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Article

Understanding Teacher Readiness for Online Teaching and Learning: A Study of Cambodian Higher Education

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Abstract: This study examines Cambodian higher education teachers' readiness for online teaching and learning (OTL) using a structural equation modeling (SEM) approach. The framework centers around three key dimensions: teachers' self-efficacy in technological, pedagogical, and content knowledge (TPACK), their perceived online teaching presence, and the institutional support they receive. A quantitative survey was administered to 140 teachers at the university level. Teachers' online teaching experience positively influenced their TPACK self-efficacy. Online teaching experience also had a significant positive impact on teachers' perceived online teaching presences. Furthermore, teachers' perceptions of institutional support were positively associated with their online teaching experience. These results highlight the critical role of teachers' online teaching experience in shaping their readiness for OTL. The findings suggest that targeted professional development programs and institutional support mechanisms can effectively enhance teachers' self-efficacy, online teaching presence, and perceptions of institutional support in Cambodian higher education.

Keywords: online teaching and learning; TPACK; institutional support; higher education; SEM

Introduction

The TPACK framework has strongly influenced research and practice in teacher education and professional development and inspired extensive research and scholarship. Since 2009, there have been over 1200 journal articles and book chapters, over 315 dissertations and 28 books with TPACK as the central construct (Zhang & Tang, 2021). Early in 2001, Pierson began to use the concept of TPCK. Pierson's TPCK referred to "Technology assisting PCK". Niess changed TPCK from a static concept to a dynamic one (Zhang & Tang, 2021). To effectively promote OTL readiness and competencies, professional development and teacher training programs need to be tailored to the teachers' various needs and backgrounds. Consequently, OTL research has been aimed at identifying the factors that may explain why or why not teachers consider themselves ready for OTL experience is one of these factors (Scherer et al., 2023).

The COVID-19 pandemic prompted the adoption of new technologies, but traditional teaching methods still dominate. Quality and relevance, equitable access, institutional governance and management, strategic investment, and the alignment of higher education with national development are anticipated challenges (Sok & Bunry, 2023). Some concerns with online learning regarding motivation of students, time management, and delay of feedback have been identified as potential limitations. However, these limitations could be addressed by having an instructor that is present and available through responses to students and timely feedback on assignments which also fosters a sense of belongingness (Martin et al., 2019; Zhang et al., 2022). Instructors require plenty of opportunities for students to participate and to be engaged with each other, the material, the service-learning agency, and the instructors themselves (Branscum, 2024). The digitalization situation in Cambodia is contradictory, with limited skills for using the internet, smartphones, and social networks in rural areas. Access to the internet is still a challenge, but the government is working to

solve this problem. Blended learning has become the dominant response to the COVID-19 pandemic in education (Vialichka, 2021). Additionally, the research highlights the need for continuous support for both technical and pedagogical aspects of online instruction (Fabríz et al., 2021). Providing training and development for faculty members is key, as those who are open to change tend to have higher satisfaction with online and distance education (Chan et al., 2021).

More research is needed on the specific factors that influence teacher readiness, beyond just attitudes, technological competency, pedagogy, training, and time constraints. The existing frameworks are broad and require more nuanced studies (Baran et al., 2011; Scherer et al., 2021; Uerz et al., 2018). There is a lack of research comparing teacher readiness across different geographical locations and types of institutions. Most studies focus on a single context. Examining gaps in readiness between urban and rural areas could provide important insights (Adedoyin & Soykan, 2023; Almaiah et al., 2020; Chea et al., 2022; Hasyim et al., 2024).

Literature Review

Technological Pedagogical Content Knowledge (TPACK)

Technological Pedagogical Content Knowledge (TPCK) was introduced to the educational research field as a theoretical framework for understanding teacher knowledge required for effective technology integration (Mishra & Koehler, 2006a). TPACK is a theoretical lens for understanding teacher readiness for online teaching and learning. The framework is about designing and evaluating teacher knowledge for effective student learning in various content. Recent developments in digital technology and the COVID-19 pandemic have moved education online. This has made educators to upgrade their digital literacy and professional identity and TPACK is a useful tool to improve teaching practices (Su, 2023). Zgheib et al. (2023) found that faculty readiness to teach online, female faculty are more prepared than male faculty in course design and attitude towards online learning. More years of teaching experience enhances pedagogy and course design. However, challenges such as unreliable internet and lack of advanced skills for interactive activities were noted. Technical skills had a big impact on faculty readiness, it's time to shift from traditional to innovative teaching methods in online education.

