

The Impacts of IPEEE Teaching Method on Teacher Self-efficacy: Based on TAM

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ABSTRACT

This study investigated the impacts of a learner-centered teaching method-Integration of the Professional Education and Entrepreneurship Education (IPEEE) on teacher self-efficacy based upon Technology Acceptance Model (TAM). Specifically, this work mainly studied the influence of perceived usefulness and perceived ease of use of IPEEE on teacher self-efficacy. Also, this study investigated the effects of perceived usefulness of IPEEE, perceived ease of use of IPEEE, and teacher self-efficacy on teacher's usage intention of IPEEE. Survey was used to collect data. The results indicate that: (1) both perceived usefulness and perceived ease of use of IPEEE exert significantly positive influences on teacher self-efficacy, although perceived usefulness shows a stronger impact; (2) perceived usefulness, perceived ease of use, and teacher self-efficacy have significantly positive effects on teacher's usage intention of IPEEE. Among the three indicators, perceived ease of use exerts the least impact on usage intention. In general, this study extends the application of TAM in the field of higher education and provides empirical evidence for the literature on teacher self-efficacy as well.

Keywords: IPEEE, Teacher self-efficacy, Perceived usefulness, Perceived ease of use

1. INTRODUCTION

In recent years, there have been frequent voices criticizing the classroom in colleges and universities, and the "phubbers" and "sleepers" in college classes have become common occurrences. Colleges and teachers try to reverse this phenomenon by various means. However, the effect is very little, and it becomes a problem. The formation of the unacceptable phenomenon could be attributed to many reasons, among which the traditionally "teacher-centered" teaching model might be the most important one. Regarding "teacher-centered" education, teacher is regarded as the main actor, which leads to low participation and negative learning behavior of students in classroom. A "classroom revolution" is expected to change the "teacher-centered" education to "learner-centered" education [1]. This is actually a teacher-led reform in teaching methodology. Among many teaching methods, the authors of this study choose "IPEEE - integration of professional education and entrepreneurship education" as the research object. This teaching method was first created by the experts of Zingy International Entrepreneurship Education College. They integrated the advantages of various teaching methods at home and abroad, and developed it into a teaching method with entrepreneurial thinking and constructivism as the underlying logic. Entrepreneurship education was fully integrated into professional education, reflecting the learner-centered participatory and co-creative learning model. This work focuses on the impact of IPEEE on teacher self-efficacy

and teaching behavior.

For ordinary college teachers, IPEEE is a new thing and technology that may change their teaching ideas and teaching methods. To some extent, the influencing factors and effects of IPEEE could be explained by the TAM (Technology Acceptance Model), a theory constructed by Fred D. Davis in 1989 [2]. At that time, Davis applied the theory of rational action (TRA) from the social psychology field to examine users' acceptance of information systems and proposed the TAM[2-3]. Subsequently, the TAM has been widely adopted in many research fields to explain the user's acceptance behaviors of new things, especially in the fields of computer and information science. Its extended application fields include online education [4-6], teaching technology [7-8], etc. Based on TAM model, this study aims to reveal the influencing factors for the acceptance of IPEEE by college teachers and its effect on teacher self-efficacy as well.

2. THEORETICAL BACKGROUND

2.1. Technology Acceptance Model

More than 30 years ago, Davis proposed TAM model to explain the decisive factors that computers could be widely accepted by a large number of users at that time and how those factors play roles [2]. TAM model (Fig. 1) reveals two key factors that affect users' acceptance and usage of new things and technologies: perceived usefulness (PU)

and perceived ease of use (PEOU). Perceived usefulness refers to the extent to which users believe that using a particular technology will help them improve their job performance. Perceived ease of use refers to the degree to which users find it effortless or easy to use a particular technology. According to TAM model, perceived ease of

use affects users' perceived usefulness of technology. Perceived usefulness and perceived ease of use work together to influence behavioral intention to use (BI). Actual use (AU, Actual use) is determined by the intention of use.

