

## A Model of Technology Integration for Teaching for University Instructors in Guangxi, China

Yang Liu<sup>1,\*</sup>, Poonpilas Asavisanu<sup>2</sup>

<sup>1</sup> Guangxi University of Science and Technology, China

<sup>2</sup> Graduate School of Human Sciences, Assumption University, Thailand

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### ABSTRACT

This study developed a model to enhance technology integration for university instructors in Guangxi, China. The objectives of the study were: 1. To determine the factors that influence the development of technology integration for teaching for instructors, 2. To identify the current level of technology integration for teaching for university instructors in Guangxi, China, 3. To find the significant demographic characteristics and influencing factors that influence technology integration for teaching for university instructors in Guangxi, China, 4. To develop a model to enhance technology integration for teaching for university instructors in Guangxi, China. This study used mixed-methods explanatory research. The sample was 618 instructors from five universities in Guangxi. Findings were instructors mostly used technology for Substitution and Augmentation purposes ( $M = 3.81, SD = 0.92$ ; and  $M = 3.79, SD = 1.07$ ), and use at the Modification and Redefinition level was moderate to low ( $M = 3.04, SD = 0.72$ ;  $M = 2.15, SD = 0.95$ ). Academic discipline was correlated with technology integration. The significant factors influencing technology integration for teaching included performance expectancy, social influence, facilitating conditions, and effort expectancy in that order. The estimated regression equation was  $\text{Use Behavior} = -0.296 + 0.310* \text{Performance Expectancy} + 0.213* \text{Effort Expectancy} + 0.269* \text{Social Influence} + 0.233* \text{Facilitating Conditions}$ . The developed model can assist administrators to encourage more technology use by focusing on the significant factors.

**Keywords:** Technology Integration, Teaching, University Instructors

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\* Corresponding Author; E-mail: ly1211@vip.qq.com

## Introduction

Information and communications technology (ICT) has significantly influenced the transformation of the traditional concept of education (Liu, 2022). Information technology has been increasingly integrated into daily teaching practices in recent years. This highlights the need for deep integration between information technology and curriculum during classroom instruction. Information technology should permeate seamlessly throughout these activities so that instructors can integrate it as naturally as using chalk and a blackboard (Harrell & Bynum, 2018; Xu and Chen, 2016). Instructors have an increasingly critical relationship with technology integration in the curriculum (Rosanda and Starcic, 2019). Therefore, instructors should comprehensively understand how to efficiently integrate information technology into their teaching (Zandvliet and Straker, 2001).

As social development, educational policies, cultural backgrounds, and technological environments vary from country to country and region to region, the level of technology integration among instructors may vary. This leads to differences in how instructors apply technology in teaching (Ashrafzadeh and Sayadian, 2015). Therefore, strengthening technology integration for teaching instructors often requires interaction with institutional, personal factors, and many other factors (Ekizoglu et al., 2010; Chen, 2007; Niederhauser and Stoddart, 2001). The development of information technology has made technology integration a critical driving force in promoting instructors' professional development (Ruggiero and Mong, 2015), and also made the research on instructors' technology integration an essential topic in studying how to encourage instructors' professional development, which has gradually triggered extensive discussions in the academic community (Zhu and Li, 2023; Takaoka et al., 2021).

However, there is a lack of research on the development and the current state of technology integration for university instructors in the context of Chinese universities (Wu, 2022; Li and Liu, 2020). Although university instructors around the world have begun to recognise the importance of technology integration, university instructors in Guangxi, China, still face a number of challenges in their current educational and pedagogical practices. First, many university instructors in Guangxi, China, struggle to fully understand the significance of technology integration and often lack a deep understanding of how technology can solve pedagogical problems, which leads to a lack of attention to the use of technology to help in instructional design, classroom instruction, and teaching assessment (Nong and Weng, 2023). Second, many university instructors in Guangxi, China, face difficulties in effectively integrating technology into their teaching, and many still find it challenging to master and integrate these technologies into their teaching practices due to the complexity and diversity of these technologies (Luo, 2022). Thirdly, many university instructors in Guangxi, China have failed to prioritize the development of this competency or acquire sufficient knowledge, and although they recognize the importance of integrating technology into their role as educators, they

lack effective strategies to help improve their integration of technology into teaching (Liang et al., 2022).

