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Development of a Model of Individual and Contextual Factors Affecting Instructors' ICT Literacy for Private Universities in Hunan Province of China

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Abstract

This study endeavors to establish a model that encapsulates individual and contextual factors affecting instructors' ICT literacy in private universities located in Hunan Province, China. The researcher employed a mixed-methods approach, integrating both qualitative and quantitative techniques, through a questionnaire survey administered to 555 instructors from private universities in Hunan Province. The findings reveal the following: 1) The level of instructors' ICT literacy in private universities within Hunan Province is notably high. 2) Among the individual factors affecting instructors' ICT literacy are ICT Self-efficacy and ICT Engagement, while contextual factors encompass University ICT Support and ICT Training. 3) The ICT literacy of instructors in private universities in Hunan Province is shaped by the intricate interplay between individual and contextual factors. Based on these insights, the study proposes a comprehensive model that integrates instructors' ICT literacy with their ICT Self-efficacy, ICT Engagement, as well as the contextual factors of University ICT Support and ICT Training.

Keywords: Instructors' ICT Literacy, ICT Self-efficacy, ICT Engagement, University ICT Support, ICT Training

1. Introduction

Information and Communication Technology (ICT) has profoundly transformed human behavior and interaction patterns, as evidenced by Cabellos et al. (2024). Notably, 21st-century education relies heavily on the utilization of ICT tools and devices, fostering an interactive learning environment, as highlighted by Angarita and Chiappe (2019). The effective integration of ICT into higher education has emerged as a cornerstone for enhancing educational quality, as reported by Hong et al. (2024). Consequently, ICT literacy has become a vital skill for educators to adapt to contemporary educational demands (Liesa-Orús et al., 2020). However, this transition also presents instructors with novel challenges, such as managing larger student cohorts, adapting teaching methodologies, ensuring information security, and addressing the "Digital Divide" (Rodríguez-Abitia et al., 2020).

In line with this evolution, the Chinese Ministry of Education introduced the "Education Informatization 2.0 Plan," urging educators to deepen the integration of ICT within curricula, actively embrace novel technologies, enhance their innovative teaching capabilities, and restructure educational modalities and systems (Chinese Ministry of Education, 2019). Hunan Province, as a pilot region, has garnered significant attention from both the government and universities in fostering instructors' ICT literacy (People's Government of Hunan Province, 2022). Nevertheless, a notable research gap exists, particularly regarding ICT literacy among instructors at private universities in the province, where studies are scarce.

To bridge this gap, this study endeavors to develop a model that examines individual and contextual factors affecting instructors' ICT literacy in private universities within Hunan Province. The proposed model aims to bolster instructors' ICT proficiency, thereby facilitating a deeper integration of ICT into higher education and ultimately improving the overall educational experience.

2. Literature Review

2.1 The Field Theory

This study draws primarily from field theory, a framework that underscores the intricate interplay of various factors in shaping outcomes (Lewin, 1943). Field theory posits that individual behavior arises from the dynamic interplay between internal forces intrinsic to the individual and external forces emanating from the social environment, with these forces being interdependent rather than independent entities (Ferrare & Apple, 2015). Lewin (1943) coined the term "living space" to encapsulate this interconnectedness between individuals and their environment, formalizing the field concept through the equation B = f(P, E) = f(LSP), where B represents behavior, P stands for the person, E signifies the environment, and LSP denotes the living space. This underscores the complexity of the field within which an individual's behavior unfolds, comprising a intricate web of interacting internal and external forces.

In the context of instructors' ICT literacy, field theory offers valuable insights into the multifaceted factors that contribute to and are affected by this skillset. Previous empirical research has affirmed the existence of multiple factors that interact to determine the level of ICT literacy among instructors (Hashemi & Kew, 2021; Ferede et al., 2022). Hence, this study categorizes these factors into two broad groups: individual factors (encompassing internal forces) and contextual factors (representing external forces). Within the realm of individual factors, we consider ICT Self-efficacy and ICT Engagement, both of which stem from the instructor's personal characteristics and motivations. Conversely, contextual factors, such as University ICT Support and ICT Training, represent external effects that shape the instructors' access to resources and opportunities for skill development.