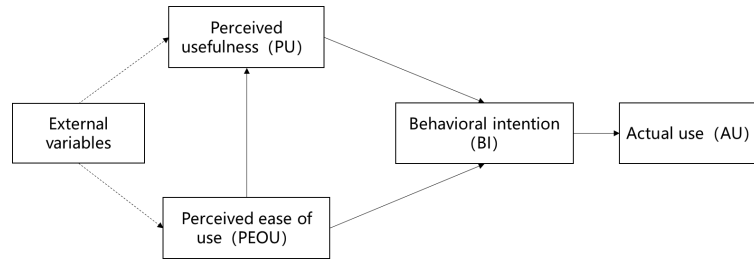


Figure 1. TAM model [2]

2.2. Teacher Self-efficacy

The concept of teacher self-efficacy (TSE) is theoretically derived from Bandura's perceived self-efficacy [9-10]. According to Bandura, perceived self-efficacy refers to the expectation that an individual can complete a certain behavior in a certain situation, and it is the belief, judgment or self- feeling on what level he can complete the task before performing a certain task. Perceived self-efficacy is generally associated with specific fields [9]. Teacher self-efficacy can be described as the concrete embodiment of perceived self-efficacy in the field of education and teaching (i.e., teachers' belief in whether they are confident in teaching related activities) [11-12]. For example, Alliner and other scholars have found that teacher self-efficacy affects teachers' energy in teaching and their desire to achieve teaching objectives [13]. Teachers with high self-efficacy usually show higher ability to plan and organize teaching activities.

3. RESEARCH HYPOTHESES

3.1. Perceived Ease of Use and Perceived Usefulness

Based on TAM model, this study defined teachers' perceived usefulness to IPEEE as that teachers can subjectively perceive that the application of this method will, to a certain extent, contribute to their rapid entry into the working state and improve their teaching level and performance [2]. Therefore, the method is valuable and meaningful. This study defined teachers' perceived ease of use to IPEEE as that teachers can subjectively perceive that the teaching method is easy to use or even can be used skillfully. The significantly positive effect of perceived ease of use on perceived usefulness has been fully demonstrated in education technology [7-8], online learning [5-6] and other fields [4]. In this study, they may

enhance their knowledge to some extent when teachers perceive that IPEEE is simple and easy to use, and then perceived usefulness may positively influence their intention to use this method. On the other hand, the relationship between users' perceived ease of use for technology or products and their intention to use has been ignored in the studies of many scholars including Davis, and insufficient attention has been paid to it [2]. However, IPEEE, as the research object, is a kind of teaching technology that can be mastered and applied by college teachers only after training. Therefore, perceived ease of use for IPEEE is likely to be one of the key factors affecting teachers' intention to use, and therefore it is necessary to propose a direct relationship between the two constructs. Accordingly, the following hypotheses are put forward:

- H1: teachers' perceived ease of use for IPEEE can significantly improve perceived usefulness of this method.
- H2: teachers' perceived ease of use for IPEEE can significantly enhance their intention to use this method.
- H3: teachers' perceived usefulness for IPEEE can significantly enhance their intention to use this method.

3.2. Teacher Self-efficacy (TSE)

Teacher self-efficacy is a teacher's belief in whether he or she is confident in tasks or activities related to teaching [11-12]. It is also an important factor affecting teaching behavior and job performance. This study emphasizes the college teacher's belief in ensuring orderly classroom discipline, controlling students' behaviors that interfere with class, enabling students to complete complex course tasks, stimulating students' interest in the course, etc. Teachers' self-efficacy may be affected by many factors, such as teaching age [14], region [15], different stages in their educational career [16], even whether they have received training, guidance, setting an example [12, 17], etc. In this study, IPEEE is a teaching technology that can be mastered after training and guidance, which has a positive effect on teachers' belief that they are competent for their teaching tasks. To some extent, this effect can be

attributed to the perceived ease of use and perceived usefulness for IPEEE, and the improvement of teachers' self-efficacy may promote their usage intention of IPEEE. Therefore, the following assumptions are put forward:
 H4: teachers' perceived ease of use for IPEEE has a significantly positive impact on teacher self-efficacy.
 H5: teachers' perceived usefulness for IPEEE has a

significantly positive impact on teacher self-efficacy.
 H6: the improvement of teacher self-efficacy has a significantly positive impact on the usage intention of IPEEE.
 Fig.2 depicts the research model based on the above hypotheses.