Therefore, research needs to identify the factors and methods that influence the improvement of technology integration in teaching for instructors in higher education (Palmore, 2011; Ekizoglu et al., 2010; Chen, 2007; Liu et al., 2004; Niederhauser and Stoddart, 2001). Hence, researchers should develop appropriate models to enhance technology integration for teaching instructors according to the realities of different regions (Sullivan et al., 2018; Yilmazel-Sahin and Oxford, 2010; Dexter et al., 2006). Based on UTAUT, SAMR model and professional development theory, this study developed a model to enhance technology integration for teaching university instructors in Guangxi, China

## Research Objective

1. To determine the factors that influence the development of technology integration for teaching for instructors.
2. To identify the current level of technology integration for teaching for university instructors in Guangxi, China.
3. To find the significant demographic characteristics and influencing factors that influence technology integration for teaching for university instructors in Guangxi, China.
4. To develop a model to enhance technology integration for teaching for university instructors in Guangxi, China.

## Literature Review

### Theoretical Framework

Three theories were used as the framework for this study, the Unified Theory of Technology Acceptance and Use (UTAUT, Venkatesh et al., 2003), SAMR model (Puentedura, 2006), and Professional Development Theory (Guskey, 2000). UTAUT was first introduced by Venkatesh and his colleagues in 2003 and combined the elements of previous theories used to explain technology adoption behavior. UTAUT has been widely used and validated in many studies and is considered a valuable framework for understanding technology acceptance. According to UTAUT, four variables: Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC) influence intention and behaviour to use technology. There are also different intention and behaviour to use technology for different people's gender, age, experience, and voluntariness of use. Performance Expectancy is an attitude or belief about the effectiveness of technology in helping them complete their job or improve their outcomes. Effort expectancy measures the ease with which individuals expect to use technology. Social influence assesses the importance individuals

place on the opinions of those close to them, such as family, friends, and colleagues, regarding their use of technology. Conditions of facilitation evaluate a person's belief in whether their organization has the necessary technical infrastructure and support for effective utilization of technology.

The SAMR model was developed by Puentedura in 2006. It is a model that classifies four levels of technology integration. The acronym SAMR stands for Substitution, Augmentation, Modification, and Redefinition. This model provides instructors with a series of criteria to help them improve their level of technology integration. Instructors can use appropriate technology based on their understanding to improve their teaching achievement. The SAMR model is represented as a conductor and provides a four-level approach for selecting, using, and evaluating technology in education. Its purpose is to describe and categorize how instructors use technology in the curriculum. Overall, the SAMR model is a practical guide for instructors who want to effectively integrate technology instruments into the curriculum. By following this framework's guidelines, instructors can make meaningful changes that benefit themselves and their students' educational experiences. Technology is used as a straightforward substitution for traditional instruction or instruments at the Substitution level without significantly changing functionality. An application might use a computer program to type a document instead of handwriting. Technology has substituted the traditional method, but the task and outcome are the same. The Augmentation level is where technology is still like a substitute, but there are some functional improvements. An example of this would be the word processing software that can replace writing by hand but also has new features like spelling check or grammar check. The technology is seen to add value to the writing process. The Modification level is where technology has allowed the task to be redesigned. An example of this would be the substitution of in-class or in-person group work for collaboration via online methods using various software. The software could allow for real-time online collaboration and feedback and editing from students and instructors. The Redefinition Level is considered the most transformative level, where technology has made it possible to create new ways of teaching and learning. An example would be virtual reality tools, where students can experience firsthand through computer-generated images or environments and immerse themselves in historical events, environments, or medical procedures. The new technology is seen to go beyond traditional learning methods to provide new ways of learning.

Professional Development Theory was developed by Guskey in 2000 in order to properly evaluate the complex process of teacher professional development and is divided into five key levels: Participants' Reactions, Participants' Learning, Organization Support and Change, Participants' Use of New Knowledge and Skills, Student Learning Outcomes. *Participants' Reactions* is related to the content, processes, and scenarios of instructors' professional development. *Participants' Learning is related to* whether the professional development activities brought about changes in the

instructors' knowledge, skills, and attitudes or beliefs. *Organization Support and Change* is related to the extent of organizational support and change in the instructors' professional development activities. *Participants' Use of New Knowledge and Skills* is related to whether or not the new knowledge and skills learned in the professional development activities have been applied by the instructors in their practice or have resulted in a change in their professional behavior or activities, and how they have been applied or how they have changed their professional behavior or activities. *Student Learning Outcomes* focuses on the specific impact on students as a result of the instructors' behavioral change, i.e. whether the professional development activity has benefited the students in some way, whether it has improved their performance, whether it has changed their behavior, and whether it has induced a change in their attitudes or perceptions.