2.2 Instructors' ICT Literacy

ICT literacy is a crucial aspect of an individual's ability to proficiently locate, organize, and administer information across diverse digital platforms, while also demonstrating a profound comprehension of technological systems and media outlets, guided by moral and ethical principles—embodying the responsible utilization of technology and media (Park et al., 2021). Given its comprehensive scope, scientific rigor, and practical applicability, the TPACK-Practical Model has been selected as the theoretical backbone of this study to elucidate instructors' ICT literacy.

The TPACK-Practical Model integrates applied knowledge (teaching experience) with TPACK skills, emphasizing their synergistic role in the teaching-learning process (Aktaş & Özmen, 2022). This model encompasses eight knowledge dimensions across five pedagogical domains: learners, subject content, curriculum design, practice teaching, and assessment. These dimensions meticulously cover: (a) leveraging ICT to comprehend student needs, (b) utilizing ICT to deepen understanding of subject matter, (c) devising ICT-enhanced curricula, (d) employing ICT-based representations, (e) adopting ICT-integrated teaching strategies, (f) applying ICT for instructional management, (g) infusing ICT into various teaching contexts, and (h) utilizing ICT for student assessment (Yeh et al., 2014).

As China embarks on the Informationization 2.0 era, research on instructors' ICT literacy has emerged as a vibrant area of inquiry (Chen & Hu, 2020). However, much of this research has been centered on enhancing instructors' ICT competence through training, with limited comprehensive exploration and analysis of its multifaceted affecting factors. Furthermore, the focus has predominantly been on pre-service teachers and educators in primary and secondary schools (Wang & Zhao, 2021). Research delving into the ICT literacy of instructors, particularly those from private universities in Hunan province, remains relatively sparse, bordering on a void in the literature.

2.3 Individual Factors

2.3.1 ICT Self-efficacy

Self-efficacy, a fundamental pillar of American social psychologist Bandura's Social Cognitive Theory, encapsulates an individual's assessment of their capability to attain defined objectives, orchestrate and execute a diverse array of actions, and regulate their psychological responses (Ouyang et al., 2023). The concept of ICT self-efficacy initially focused on one's self-efficacy in the realm of computers and has subsequently evolved to encompass beliefs and perceptions about their proficiency in harnessing and utilizing technology (such as computers, the Internet, and multimedia) to accomplish specific educational objectives (Senkbeil, 2023).

2.3.2 ICT Engagement

ICT Engagement, a nascent concept in the cognitive-motivational dimension of ICT literacy, was introduced by Zylka et al. (2015). It is theoretically grounded in motivational and metacognitive constructs, encompassing ICT interest, perceived ICT competence, the sense of autonomy in ICT usage, and the integration of ICT as a topic in social interactions (Goldhammer et al., 2016). While the existing literature has directed significant attention

towards examining facets associated with ICT engagement, it is acknowledged that this body of knowledge remains incomplete (Ma & Qin, 2021). Consequently, the present study endeavors to delve deeper into this novel aspect of ICT literacy, seeking to expand our understanding of this crucial factor.

2.4 Contextual Factors

2.4.1 University ICT Support

The integration of ICT into teaching and learning practices in higher education is constrained by the specific contexts within which instructors operate. Notably, limited resources at universities pose a significant hindrance to the widespread application of ICT in educational settings (Habiba & Ahmed, 2020). Comprehensive University ICT Support, encompassing strategic ICT planning, targeted professional development that bridges technology and pedagogy, as well as ensuring the availability and accessibility of robust ICT infrastructure, is crucial for overcoming these barriers (Ferede et al., 2022).

