.

Apart from that, facilitating conditions (FC) significantly influences attitude towards ICT (AICT) (t-statistics 8.004; p = .000). It revealed that facilitating Conditions play a significant role in influencing students' attitude on the use of ICT. This finding is in line with a study of Pham & Lai (2022), reported that facilitating condition had a significant influence on students' attitude towards ICT use for English learning. Facilitating conditions include more powerful and advanced infrastructures will undoubtedly contribute to improved organisational and technical assistance. In the language learning context, facilitating conditions can include tools, resources, knowledge, internet speed and support staff. Learners will be unwilling to use ICT for language learning unless these prerequisites are met. When students perceive that the necessary infrastructure and support are in place, they are more likely to adopt and use the ICT effectively, in other words, facilitating conditions affects the attitude of students towards the use technology (Hamidi & Chavoshi, (2019).

From the quantitative data analysis, it shows that subjective norms (SN) have a significant effect on attitude towards ICT (AICT) (t-statistics 6.092; p = .000). It means that SN had predicative power on students' attitude towards the use of ICT. This finding is consistent with Venkatesh et al. (2003), indicated that subjective norms had significant influence on students' attitude towards ICT for English language learning. Subjective norm refers to the degree to which an individual perceives that important others believe he or she should use ICT for learning English. Another study by Pan and Shao (2020) revealed that students' attitudes towards the usage of technology may have been influenced by their previous experience or personal interest in interacting with

technology, as well as their perception that teachers or peers believed he or she should utilise technology for language learning. In the current era of digital learning, traditional class-based learning guidance is no longer adequate to encourage students to be actively involved in the learning process. However, using technology for self-directed learning is essential for students, and using technology for independent learning creates student-centred learning.

Furthermore, subjective norms (SN) significantly influence self-directed language learning with ICT (SDLLICT) (t-statistics 5.265; p = .000). Demonstrating that the association between subjective norms and students' self-directed language acquisition using ICT was favourable and substantial, which agrees with the results of Lai et al. (2022). A similar finding regarding subjective norms to use technology was also reported by Pan & Shao (2020). When the environment (friends/peers and teachers) provide support regarding the use of ICT for Language learning, the use of ICT for SDLL will be increased. The Social Influence from peers and teachers of using ICT stimulates the rise of usage of ICT in learning English. Although how students engage in self-directed learning is completely depending on students' own choices, in this communal context, they are nevertheless influenced by instructors and peers since they want to establish close relationships with and get support from them. If this is the case, self-directed learners would most likely seek assistance from teachers and work with their classmates to stay motivated during the learning process.

In addition, attitude towards ICT (AICT) significantly influence self-directed language learning with ICT (SDLLICT) (t-statistics 4.523; p = .000). One of the goals of this study is to better understand the elements that influence EFL university students' self-directed language learning with ICT. Attitude towards ICT had a significant influence on students' SDLLICT. This coincides with previous research of Lai et al (2022) and Pan & Shao (2020), showing that attitude toward ICT was found to have a significant effect of learners' self-directed language learning with ICT. Self-directed learning is learner-controlled and often happens out of class. Students are responsible to select the appropriate learning tools (e.g., apps, and websites) as well as learning materials for learning English. It therefore makes sense that attitudes and beliefs considerably contribute to students' desire to use ICT for self-directed learning process (Park et al., 2018). Thus, to enable learners to continue in self-directed language learning and gain language development effectively, it is necessary to change their attitude towards ICT. (Zhou et al., 2022).

More specifically, self-directed language learning readiness (SDLLR) has a significant effect on self-directed language learning (SDLLICT) (t-statistics 10.985; p = .000). It means that SDLLR becomes significant drivers for SDLLICT. The more students ready for self-directed language learning, the better their self-directed learning with ICT in English language learning. This finding is consistent with studies by Chau et al. (2021) and Dogham (2022), indicated that Students' readiness for self-directed learning influence the intention and motivation to positively adopt ICT for self-directed language learning. The level of responsibility that the learner takes for his or her own learning may be used to describe self-directed learning. The self-directed learner takes responsibility and accepts the freedom to learn what is essential to them. Readiness for SDL exists on a spectrum and is present in each individual to some level. The previous studies support a concept that aligning instruction with SDL readiness provides the most effective learning opportunity (Teo et al. 2010; Sumuer, 2018).

The results of this study provide perspectives on the potentials of ICT use to promote self-directed language learning, along with information about determinant factors of self-directed language learning with ICT. This study's postulated correlations between factors might serve as a guideline and be extremely valuable to both lecturers and students in terms of using ICT in English language learning. Organisational and institutional support, such as the availability of infrastructure, tools, and human resources, are important in facilitating students' use of ICT. As a result, the consequences of this study are likely to extend beyond the structural model validation report.

5.CONCLUSION

The current study shows internal consistency reliability and supports the validity of pre-service teachers' views of ICT use for self-directed language learning. The findings indicate that the respondents have a positive attitude towards using ICT for learning English. However, they have a strong inclination to accept it, and it will affect the students' use of ICT for self-directed language learning. The results of data analysis revealed that nine out of ten hypotheses were supported with the exception of the relationship between OCSE and SDLLICT, indicating that the online communication self-efficacy variable is not related to self-directed language learning regarding the use of ICT for learning English. It illustrates that the students' online communication self-efficacy does not affect the use of ICT for self-directed language learning.

This study has two primary limitations. First, there were more female respondents than men, which might restrict the findings' generalizability. Second, the scope of the research model only considers six variables as factors influencing self-directed language learning (ICTSE, OCSE, FC, SN, AICT, and SDLLR), thus, this model does not cover other factors that can also contribute to students' self-directed language learning with ICT. Future studies need to investigate other aspects such as motivation, perceived enjoyment, and gender among student groups from different provinces or educational levels with different strata, such as students at the secondary school level.

Future study is urged to examine the findings, as well as the advantages and drawbacks of encouraging pre-service teachers to use ICT for self-directed language learning and contribute to innovation in the English education sector. Furthermore, it is encouraged to extend the study model and/or compare the acquired data by incorporating other groups and constructs such as age and experience to investigate the influence of these other factors on the model.

In conclusion, knowing the variables influencing the usage of ICT may improve the quality of the English learning process and enable pre-service teachers to capitalise on the potential and benefits of new technologies. Furthermore, the findings support and encourage the use of ICT-assisted language learning as an innovative method to English language learning and teaching.

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