### **Technology Use in Higher Education in China**

Technology use in higher education in China started later than in Western developed countries (Shi, 2017). Since the early 1990s, technology began to be applied in higher education on a large scale. Many universities actively introduced multimedia technology, voice classrooms, distance education, virtual classrooms, and other advanced means. However, due to the university's other supporting facilities, traditional teaching concepts, instructors' teaching methods, and other problems, the theory and practice of technology have yet to be scientifically combined in the application (Guo, 2009). However, due to other supporting facilities in universities, traditional teaching concepts, instructors' teaching methods, and other problems, the theory and practice of technology have yet to be scientifically combined in application. The Chinese government has emphasized these problems. Solutions have been proposed at the national policy level, such as reasonable application of technology to reform the teaching, adjust the structure, and change the concept so that technology use in higher education in China can catch up with the world's advanced level as soon as possible (Yuan and Zheng, 2023; Shi, 2017).

China has made significant strides in developing and implementing ICT in Education since the 1990s. This progress is a result of major projects, policy measures, and the Ministry of Education's issuing the 2010 Outline of the National Medium- and Long-Term Educational Reform and Development Plan (2010-2020). The plan sets ambitious goals for education modernization, fostering a learning society, and positioning China among the leading countries in terms of human resources by 2020. For the first time, the national education development plan has incorporated the goal of accelerating ICT in education. This includes speeding up the construction of ICT infrastructure, promoting the development and use of high-quality educational resources, integrating information technology into teaching to enhance learning outcomes, and establishing a national education management information system. The plan sets out specific tasks and requirements for China's ICT in education construction, such as improving infrastructure, expanding access to quality educational

resources, leveraging technology for better teaching methods, and fostering active and independent learning. Additionally, it emphasizes the need for a comprehensive national education management information system (Ministry of Education of the People's Republic of China, 2010).

In 2012, China's Ministry of Education released the first national strategic plan for ICT in Education: "ICT in Education Ten-Year Development Plan (2011-2020)". This plan aims to establish an ICT in an education system that will align with the national development goals by 2020. It also strives for ICT in Education to reach an advanced international level and fully realize its role in supporting education reform and development. The plan outlines specific objectives for constructing learning environments, integrating information technology and education, and managing ICT in education. Additionally, it provides a framework for implementing these tasks within higher education. It deploys development tasks for the management of ICT in education, the construction of the public environment, the construction of instructors, the construction of mechanisms and other special construction contents, and deploys and arranges the organization and leadership, policies and regulations, technical services and financial inputs to ensure the smooth implementation of the development tasks and the project works. The organization and leadership, policies and regulations, technical services, and financial inputs are also deployed and arranged (Ministry of Education of the People's Republic of China, 2012).

## Research Framework

This study explores the level of instructional use of technology, factors affecting technology integration behavior, and demographic characteristics of teachers in Guangxi, China, to develop a model to enhance technology integration for teaching for university instructors in Guangxi, China. This study is based on the UTAUT (Venkatesh et al., 2003), SAMR model (Puentedura, 2006), Professional Development Theory (Guskey, 2000). The SAMR model was used to identify the current level of technology integration for teaching for university instructors in Guangxi, China. The UTAUT was used to find the significant demographic characteristics and influencing factors that influence technology integration for teaching for university instructors in Guangxi, China. Professional Development Theory was used to guide the development and use model to enhance technology integration for teaching for university instructors in Guangxi, China. Based on these findings, presented to 10 experts for evaluation and validation. Figure 1 illustrates the conceptual framework and the main variables involved in this study.