2.4.2 ICT Training

Instructors' current stance towards ICT training is overwhelmingly positive, with nearly all expressing a willingness to engage in training courses, conferences, and seminars focused on ICT (Zagouras et al., 2022). Nevertheless, acquiring ICT literacy through such training is not a straightforward endeavor (Hashemi & Kew, 2021). Consequently, the full potential of ICT training can only be realized when it is designed and delivered in an effective manner that genuinely enhances participants' knowledge and skills.

2.5 Previous Research on Variables

2.5.1 Relationship Between Instructors' ICT Literacy and ICT Self-efficacy

Research has consistently demonstrated that ICT Self-efficacy stands as a pivotal factor in shaping an individual's ICT literacy (Yu & Hu, 2022). When instructors possess high levels of ICT Self-efficacy, they are more likely to be motivated to utilize ICT, adeptly adapt to technological advancements, and are better equipped to seamlessly integrate these technologies into their classroom practices. This, in turn, fosters the successful integration of ICT technologies, leading to enhanced teaching and learning outcomes (Wang & Zhao, 2021). Consequently, the following hypotheses are proposed in this study:

H1: ICT Self-efficacy has a positive impact on instructors' ICT literacy.

2.5.2 Relationship Between Instructors' ICT Literacy and University ICT Support

The scarcity of time and its effective allocation pose universal challenges in integrating ICT into teaching and learning processes (Hashemi & Kew, 2021). Furthermore, instructors require institutional motivation and technological support to leverage ICT effectively in their teaching endeavors (Wang & Zhao, 2021). This underscores the notion that a heightened level of university ICT support is directly correlated with an increase in instructors' capability to integrate ICT, ultimately leading to enhanced ICT literacy among them. Based on this understanding, the following research hypotheses are formulated for this study:

H2: University ICT Support has a positive impact on instructors' ICT literacy.

2.5.3 Relationship Between University ICT Support and ICT Training

Research indicates that current ICT training for instructors falls short of being adequate (Gomez et al., 2022). To bolster the effectiveness of such training in fostering instructors' ICT literacy, university administrations must undertake measures aimed at fostering a conducive environment for ICT utilization (Gomez et al., 2022). Additionally, addressing external barriers to ICT training, particularly those related to human and material resources (Chen et al., 2022), is imperative. Consequently, this study proposes the following research hypotheses to address these issues:

H3: University ICT Support has a positive impact on ICT Training.

2.5.4 Relationship Between ICT Training and ICT Engagement

Research has highlighted that while ICT training contributes to instructors' acquisition of ICT competencies, it does not automatically translate into increased utilization of ICT in teaching and learning practices (Aslan & Zhu, 2018). This underscores the need for effective ICT training to emphasize ICT Engagement, empowering instructors to seamlessly integrate technology into their teaching and learning processes with greater ease and efficacy (Agyei, 2021). With this in mind, the following research hypotheses are proposed for this study:

H4: ICT Training has a positive impact on ICT Engagement.

2.5.5 Relationship Between ICT Engagement and ICT Self-efficacy

ICT Engagement is widely acknowledged as a pivotal individual factor that enables instructors to develop and adapt ICT skills in a self-directed manner (Kunina-Habenicht & Goldhammer, 2020). Furthermore, ICT interest fosters positive sentiments towards ICT-related behaviors, motivating individuals to engage more actively (Goldhammer et al., 2016). Heightened perceived ICT competence and autonomy bolster instructors' self-confidence in engaging with ICT activities, fostering a sense of mastery and control (Ma & Qin, 2021). Additionally, leveraging ICT for social interaction enhances instructors' comprehension of optimal ICT usage practices. Based on these insights, the following research hypotheses are formulated for this study:

H5: ICT Engagement has a positive effect on ICT Self-efficacy.

3. Methods

3.1 Ethical Considerations

This study was granted approval by the Human Research Ethics Committee of Stamford International University on 23 April 2024, under Approval Code STIU-HREC058/2024.