Çam & Koç (2024) conducted a study on a professional development program to enhance teacher's TPACK. The program increased participants' self-confidence and ability to integrate technology into teaching. The study confirmed earlier research that TPACK-oriented training affects teachers to transfer their knowledge into practice. Moreover, Paetsch et al. (2023) found a positive relationship between pandemic-related experience, technology integration self-efficacy and support for ICT integration in post-pandemic teaching. Moreover, Paetsch et al. (2023) found a positive relationship between pandemic-related experience, technology integration self-efficacy and support for ICT integration in post-pandemic teaching.

Teacher's Self Efficacy

Teacher self-efficacy (TSE) is the teacher's belief in their ability to teach students and impact student learning outcomes (Gordon et al., 2023; Ramakrishnan & Salleh, 2019). It is a crucial factor that affects various aspects of teaching including instructional strategies, classroom management and student engagement (Amin Mydin et al., 2022; Gordon et al., 2023). Researchers have developed several instruments to measure TSE such as the Teacher Self-Efficacy Scale (TSES) and the Teacher's Sense of Efficacy Scale (TSES) (Corry & Stella, 2018; Gordon et al., 2023). These scales assess teachers' belief in their ability to perform specific teaching tasks and overall confidence in their teaching.

Many studies have found that online teaching self-efficacy is related to years of teaching experience, grade level taught and level of technological proficiency (Dolighan & Owen, 2021; Yang & Du, 2024). Teachers with higher self-efficacy are more confident in managing online learning environments and more likely to try out new teaching methods. Research indicates that educators frequently have difficulties in properly incorporating technology into their instructional methods, thus undermining their self-efficacy in online teaching (Corry & Stella, 2018; Dolighan & Owen, 2021).

This challenge is especially evident for educators with less experience or training in online instruction.

Support and Professional Development

Access to sufficient support and professional development opportunities is essential for improving teachers' preparedness for online instruction and learning. Continuous training, mentorship, and collaborative networks can enable educators to acquire the knowledge, skills, and confidence necessary to manage the intricacies of online education (Archambault & Crippen, 2009). Robust support and professional development are essential for facilitating teachers' smooth transition to online and blended education formats. Studies indicate that specialized training programs may markedly enhance educators' digital skills, self-assurance, and understanding of optimal online teaching techniques (Horvitz & Beach, 2011; Rafique, 2024). Studies have repeatedly shown that these programs may significantly enhance teacher self-efficacy, especially when customized to address the individual needs and concerns of the participating instructors (Baroudi & Shaya, 2022; Corry & Stella, 2018; Dolighan & Owen, 2021).

Research Questions

The current study intends to evaluate the association between teacher experience and preparation for online context. The study gives useful insights into the elements impacting teacher preparedness by addressing the following research questions: (1): To what degree does teaching experience impact the instructors' preparedness for Online Teaching and Learning (OTL) across many dimensions, such as Technological Pedagogical Content Knowledge (TPACK), self-efficacy, perceived online teaching presence, and perceived institutional support? (2): How do the correlations between teaching experience and preparedness for OTL change across the dimensions?

Participants

The quantitative sample contained 140 instructors from several higher education institutions in Cambodia. These individuals were picked using a random selection approach with a representative range of teaching disciplines, years of experience, and expertise with online teaching platforms. The selection criteria were meant to capture a wide range of views and experiences, thereby improving the reliability and generalizability of the findings. The academics that participated in the survey were from different academic areas, including sciences, humanities, social sciences, and professional studies. Additionally, the sample consisted of teachers with varying degrees of skill, from rookie instructors to experienced educators, to offer a thorough assessment of how experience effects readiness for online teaching.

Methodology

Research Design

This study adopts a quantitative research approach, employing an online survey to acquire data from instructors in higher education institutions in Cambodia. The survey approach facilitates the collection of numerical data, which may be statistically examined to understand the correlations between variables. Structural Equation Modeling (SEM) is used to analyze the intricate interactions between the variables.

Data Collection and Procedure

The online survey form was utilized to collect the data, which stressed critical areas such as technical capabilities, pedagogical techniques for online learning, institutional support mechanisms, and personal attitudes toward online education. The survey was sent through the email and Telegram. The data-collecting period was extended from March to June 2024, while maintaining their identity and anonymity.