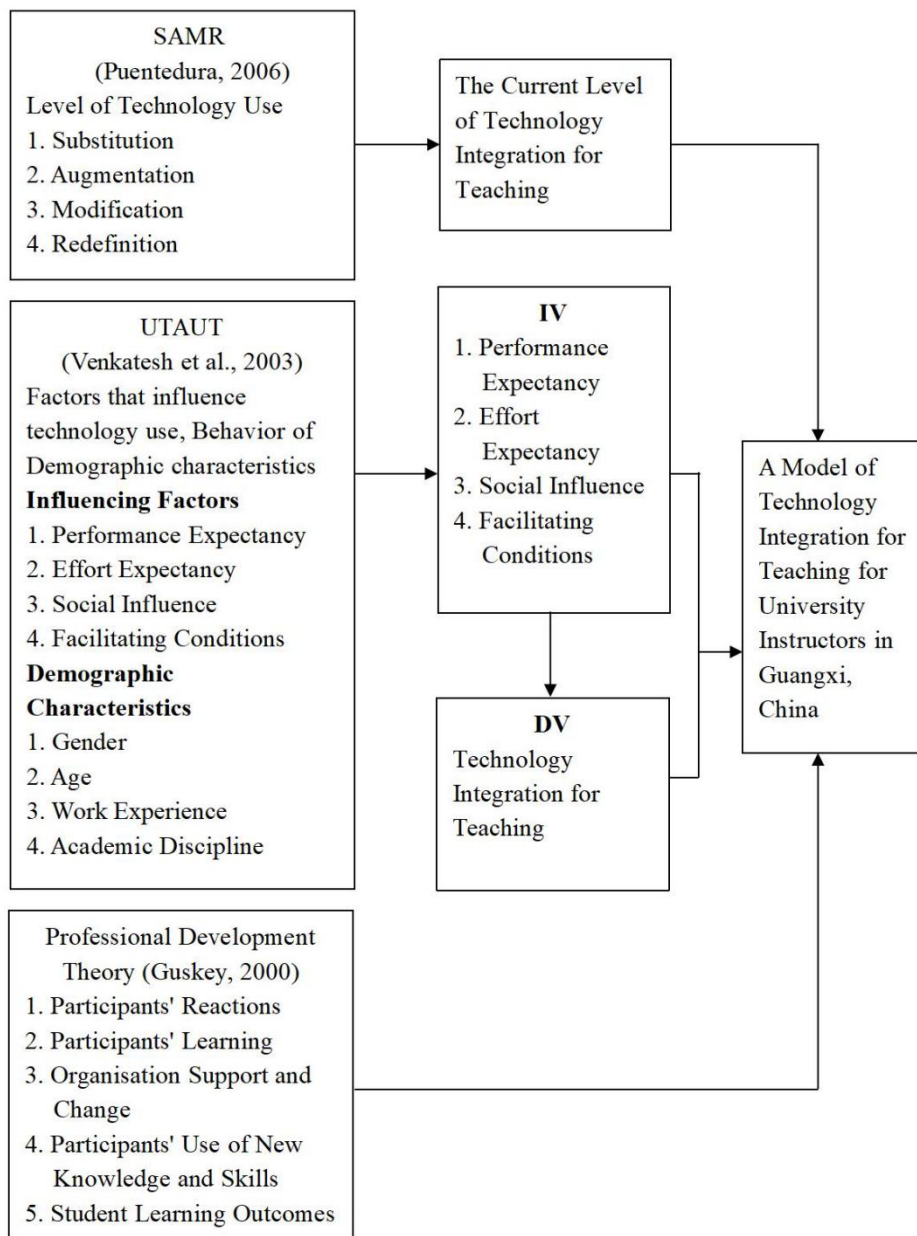


Figure 1 Research Framework

## Methodology

### Research Design

To achieve the study objectives of exploring the factors that affect technology integration and subsequently analyzing the relevance of those factors, this study employed a mixed methods approach, incorporating both qualitative and quantitative methods. Specifically, the study design was an exploratory mixed methods with an instrument development design. Data were collected using both qualitative and quantitative methods. The study was composed of five parts to achieve each of the research objectives. The first part was a literature review and content analysis. The second part involved developing a questionnaire and collecting data. The third part was statistical

analysis. The fourth part developed a theoretical model of technology integration for teaching. The fifth part involved validating the model.

### **Population and Sample**

The researcher selected the population from the top ten universities out of 89 universities in Guangxi, China, based on the 2024 ABC China University Rankings. To collect data for objective two, the target population was instructors from those five universities. The approximate population of instructors from the five universities was 11,562 instructors. The researcher used the quota sampling method in allocating the number of surveyed instructors in each university so that the number of questionnaire surveyed instructors in each university was greater than 5% of the total number of instructors in that university. The researcher determined a minimum sample size of 608 instructors, which is considered sufficient to ensure the study results can be generalizable to the context of Guangxi.