3.2 Participants

The researcher employed a convenience sampling technique to recruit 555 instructors from three private universities located in Hunan Province, China, for participation in this study. After securing the informed consent of the participants, an online questionnaire survey was administered. The sample comprised 300 female and 255 male instructors, with the majority (33.9%) falling within the 40–49 age bracket. Notably, approximately 60% of the respondents held a postgraduate degree or higher academic qualification, including 9.0% with a doctoral degree. Interestingly, the two most prevalent teaching experience categories were instructors with over 15 years of experience (38.6%) and those with less than 5 years of experience (36%), suggesting a diverse range of expertise among participants.

3.3 Instrumentation

The questionnaire employed in this study was structured into three distinct sections. The first section comprised a demographic survey, gathering information on the instructors' gender, age, years of teaching experience, duration of computer usage, and participation in ICT-related training. The second section featured the instructors' ICT literacy, utilizing the TPACK-Practical scale devised by Yeh et al. (2014). This scale encompasses eight knowledge elements across five teaching domains, totaling 22 items, providing a comprehensive assessment of ICT proficiency. The third section assessed factors affecting instructors' ICT literacy, comprising four validated and widely-used subscales: ICT Self-efficacy, ICT Engagement, University ICT Support, and ICT Training, with a cumulative total of 35 items. All sections employed a 5-point Likert scale, ranging from 'strongly disagree' to 'strongly agree', to capture participants' responses. The questionnaire's reliability was rigorously tested, yielding Cronbach's alpha values ranging from 0.9 to 1 for all dimensions, indicating high internal consistency. Table 1 presents a detailed breakdown of these findings.

Table 1. Scale reliability statistics

Constructs	Domains		Cronbach's Alpha Coefficient based on each variable		Cronbach's Alpha Coefficient based on Constructs
Instructors' ICT Literacy	Learners		0.929		0.977
	Subject Content		0.920		
	Curriculum Design	Planning ICT-infused curriculum	0.938	0.962	
		Using ICT representations to present instructional representations	0.954		
		Using ICT representations to present instructional representations	0.941		
	Practical Teaching	Planning ICT-infused curriculum	0.920	0.958	
		Using ICT representations to present instructional representations	0.946		
	Assessment		0.950		
Factors Affecting Instructors' ICT Literacy	ICT Self-efficacy		0.923		0.980
	ICT Engagement	ICT interest	0.917	0.970	
		Perceived ICT competence	0.929		
		Perceived autonomy in ICT use	0.949		
		ICT as a topic in social interaction	0.926		
	University ICT Support		0.957		
	ICT Training		0.953		
Overall					0.985

3.4 Data Analysis

After the completion of data collection, the researcher proceeded to analyze and process the data utilizing both SPSS and Amos software. Initially, descriptive statistics were employed to present a clear picture of each variable through calculations of percentages, means, and standard deviations. Subsequently, Structural Equation Modelling (SEM) was conducted to delve into the intricate path relationships existing among the variables. This analysis not only examined the reliability of the model but also assessed its convergent and discriminant validity, ensuring the robustness and precision of the findings. Lastly, to further validate the model, it was subjected to rigorous scrutiny by an expert focus group, thereby reinforcing its credibility and applicability.

4. Results

4.1 Instructors' ICT Literacy in Private Universities of Hunan Province

Table 2 presents the mean and standard deviation of instructors' ICT literacy in private universities of Hunan Province. The overall picture reveals a high level of ICT literacy among instructors, as evidenced by a mean score of 4.18, falling within the range of 4.00 to 4.50 on the 5-point Likert scale. However, a nuanced analysis uncovers variations across different dimensions. Notably, the dimension related to 'Learner' scored the lowest (M = 4.12, S.D. = 0.75), indicating instructors' relatively limited utilization of ICT for assessing and managing students. In contrast, the 'Subject Content' dimension garnered the highest score (M=4.23, S.D.=0.69), highlighting instructors' proficiency in employing ICT to enrich and enhance instructional content. These descriptive statistics offer valuable insights into the current state of instructors' ICT literacy in private universities of Hunan Province, pinpointing areas where further improvement and enhancement are warranted.