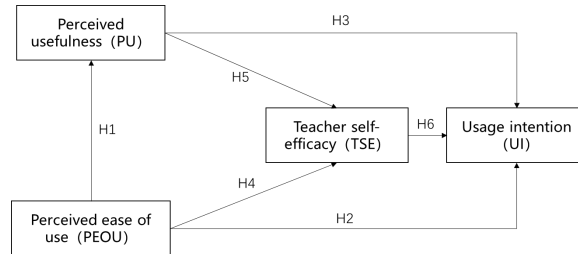


Figure 2. Research model

4. RESEARCH METHOD

In this study, survey was used to collect data.

Measurement items were derived from previous studies with modification to fit into the actual situation of this study (see Table 1 for details). 7-point Likert scales were used for all items. Option 1 is disagree, and 4 is neutral and 7 is completely agree.

Table 1. Measurement Items

Construct	Measurement item	Reference
Perceived ease of use (PEOU)	This teaching method is easy to apply	[2,20]
	This teaching method can easily reach the level of proficiency	
	It's easy for me to learn to apply this teaching method	
Perceived usefulness (PU)	This teaching method is useful for me to improve my teaching level	[2,5,20]
	This teaching method helps me to improve my teaching level more quickly	
	This teaching method helps me get into work quickly	
	Applying this method will help me improve my teaching performance	
	I will find them useful in applying this teaching method	
Teacher self-efficacy (TSE)	I can make sure my class is disciplined	[14,18,19]
	I can control the students' interference with the class	
	I can get students to complete more complicated course tasks	
	I can stimulate students' interest in the course	
Usage intention(UI)	I think applying this method is a good way	[2,5,20]
	I think applying this teaching method will give me a good return	
	I find it pleasant to apply this teaching method	

The subjects of this study are college teachers who have participated in the IPEEE related training at least once. 95 qualified college teachers were invited to participate in the survey. 92 valid questionnaires were obtained, and the effective rate was 96.84%. The sample distribution is shown in Table 2.

Table 2. Subject’s demographic characteristics

Features	Number	Percentage	Features	Number	Percentage
Gender			Professional Title		
Female	72	78.26%	Senior	9	9.78%
Male	20	21.74%	Intermediate	70	76.09%
			Primary	13	14.13%
Age			College Teaching Age		
<30	2	2.17%	<5 years	20	21.74%
30-35	33	35.87%	5-10 years	27	29.35%
35-40	18	19.57%	10-15 years	23	25.00%
40-45	27	29.35%	15-20 years	14	15.22%
45-50	10	10.87%	20-25 years	4	4.35%
>50	2	2.17%	>25 years	4	4.35%
Total	92	100%	Total	92	100%

5. DATA ANALYSIS

In this study, R language was used as data analysis tool, and PLS path modeling was used to test the hypothesis

relationship among perceived usefulness (PU), perceived ease of use (PEOU), teacher self-efficacy (TSE) and teacher's intention to use IPEEE.

First, the reliability of each variable measurement item is tested. As shown in Table 3, it indicates that each variable has acceptable high reliability due to the cross loadings of each factor is higher than 0.7.

Table 3. Cross loadings for variable measurement items

	Perceived ease of use (PEOU)	Perceived usefulness (PU)	Teacher self-efficacy (TSE)	Usage intention (UI)
PEOU01	0.887	0.503	0.392	0.509
PEOU02	0.804	0.271	0.384	0.363
PEOU03	0.744	0.262	0.323	0.388
PU01	0.318	0.869	0.44	0.625
PU02	0.377	0.904	0.631	0.607
PU03	0.5	0.905	0.583	0.671
PU04	0.431	0.862	0.54	0.652
PU05	0.304	0.876	0.489	0.596
TSE01	0.485	0.627	0.899	0.658
TSE02	0.368	0.492	0.897	0.576
TSE03	0.315	0.449	0.871	0.443
TSE04	0.413	0.588	0.911	0.652
UI01	0.463	0.559	0.357	0.816
UI02	0.467	0.733	0.741	0.924
UI03	0.386	0.462	0.505	0.757

Second, the composite reliability (CR) and Cronbach’s alpha (α) were tested to determine the convergent validity. Generally speaking, the convergent validity is higher when the CR and α are not less than 0.70. As shown in Table 4, the CR value and α of each variable in this study are all higher than 0.70, indicating that it has high convergent validity.