### **Research Instrument**

The research instrument for objective two was a questionnaire. The first part, type of technology integration was adapted from the questionnaire developed by Lubega et al. in 2014. part was divided into four domains: Substitution (questions 1 to 9), Augmentation (questions 10 to 18), Modification (questions 19 to 25), and Redefinition (questions 26 to 30). The second part of the questionnaire was developed based on the UTAUT model and external experts validated the question items to obtain the final remaining items in the survey. The questionnaire used a 5-point Likert scale. The researcher validated the questionnaire using the Content Validity Index (CVI). The researcher conducted a pretest involving 30 instructors to assess questionnaire reliability. Cronbach's alpha coefficient was used to establish reliability.

### **Data Collection**

The questionnaire was translated into Chinese so all participants could understand the contents well. It was distributed online.

### **Data Analysis**

Multiple linear regression (MLR) analysis was used to analyze the linear relationship among the factors and levels of technology integration and to find the significant factors that influence technology integration for instructors' teaching. For this study, *Use Behavior* was considered the dependent variable. *Performance Expectancy*, *Effort Expectancy*, *Social Influence*, and *Facilitating Conditions* were the independent variables. The results of all of the above objectives will be applied in the development of the model. For the implementation of the model, the researcher used Guskey's professional development theory as the framework. To validate the model, the study applied the expert intuition validation method. This approach involved taking the insight and suggestions from experts who met the following criteria: being a higher education instructor, having

knowledge of educational technology, and being able to evaluate research methodology and understand the model, purpose, and underlying assumptions.

## Findings

### 1. Findings for Research Objective One

Based on the systematic literature review and content analysis, four factors were found that influence the development of technology integration for teaching for instructors. These factors are Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions. Performance Expectancy include: 1) Teaching quality; 2) Teaching productivity; 3) Students' interest in learning; 4) Students' understanding of knowledge; 5) Students learning productivity. Effort Expectancy include: 1) Time cost; 2) Difficulty in using technology; 3) Difficulty of integration. Social Influence include: 1) Education policy; 2) Encouragement from university; 3) Encouragement from the leader; 4) Colleagues are using; 5) Student acceptance. Facilitating Conditions include: 1) Capacity to use technology; 2) Knowledge of technology; 3) Equipment guarantee; 4) Network resource; 5) Training; 6) Guidance from others.

### 2. Findings for Research Objective Two

The minimum sample size determined by the researcher was 608, and to ensure that enough questionnaires were collected, the researcher distributed questionnaires to 670 faculty members at five target universities in Guangxi, China, and 618 valid questionnaires were returned, which is 92.24% of the questionnaire return rate. Table 1 shows a summary of the responses obtained.

**Table 1** Summary of Responses

Universities Included in Study	Instructors	Distributed	Returned
Guangxi University	3,560	206	187
Guangxi Normal University	2,160	125	111
Guangxi University of Science and Technology	1,732	100	92
Guangxi Medical University	2,760	161	155
Guangxi Arts University	1,350	78	73
Total Number of Instructors	11,562	670	618

More men than women participated in the survey. In terms of age, the largest number of instructors were in the 20-30 age group, with 200 (32.36 %), accounting for nearly one third of the participants, while the smallest number of instructors were in the 51-60 age group, with 83 (13.43 %). In terms of work experience, the largest number of instructors had five years but not more than ten

years of work experience, with 187 (30.26%), and the smallest number of instructors had twenty years and above of work experience, with 86 (13.92%). In terms of academic discipline, Management has the highest number of instructors with 154 (24.92 %) and arts has the lowest number of instructors with 17 (2.75%). Table 2 shows a summary of these demographic findings.

**Table 2** Demographic Findings (n = 618)

Gender	Frequency	Percentage
Male	353	57.12
Female	265	42.88
Age	Frequency	Percentage
20-30	169	27.35
31-40	187	30.26
41-50	176	28.48
51-60	86	13.92
Work experience	Frequency	Percentage
One to five years	169	27.35
Five years but not more than ten years	187	30.26
Ten but not more than twenty years	176	28.48
Twenty years and above	86	13.92
Academic Discipline	Frequency	Percentage
Philosophy	32	5.18
Economics	18	2.91
Law	92	14.89
Education	42	6.80
Literature	31	5.02
History	37	5.99
Science	19	3.07
Engineering	42	6.80
Agriculture	34	5.50
Medicine	100	16.18
Management	154	24.92
Arts	17	2.75