Table 2. Mean Scores and Standard Deviations of Items Related to the Instructors' ICT Literacy (n=555)

Item		**Mean**		**S.D.**	**Interpretation**
Learners		4.12		0.75	High
Subject Content		4.23		0.69	High
Curriculum Design	Planning ICT-infused curriculum	4.18	4.22	0.59	High
	Using ICT representations to present instructional representations	4.26			
	Using ICT representations to present instructional representations	4.23			
Practical Teaching	Planning ICT-infused curriculum	4.23	4.21	0.62	High
	Using ICT representations to present instructional representations	4.19			
Assessment		4.14		0.68	High
Overall		**4.18**		**0.58**	**High**

4.2 Individual and Contextual Factors Affecting Instructors' ICT Literacy in Private Universities of Hunan Province

4.2.1 Descriptive Statistics Analysis

Table 3 depicts the means and standard deviations of the factors affecting instructors' ICT literacy in private universities of Hunan Province. The scores for each factor span from 3.50 to 4.50, with individual factors generally surpassing contextual factors in terms of impact. Notably, 'ICT Engagement' stands out as the highest-scoring factor (M = 4.14, S.D. = 0.69), signifying that ICT has deeply integrated into instructors' personal, professional, and academic lives. Conversely, 'University ICT Support' emerges as the lowest-scoring factor (M = 3.87, S.D. = 0.79), reflecting instructors' relative reliance on self-driven ICT literacy development and perceived scarcity of external, particularly university-level, support. In summary, instructors primarily count on their own initiatives to enhance their ICT literacy, perceiving a need for enhanced external support structures within their institutions.

Table 3. Mean Score and Standard Deviation of Factors Affecting Instructors' ICT Literacy (n=555)

Item		Mean		S.D.	Interpretation
ICT Self-efficacy		4.08		0.66	High
ICT Engagement	ICT interest	4.05	4.14	0.69	High
	Perceived ICT competence	3.85			
	Perceived autonomy in ICT use	4.04			
	ICT as a topic in social interaction	3.81			
University ICT Support		3.87		0.79	High
ICT Training		3.95		0.72	High

4.2.2 Normality Test

The researcher conducted a normality test on the study's dataset, and the findings presented in Table 4 indicate that all measurement question items exhibit skewness and kurtosis values within the acceptable range. Consequently, it can be confidently stated that the data corresponding to each measurement question item adheres closely to an approximate normal distribution.

Table 4. Measurement Item Normality Test Results

Dimensions			Items	Kurtosis	Skewness
ICTL	LN		L1	-1.084	2.183
			L2	-0.969	1.499
			L3	-1.005	1.645
	SC		SC1	-1.015	2.433
			SC2	-1.003	1.949
	CD	CD-P	CD-P1	-0.668	1.149
			CD-P2	-0.621	1.096
			CD-P3	-0.787	1.281
		CD-U	CD-U1	-0.586	0.959
			CD-U2	-0.474	0.37
			CD-U3	-0.537	0.804
		CD-E	CD-E1	-0.454	0.576
			CD-E2	-0.626	0.971
	PT	PT-A	PT-A1	-0.604	0.585
			PT-A2	-0.675	0.807
		PT-I	PT-I1	-0.513	0.761
			PT-I2	-0.556	0.82
			PT-I3	-0.444	0.491
			PT-I4	-0.639	0.785
	A		A1	-0.458	0.246
			A2	-0.533	0.236
			A3	-0.688	0.829
Factors	IS		IS1	-0.555	0.378
			IS2	-0.593	1.029
			IS3	-0.477	-0.022
			IS5	-0.434	-0.012
	IE	IE-I	IE-I1	-0.525	-0.523
			IE-I2	-0.549	0.578
			IE-I3	-0.43	-0.025
			IE-I4	-0.433	0.22
			IE-I5	-0.679	0.292
			IE-I6	-0.5	0.535
		IE-PIC	IE-PIC1	-0.355	-0.533
			IE-PIC2	-0.46	-0.186
			IE-PIC3	-0.605	0.684
			IE-PIC4	-0.502	0.033
			IE-PIC5	-0.564	0.138
		IE-PIU	IE-PIU1	-0.939	1.361
			IE-PIU2	-0.574	0.34
			IE-PIU3	-0.555	0.383
			IE-PIU4	-0.81	1.005
			IE-PIU5	-0.762	1.107
		IE-S	IE-S1	-0.7	0.908
			IE-S2	-0.593	0.328
			IE-S3	-0.452	-0.727
			IE-S4	-0.637	0.517
			IE-S5	-0.734	0.729
	US		US1	-0.731	0.95
			US2	-0.785	1.056
			US3	-0.691	0.66
			US4	-0.647	0.234
			US5	-0.598	0.746
	ICTT		ICTT1	-0.429	0.309
			ICTT2	-0.68	0.569
			ICTT3	-0.637	0.396
			ICTT4	-0.645	0.813
			ICTT5	-0.744	0.86