Measurement

This survey was particularly created to assess instructors' preparation for online teaching and learning in higher education institutions in Cambodia. The poll consisted of 29 questions and was separated into three primary sections: self-efficacy, perceived online teaching presence, and perceived institutional support. The readiness for OTL measure contained three dimensions. Teachers' self-efficacy in their TPACK, perceived online teaching presence, and the perceived institutional support. These dimensions covered teachers' readiness perceptions of core aspects of knowledge, teaching, and support. Teachers responded to the items using a 5-point agreement scale (1= strongly disagree, 5 = strongly agree).

Reliability

The reliability indices provided for the constructs in the measurement model offer insight into the consistency and reliability of the measures used.

Table 1. Reliability indices of the Readiness Constructs.

Variable	α	Ordinal α	ω_1	ω_2	ω_3	AVE
TCK	0.904	0.916	0.861	0.861	0.861	0.852
TPK	0.952	0.964	0.938	0.938	0.940	0.874
TCPK	0.946	0.958	0.932	0.932	0.936	0.857
CoI	0.940	0.969	0.943	0.943	0.944	0.890
CA	0.967	0.979	0.964	0.964	0.974	0.879
Feedback	0.884	0.929	0.888	0.888	0.888	0.870
IS	0.945	0.963	0.948	0.948	0.957	0.822

Note: α = Cronbach alpha; ω_1 = Omega; AVE = Average variance extracted.

Data Analysis

The data were examined using SEM, using the Jamovi statistical program, which provides tools for model definition, estimation, and assessment. SEM was chosen for its capacity to handle complicated interactions between observable and latent variables, enabling a complete study of both measurement and structural models. The model fit was computed using multiple indices, including the chi-square test and Standardized Root Mean Square Residual (SRMR).

Findings

SEM for Teacher's Readiness in OTL

SEM was used to evaluate a number of constructs, including Clarity of Instruction (CoI), Cognitive Activation (CA), Feedback, Technological Content Knowledge (TCK), Technological Pedagogy Knowledge (TPK), and Technological Content Pedagogy Knowledge (TCPK), in order to determine how prepared teachers were for Online Teaching and Learning (OTL). The overall fit of the SEM was tested using multiple fit indices. The chi-square (X^2) value for the user model was 309, with $p = 0.996 > 0.05$, suggesting a very strong fit (Peugh & Feldon, 2020). Additionally, the Baseline Model generated an $X^2 = 146,613$, and $p < .001$. Despite the huge chi-square value in the Baseline Model, the user model's fit indices gave more useful information.

Table 2. Fit Indices and Model Comparisons.

Fit Index	Value	p-value	Result
Model Tests			
User Model	$\chi^2 = 309, df = 378$	0.996	Very good fit

Baseline Model	$\chi^2 = 146,613$, df = 435	< .001	Poor fit
Fit Indices			
SRMR	0.038		Excellent fit
RMSEA	0.000	1	Excellent fit
CFI	1.000		Perfect fit
TLI	1.001		Perfect fit
NNFI (Bentler-Bonett)	1.001		Good fit
RNI	1.000		Good fit
NFI (Bentler-Bonett)	0.998		Perfect fit
RFI (Bollen's)	0.998		Perfect fit
IFI (Bollen's)	1.000		Perfect fit
PNFI	0.867		Good fit

Note: SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; NNFI = Bentler-Bonett Non-normed Fit Index; RNI = Relative Noncentrality Index; NFI = Bentler-Bonett Normed Fit Index; RFI = Bollen's Relative Fit Index; IFI = Bollen's Incremental Fit Index; PNFI = Parsimony Normed Fit Index.

The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) both showed a perfect match (Goretzko et al., 2024; Stone, 2021a). Other fit indices validated the model's adequacy with values of 1.001 and 1.000, respectively.

Parameters Estimates of Oline Teaching Experience

The parameter estimates were used to look into the influence of online teaching experience (Online Exp) on several elements of instructors' attitudes and readiness for online teaching. The study focuses on a number of dependent variables, including Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and various dimensions of perceived online teaching presence (POTP), such as Clarity of Instruction, Cognitive Activation, and Feedback. The impact on Institutional Support (SI) is also considered.