The current level of technology integration for teaching for university instructors in Guangxi, China was Medium (Mean = 3.35, SD = 0.47) when assessed using the SAMR model. High at the Substitution and Augmentation levels, Medium at the Modification level, Low at the Redefinition level, and Medium at the overall level. After comparing and ranking the means for each domain, the

results indicated that the dimensions ranked in descending order were: 1) Substitution (Mean = 3.81, SD = 0.92); 2) Augmentation (Mean = 3.79, SD = 1.07); 3) Modification (Mean = 3.04, SD = 0.72); 4) Redefinition (Mean = 2.15, SD = 0.95). Table 3 shows a composite ranking and the total level of technology integration for teaching for university instructors in Guangxi, China.

**Table 3** Summary of Levels of Technology Use (n=618)

Domain	Mean	Standard Deviation	Level	Ranking
Substitution	3.81	0.92	High	1
Augmentation	3.79	1.07	High	2
Modification	3.04	0.72	Medium	3
Redefinition	2.15	0.95	Low	4

### 3. Findings for Research Objective Three

The demographic characteristics such as Gender, Age, Work Experience, and Academic Discipline that influence the technology integration for teaching were analyzed. ANOVA was used to analyze the correlations between use behavior and significant demographic characteristic. The results showed that only Academic Discipline had a significance of less than 0.05, which suggests that of the four significant demographic characteristics, only Academic Discipline was correlated with Use Behavior. Table 4 shows the results.

**Table 4** Correlation Between Use Behavior and Significant Demographic Characteristics

Source	Sum of Squares	Degrees of Freedom	Mean Squares	F Value	Sig.
Corrected Model	170.892 <sup>a</sup>	109	1.568	1.441	0.05
Intercept	1245.250	1	1245.250	1144.613	0.000
Gender	0.113	1	0.113	0.104	0.747
Age	2.486	3	0.829	0.762	0.516
Work Experience	1.797	3	0.599	0.551	0.648
Academic Discipline	23.819	11	2.165	1.990	0.027

Note: Dependent Variable: Use Behavior

For the four independent variables, Performance Expectancy is very important (mean = 3.74, S.D. = 1.02), Effort Expectancy is very important (mean = 3.80, S.D. = 1.03), Social Influence is very important (mean = 3.78, S.D. = 1.03), Facilitating Conditions is very important (mean = 3.81, S.D. = 1.09).

This suggests that all four factors of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Conditions are important in technology integration for teaching. Tables 5, 6, and 7 show the results.

**Table 5** Correlation Between Use Behavior and Influencing Factors

		Performance Expectancy	Effort Expectancy	Social Influence	Facilitating Conditions
Use Behavior	Correlation	0.469**	0.409**	0.500**	0.476**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000

Note: \*\* denotes that correlation is significant at the 0.01 level (2-tailed).

**Table 6** Regression Formula

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.679a	0.461	0.457	0.79770

Note: a. Predictors: (Constant), Performance Expectancy, Effort expectancy, Social influence, Facilitating Conditions.

**Table 7** Analysis of Variance Results

Model		Sum of Squares	Degrees of Freedom	Mean Squares	F Value	Sig.
1	Regression	333.494	4	83.374	131.025	0.000 <sup>b</sup>
	Residual	390.063	613	0.636		
	Total	723.557	617			

Note: a. Dependent Variable: Use Behavior

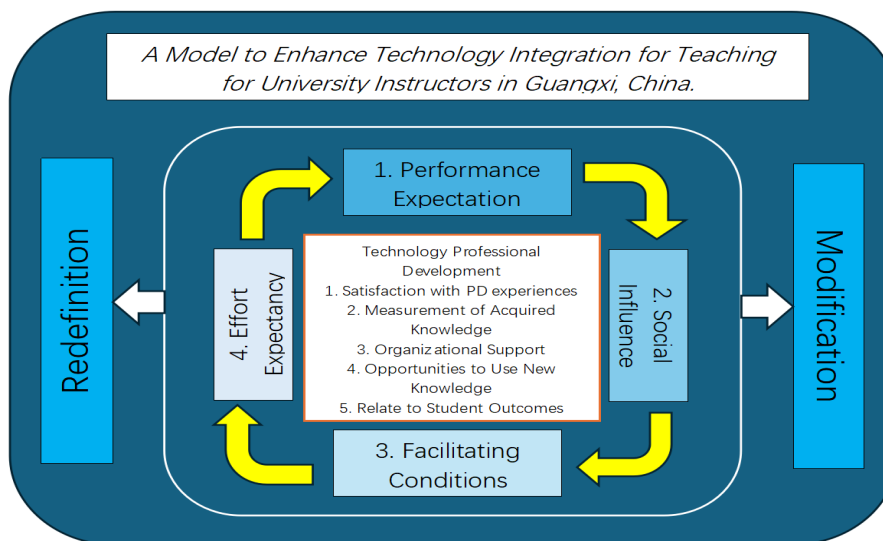
b. Predictors: (Constant), Performance Expectancy, Effort expectancy, Social influence, Facilitating Conditions.