4.2.3 Correlation Analysis

Based on the analysis results presented in Table 5, it is evident that a significant positive correlation exists between the variables under investigation.

Table 5. Results of Pearson Correlation Analysis between Dimensions

	LN	SCU	CD-P	CD-U	CD-E	PT-I	A	IS	IE-I	IE-PIC	IE-PIU	IE-S	US	ICTT
LN	1													
SCU	.647**	1												
CD-P	.649**	.734**	1											
CD-U	.603**	.660**	.784**	1										
CD-E	.611**	.595**	.758**	.849**	1									
PT-A	.593**	.555**	.719**	.754**	.791**									
PT-I	.642**	.621**	.772**	.799**	.815**	1								
A	.636**	.584**	.738**	.779**	.794**	.832**	1							
IS	.628**	.595**	.708**	.730**	.721**	.765**	.741**	1						
IE-I	.539**	.537**	.634**	.639**	.654**	.710**	.686**	.795**	1					
IE-PIC	.488**	.453**	.565**	.513**	.568**	.610**	.600**	.763**	.807**	1				
IE-PIU	.523**	.516**	.572**	.567**	.551**	.601**	.629**	.727**	.744**	.787**	1			
IE-S	.502**	.435**	.549**	.495**	.525**	.592**	.575**	.732**	.751**	.842**	.777**	1		
US	.494**	.440**	.581**	.498**	.530**	.596**	.560**	.639**	.621**	.676**	.597**	.704**	1	
ICTT	.518**	.465**	.595**	.546**	.594**	.651**	.622**	.726**	.715**	.773**	.680**	.764**	.838**	1

Note. ** Significant correlation at the 0.01 level (two-tailed).

4.2.4 Structural Equation Model

The fitness of the SEM model exploring the effect of individual and contextual factors on instructors' ICT literacy in private universities of Hunan Province was rigorously assessed, with the results summarized in Table 4.25. The model demonstrated excellent fit, as evidenced by a CMIN/DF ratio of 2.278 (within the ideal range of 1–3) and an RMSEA value of 0.048 (indicating superb fit, < 0.05). Furthermore, the indices of NFI, TLI, CFI, and RFI all exceeded 0.9, signifying a high level of model fit. Consequently, the SEM model effectively captures the factors affecting instructors' ICT literacy in private universities of Hunan Province.

Table 6. Results of SEM Model Fitness Test

CMIN/DF	**RMSEA**	**CFI**	**NFI**	**RFI**	**TLI**
2.256	0.048	0.983	0.970	0.962	0.979

To validate the convergent validity of the model's items, three criteria were met: (1) factor loadings for all items surpassed 0.7, (2) composite reliabilities for item combinations were above 0.9, and (3) AVEs (Average Variance Extracted) exceeded 0.5. These findings, statistically significant at the 0.001 level, underscore the strong factor structure, reliability, and convergent validity across all dimensions, as detailed in Table 7.