Table 3. Parameters estimates of online teaching experiences on Dependent variables.

Dep	Pred	Estimate	SE	95% Confidence Intervals		β	z	p
				Lower	Upper			
TCK	OTL	0.164	0.0478	0.0699	0.257	0.223	3.42	< .001
TPK	OTL	0.206	0.0574	0.0935	0.318	0.254	3.59	< .001
TCPK	OTL	0.225	0.0555	0.1159	0.334	0.274	4.05	< .001
CoI	OTL	0.19	0.0584	0.0757	0.305	0.234	3.26	0.001
CA	OTL	0.197	0.048	0.1027	0.291	0.26	4.1	< .001
Feedback	OTL	0.218	0.0681	0.085	0.352	0.258	3.21	0.001
IS	OTL	0.175	0.0589	0.0595	0.29	0.221	2.97	0.003

Note: Dep= Dependent Variable; Pred = Predictor; OTL = Online Teaching and Learning; SE = Standard Error; TCK = Technological content knowledge; TPK = Technological Pedagogy knowledge; TCPK = Technological Content Pedagogy knowledge; POTP = Perceived Online Teaching Presence; CoI = Clarity of Instruction; CA = Cognitive Activation; IS = Institutional Support.

There was a substantial positive correlation between online teaching experience and TCK ($\beta = 0.223$, $p < .001$), TPK ($\beta = 0.254$, $p < .001$), and TCPK ($\beta = 0.274$, $p < .001$). This shows that increasing online teaching experience correlates with better levels of technology competence among teachers. Online teaching experience had a significant positive effect on the clarity of instruction ($\beta = 0.234$, $p = 0.001$), cognitive activation ($\beta = 0.26$, $p < .001$), and feedback ($\beta = 0.258$, $p = 0.001$) dimensions of POTP. This indicates that more online teaching experience enhances teachers' perceptions of their instructional practices. Online teaching experience had a significant positive relationship with PIS ($\beta = 0.221$, $p = 0.003$), suggesting that teachers with more online teaching experience perceive greater institutional support.

Measures of Indicators and Factors

The measurement model results presented evaluate the relationships between observed variables (indicators) and their corresponding latent constructs (factors) within the context of teachers' perceptions and readiness for online teaching. We analyze the estimates, standard errors (SE), 95% confidence intervals, standardized loadings (β), z-values, and p-values for each observed variable across various latent constructs.

Table 4. Measurement Model.

Latent	Observed	Estimate	SE	95% Confidence Intervals		β	z	p
				Lower	Upper			
Online	Online teaching	1	0	1	1	1		
TCK	tpack1	1	0	1	1	0.845		
	tpack2	1.161	0.041	1.08	1.242	0.981	28.1	< .001
TPK	tpack3	1	0	1	1	0.935		
	tpack4	0.949	0.022	0.905	0.993	0.887	42.7	< .001
	tpack5	1.02	0.018	0.983	1.056	0.953	54.8	< .001
	tpack6	1.008	0.020	0.968	1.047	0.942	50	< .001
TCPK	tpack7	1	0	1	1	0.945		
	tpack8	0.951	0.022	0.908	0.994	0.899	43.2	< .001
	tpack9	0.948	0.022	0.904	0.991	0.896	43	< .001
	tpack10	0.981	0.018	0.945	1.016	0.927	54.1	< .001
CoI	presence1	1	0	1	1	0.937		
	presence2	0.957	0.024	0.909	1.005	0.897	39	< .001
	presence3	1.038	0.018	1.001	1.075	0.972	55.2	< .001
	presence4	0.989	0.019	0.951	1.027	0.927	50.8	< .001
CA	presence5	1	0	1	1	0.874		
	presence6	1.11	0.026	1.057	1.162	0.97	41.5	< .001
	presence7	1.074	0.024	1.027	1.122	0.939	44.2	< .001
	presence8	1.077	0.024	1.028	1.125	0.941	43.6	< .001
	presence9	1.063	0.023	1.016	1.109	0.929	45	< .001
	presence10	1.055	0.022	1.01	1.1	0.922	46.4	< .001
	presence11	1.072	0.02	1.033	1.111	0.937	53.6	< .001
Feedback	presence12	1	0	1	1	0.975		
	presence13	0.899	0.024	0.85	0.947	0.876	36.3	< .001
IS	IS1	1	0	1	1	0.912		

IS2	1	0.028	0.945	1.055	0.912	35.7	< .001
IS3	1.052	0.029	0.994	1.11	0.96	35.4	< .001
IS4	0.936	0.031	0.875	0.996	0.853	30.2	< .001
IS5	0.924	0.036	0.853	0.995	0.842	25.5	< .001
IS6	0.992	0.030	0.931	1.052	0.904	32.3	< .001

Note: SE = Standard Error.