Note: Sig. is the significance

To summarize, the results of multiple regression analysis indicate that *Performance Expectancy*, *Effort expectancy*, *Social influence* and *Facilitating Conditions* are all significant strategies that influence technology integration for teaching. Among these independent variables, ranked by beta ( $\beta$ ) values in descending order, are *Performance Expectancy*, *Social influence*, *Facilitating Conditions* and *Effort expectancy*.

#### 4. Findings for Research Objective Four

Findings from all previous objectives were combined to develop a theoretical model of technology integration for teaching. Figure 2 shows the final model developed.



**Figure 2** Theoretical Model to Enhance Technology Integration for Teaching for University Instructors in Guangxi, China

The model is comprised of three basic parts. The first part identifies the level of technology integration that is needed to be improved. They are Modification and Redefinition. These two types of technology integration were found to be at low levels. The second part of the model is the factors that influence the use of technology for this group of instructors. It was found that Performance Expectancy was the most significant factor, followed by Social Influence, Facilitating Conditions, and Effort Expectancy. The third part recommends the characteristics or criteria for professional development that should be present in order for professional development in this area to be effective at enhancing technology use.

#### Discussion

The study findings showed that most instructors used technology at the Substitution and Augmentation levels. Research studies have shown that many instructors in Guangxi, China, also only use technology for Substitution and Augmentation, and very few instructors use it for Modification and Redefinition. This means that instructors do not use technology to the best of their abilities. This is due to several complex reasons, such as different subject instructors having different needs for the use of technology in teaching and learning, lack of organizational support, and the difficulty

of the technology, so we need to find out the reasons and ways to enhance them further in the following study.

Performance expectancy, where instructors feel that technology can help them with their work, was the most significant in beta scores in this study. Azanza et al. (2024) studied university lecturers in Spain and found that positive attitudes and training were associated with higher self-efficacy about technology use. This supports the findings of this study in that in order to encourage technology use, instructors need to have training to equip them with knowledge, and the more instructors feel that technology use is beneficial to their teaching (positive attitude), they will be more likely to use it.

It is worth noting that Performance Expectancy has also been shown to be one of the most influential factors affecting use behavior. It refers to university instructors' expectations of the teaching effectiveness and student learning outcomes that may result from using instructional technology (Teo and Noyes, 2011). Performance Expectancy refers to university instructors' expectations of the teaching and learning outcomes that may result from using instructional technology (Salloum and Shaalan, 2019). Instructors are more likely to integrate instructional technology if they believe it will significantly improve student achievement, classroom engagement, or creativity. Strong performance Expectations can motivate teachers to actively explore and learn new instructional technologies to improve the quality of teaching and learning. Social influence includes perceptions and evaluations from colleagues, students, leaders, and the external community about using instructors' instructional technologies (Nandwani and Khan, 2016; Kocaleva et al., 2015). If people around them actively support and promote instructional technology, it will be easier for instructors to accept and integrate it. Social influence can form a kind of "herd effect," which makes instructors feel that the use of instructional technology is a kind of social expectation and responsibility, thus increasing their motivation to use instructional technology (Altafi, 2021; Garone et al., 2019; Oye et al., 2017; Lewis et al., 2013).

Facilitating Conditions refers to the external support and resources required for instructors to integrate instructional technology, such as technical equipment, training opportunities, and policy support (Teo and Noyes, 2011). If the university can provide sufficient resources and support, it will be easier for instructors to integrate instructional technology. Good facilitating conditions can reduce the difficulty and risk of integrating instructional technology for the instructors and increase their confidence and motivation to use instructional technology (Altafi, 2021; Salloum and Shaalan, 2019).