Table 7. Results of SEM Model Convergent Validity and Combined Reliability Test for Each Dimension

Path Relationship			Estimate	AVE	CR
L1	<---	Learners	0.891	0.814	0.929
L2	<---	Learners	0.931		
L3	<---	Learners	0.884		
SC1	<---	Subject Content	0.935	0.846	0.916
SC2	<---	Subject Content	0.904		
CD-P	<---	Curriculum Design	0.893	0.797	0.922
CD-U	<---	Curriculum Design	0.892		
CD-E	<---	Curriculum Design	0.879		
PT-A	<---	Practical Teaching	0.951	0.861	0.925
PT-I	<---	Practical Teaching	0.904		
A1	<---	Assessment	0.913	0.865	0.951
A2	<---	Assessment	0.930		
A3	<---	Assessment	0.947		
IS5	<---	ICT Self-efficacy	0.880	0.738	0.918
IS3	<---	ICT Self-efficacy	0.885		
IS2	<---	ICT Self-efficacy	0.822		
IS1	<---	ICT Self-efficacy	0.847		
IE-S	<---	ICT Engagement	0.908	0.792	0.938
IE-PIU	<---	ICT Engagement	0.847		
IE-PIC	<---	ICT Engagement	0.923		
IE-I	<---	ICT Engagement	0.879		
US5	<---	University ICT Support	0.896	0.814	0.956
US4	<---	University ICT Support	0.919		
US3	<---	University ICT Support	0.919		
US2	<---	University ICT Support	0.906		
US1	<---	University ICT Support	0.870		
ICTT5	<---	ICT Training	0.897	0.799	0.952
ICTT4	<---	ICT Training	0.931		
ICTT3	<---	ICT Training	0.907		
ICTT2	<---	ICT Training	0.874		
ICTT1	<---	ICT Training	0.859		

The path analysis results presented in Table 8 reveal significant positive relationships between the model's variables: (1) ICT Self-efficacy robustly predicts instructors' ICT literacy ($\beta = 0.756$, $p < 0.001$), supporting Hypothesis H1; (2) University ICT Support also positively contributes to instructors' ICT literacy ($\beta = 0.178$, $p < 0.001$), confirming Hypothesis H2; (3) ICT Engagement significantly enhances ICT Self-efficacy ($\beta = 0.806$, $p < 0.001$), verifying Hypothesis H3; (4) ICT Training fosters greater ICT Engagement among instructors ($\beta = 0.832$, $p < 0.001$), thereby validating Hypothesis H4; and (5) University ICT Support significantly predicts the provision of ICT Training ($\beta = 0.879$, $p < 0.001$), confirming Hypothesis H5.

Table 8. Results of Path Relationship Test of SEM Model

Path relationship			Estimate	S.E.	C.R.	P
ICTL	<---	IS	0.756	0.04	15.675	***
ICTL	<---	US	0.178	0.021	5.327	***
IS	<---	IE	0.806	0.043	22.313	***
IE	<---	ICTT	0.832	0.028	22.370	***
ICTT	<---	US	0.879	0.029	26.073	***

Informed by these insights, the researcher devised a comprehensive model depicting the interplay of individual and contextual factors affecting instructors' ICT literacy in private universities of Hunan Province, as illustrated in Figure 1.