Furthermore, the discriminant validity can be obtained by detecting the average variance extracted (AVE) of each variable. Theoretically, the discriminant validity is higher when the square root of AVE is higher than the correlation coefficient between variables. As shown in Table 4, the

values on the diagonal of the table are the square roots of AVE for each variable. It can be seen that each value on the diagonal is higher than the correlation coefficient between variables in the row and column, which indicates that the discriminant validity of the variables in this study is effective.

Table 4. Convergent validity and discriminant validity

	Cronbach's α	CR	Perceived ease of use (PEOU)	Perceived usefulness (PU)	Teacher self-efficacy (TSE)	Usage intention (UI)
Perceived ease of use (PEOU)	0.746	0.856	0.814			
Cont. to Table 4						
Perceived usefulness (PU)	0.93	0.947	0.444	0.883		
Teacher self-efficacy (TSE)	0.918	0.942	0.45	0.613	0.894	
Usage intention (UI)	0.781	0.874	0.524	0.715	0.663	0.835

Notes: Table diagonal value: square root of AVE; Value below diagonal: correlation coefficient between variables.

Furthermore, PLS path model method was used to test the strength and significance of the hypothesis relationship among the variables. Results as shown in Fig. 3, perceived ease of use for IPEEE significantly improved perceived usefulness ($P < 0.001$), with explanatory power of 19.7%, and H1 is supported. Both perceived usefulness and perceived ease of use have significantly positive impacts on teacher self-efficacy, yet perceived usefulness has a more significant effect ($P < 0.001$). Their explanatory

power on teacher self-efficacy reaches 41.5%, and H4 and H5 are supported. Perceived usefulness, perceived ease of use and teacher self-efficacy have significantly positive effects on teachers' intention to use IPEEE. The explanatory power of the three factors on the intention to use IPEEE reaches 61.9%, and H2, H3 and H6 are all supported. Comparatively speaking, the influence of perceived ease of use on usage intention is weaker than perceived usefulness and teachers' self-efficacy.

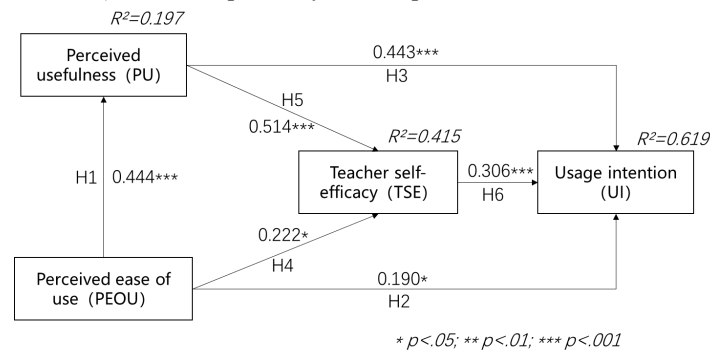


Figure 3. Structural model

6. CONCLUSION

Based on TAM model, this study confirmed the application of IPEEE and the effect of its perceived usefulness and perceived ease of use on college teachers' self-efficacy. Results show that perceived usefulness and perceived ease of use for IPEEE have significantly positive impacts on college teachers' self-efficacy, and the impact of perceived usefulness is higher than that of perceived ease of use. At the same time, perceived usefulness, perceived ease of use, and teacher self-efficacy have significantly positive impacts on the usage intention of IPEEE, and relatively speaking, perceived ease of use has a weak impact on the usage intention.

This study extends the application of TAM model in the field of higher education. Meanwhile, it offers empirical evidence for the theory of teacher self-efficacy. On the other hand, the research conclusion puts forward some practical suggestions for college administrators, teachers and builders of IPEEE.

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