A study of technology use in Korean teachers found that technology use was strongly correlated to others in the organization asking teachers to use technology. The study showed that 'adapting to external requests and other's expectations' was the strongest factor and was not related

to the technological impact of teaching. The study also found that 'using the enhanced functions of technology' was the weakest factor. However, according to UTAUT theory and the findings of this study, it was the factor with the most significance (Baek et al., 2008). Nonetheless, regarding social expectations and others, this study's findings confirm that significant others, such as leaders and colleagues, influence whether instructors will use technology. Goh et al. (2020) found that subjective norms, constructivist behavior, and technological complexity are all related to technology use behavior. They recommend that university administrators emphasize the development of instructors' beliefs that there are benefits in using technology for teaching (Performance Expectancy). This belief can be enhanced through regular training and promotions and a strong organizational culture encouraging technology use (Facilitating Conditions). Individuals should be encouraged to view technology use as a form of social compliance with the organizational culture, which may lead to greater group conformity (Social Influence).

There is no correlation between technology integration and teaching behaviors of different genders, ages, and work experiences. However, there was a correlation between the technology integration for teaching behaviors of different academic disciplines and the level of integration that varies across academic disciplines. The impact of different academic disciplines on technology integration for university instructors' teaching is multifaceted, and the following is a specific discussion of these influences. Different academic disciplines have different teaching content and objectives and will have different technology needs. For example, science and engineering disciplines may be more inclined to use simulation software and laboratory techniques. In contrast, liberal arts disciplines may focus more on techniques such as multimedia presentations and interactive discussions. The culture and traditions of the discipline may also influence instructors' attitudes and use of technology. Some disciplines may focus more on traditional teaching methods, while others are more open to experimenting with new technologies. In summary, there are differences in technology integration for teaching among university instructors of different genders, ages, work experiences, and academic disciplines. In order to promote technology integration for teaching, these differences need to be addressed, and targeted support and training must be provided. At the same time, exchanges and collaboration between instructors should encourage them to learn from each other's experiences and work together to improve teaching effectiveness.

## Recommendation

### 1. Recommendation for Research Utilization

Implementing this theoretical model for the enhancement of technology use in university instructors in Guangxi can be done via administrative policy and social influence. Administrators or those responsible for the enhancement of technology use, should thoroughly understand the

model, its components and purpose. The model has already pointed out that technology use at the Modification and Redefinition levels need to be encouraged as instructors are already using technology at the Substitution and Augmentation level. The model has already pointed out that Effort Expectancy, Social Influence, Facilitating Conditions, and Effort Expectancy are the factors, in that sequence, that influence instructors in their decisions to use technology. Administrators should encourage instructors to use technology by showing them how it can make their teaching more efficient and save time. They should also be recognized for their use of technology in innovative ways by their leaders or colleagues (Performance Expectancy). An environment that encourages technology use should be perceived by the instructors. They should see examples of effective and efficient technology use by their leaders, peers and other social colleagues. The environment in their universities should encourage technology use. For those instructors in the university who excel in technology should be considered examples to follow to get recognition and promotion (Social Influence). To encourage instructors, the universities and various departments should be supportive of technology use. There must be adequate infrastructure, software, hardware and other support. The IT department must be willing and available to help instructors when they have problems (Facilitating Conditions). Finally, to encourage instructors, they need to be informed and trained on how to use various technology. This can be accomplished by various professional development activities and training. However, it is not enough to do only the training. It is important to make sure that the training works. This can be ensured by paying attention to the professional development characteristics that are recommended in the model.

## **2. Recommendation for Future Research**

Although the study's research methodology, sample, and analysis methods are sound, there are still some limitations that can be noted. The questionnaire design may be limited in covering all the important aspects related to technology integration for teaching, or there may be ambiguities in the formulation of certain questions, resulting in the data collected not being comprehensive or accurate. There may be limitation of data interpretation. The data obtained from questionnaires are often quantitative. They may not fully reflect the instructors' actual thoughts and experiences, so there may be a certain degree of subjectivity and bias in the interpretation of the data. To address the above limitations, future researchers may consider expanding the scope of the sample, increasing the sample size, optimizing the questionnaire design, adopting a variety of research methods (e.g., interviews, observations) to collect data, and combining the findings with the feedback from other stakeholders to more comprehensively study technology integration.

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