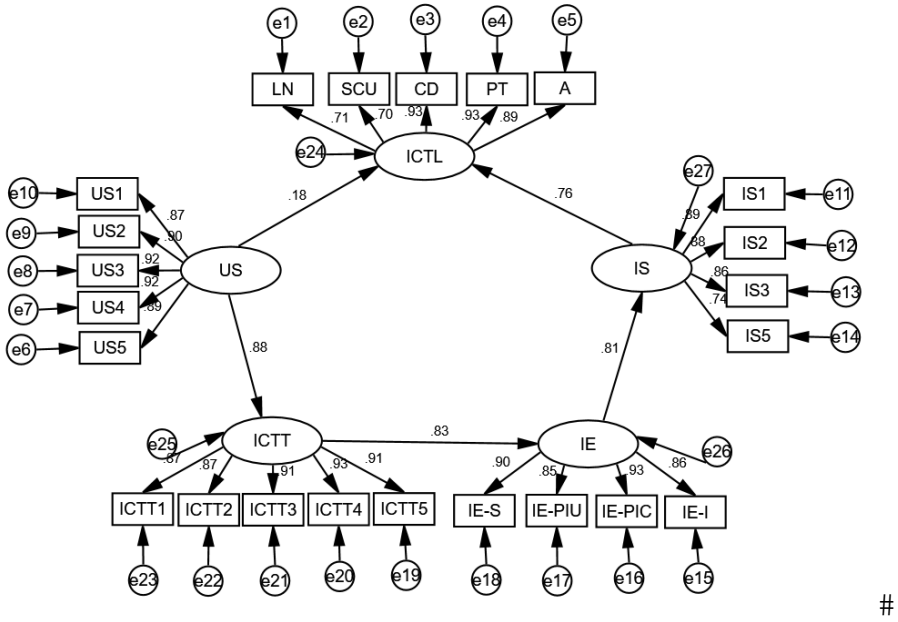

Figure 1. Model of Individual and Contextual Factors Affecting Instructors' ICT Literacy for Private Universities in Hunan Province

5. Discussion

The survey findings regarding the current state of instructors' ICT literacy in private universities of Hunan Province underscore challenges in their comprehension and practical application of teaching methodologies and instructional design tailored for ICT integration. These observations align with the conclusions drawn by Wang and Zhao (2021).

Our study underscores the intricate interplay between individual and contextual factors in shaping instructors' ICT literacy, echoing the results of previous empirical investigations conducted by Hashemi and Kew (2021) and Ferede et al. (2022). Emphasizing the pivotal role of Self-efficacy among individual factors, this study adds to the growing body of knowledge initiated by Yu and Hu (2022). Contrary to Gomez's (2022) assertion of inadequate ICT Self-efficacy among instructors, our research reveals that Chinese instructors exhibit high levels of Self-efficacy and confidence (M = 4.08, SD = 0.66) in leveraging ICT for teaching and learning. This underscores a distinction in the context-specific manifestation of Self-efficacy.

Furthermore, our findings confirm the positive effect of ICT Engagement on ICT Self-efficacy, aligning with the evidence presented by Goldhammer et al. (2016), Ma and Qin (2021), and Kunina-Habenicht and Goldhammer (2020). This study also reinforces the critical role of University ICT Support in fostering instructors' ICT literacy and the provision of ICT Training, consistent with the work of Wang and Zhao (2021) and Gomez et al. (2022).

Lastly, by demonstrating the positive impact of ICT Training on ICT Engagement, our research contributes to deepening the understanding of ICT Engagement dynamics, thereby enriching the field's knowledge base.

6. Conclusion

The objective of this study is to establish a comprehensive model that encapsulates individual and contextual factors affecting instructors' ICT literacy in private universities within Hunan Province. Our findings reveal that instructors in these institutions possess a high degree of ICT literacy, which is shaped by the intricate interplay between individual factors, specifically ICT Self-efficacy and ICT Engagement, and contextual factors such as University ICT Support and ICT Training.

This research endeavors to bridge a gap in the existing literature on instructors' ICT literacy in Hunan Province, China. By providing empirical insights, our study offers valuable reference points for instructors, university administrators, and relevant education departments to devise effective policies aimed at enhancing instructors' ICT literacy. Moreover, the outcomes of this study have implications for fostering students' ICT literacy as well, contributing positively to their digital readiness and skill development.

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Obtained.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

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