The measurement model demonstrates that the observed variables accumulated high and statistically significant loadings on their corresponding latent constructs.

Discussion

The excellent model fit indices, including a nonsignificant chi-square value, underscore the robustness of the SEM model used in this study (Goretzko et al., 2021; Stone, 2021b). These findings are consistent with those of Goretzko et al. (2021) and Shi et al. (2018), who found that high CFI and TLI values indicated strong model fit in educational research. The favorable link between online teaching experience and TCK is consistent with other research that emphasizes the relevance of experience in establishing technical competence among teachers. This validates the estimate's accuracy and reinforces Mishra & Koehler's (2006b) conclusions on the importance of technology content knowledge in the digital age.

The considerable influence of online teaching experience on TPK is similar to the findings of Chai et al. (2013) which stress the cruciality of teaching experience in improving teachers' pedagogical understanding of technology. According to Koehler et al. (2013), the association between online experience and TCPK emphasizes the necessity of thorough knowledge integration in effective online education. Their findings also show that the creation of TPACK is critical for instructors to successfully integrate technology into their teaching methods. The significant positive effects on clarity of instruction, cognitive activation, and feedback dimensions of POTP corroborate the findings of Diamah et al. (2022) on efficiency of a training program based on technology pedagogical content knowledge and Bolkan (2016) on clear instruction, which can employ a variety of effective teaching behaviors, such as those that reflect the instruction, to increase the odds that students experience success in their courses. It was argued that the reason clarity works to influence student success is because of its ability to reduce learners' cognitive load experienced as receiver apprehension. The strong association between online teaching experience and PIS elucidates that institutional support is crucial in allowing effective online teaching (Al-Samarraie et al., 2018). The strong association between online teaching experience and PIS elucidates that institutional support is crucial in allowing effective online teaching.

Implications and Conclusion

Several major recommendations may be made to teachers, universities (HEIs), and policymakers (MoEYS) to strengthen the readiness of teachers for online teaching and learning. Teachers should engage in continual professional development opportunities to strengthen practical skills. A study by Chea et al. (2022) proposed the TPACK framework for effective technology integration in teaching. Research has shown that teacher collaboration and the sharing of best practices can significantly improve online teaching skills and student outcomes (Chea et al., 2022; Dede et al., 2008; Prestridge, 2019). Several studies have demonstrated that instructors with a growth mindset are more effective in moving to online and blended learning environments (Dweck, 2024; Ertmer & Ottenbreit-Leftwich, 2010). Studies have underlined the significance of explicit learning objectives, regular feedback, and cognitive activation tactics to maintain student engagement and learning in online contexts (Means et al., 2010; Snook et al., 2009)

Higher education institutions (HEIs) should invest in reliable digital infrastructure, including stable internet connectivity and user-friendly learning management systems, to support online teaching and learning (Means et al., 2010), and equipping teachers with the necessary skills and knowledge for effective online instruction (Baran & Correia, 2014; Schmidt et al., 2009b).

Providing technical assistance and tools for instructors is vital to address the difficulties and strengthen their online teaching abilities (Ertmer & Ottenbreit-Leftwich, 2010; Hermien & Wiyatini, 2019). It is encouraged to develop a culture of creativity and cooperation among teachers for effective online teaching approaches (Dede et al., 2008; Prestridge, 2019). Several studies emphasized the significance of clear guidelines and policy for the quality and consistency (Hermien & Wiyatini, 2019), collaboration with various HEIs to address gaps in teacher readiness and competencies (Baran et al., 2011), and promotion of the online and blended learning integration to enhance access and flexibility for students (Means et al., 2010). Further research should undertake longitudinal studies to gauge how teachers' perceptions of OTL have changed. It is advisable to explore the viewpoints of students and other relevant stakeholders in order to have a broader understanding of online teaching and learning in HEIs in Cambodia.

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