The Influencing Factors of Technology Usage Behavior Intention Among Teachers in Rural Areas: A Case Study of Faku County Middle School in Shenyang City, Liaoning Province, China

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Abstract

This study aims to understand what factors influence vocational college teachers in Objective: To study the impact of six independent variables (Constructivist teaching belief, Perceived ease of use, Self-efficacy, Social influence Subjective norm, Value beliefs) on one dependent variable (Behavioral intention to use technology). In addition, it aims to identify significant differences between variables. Research design, data, and methods: The study utilized the effectiveness of Index of Objective Consistency (IOC) and the reliability of Cronbach's Alpha pilot scale (n=30). Using multiple linear regression method to analyze the effective responses of 100 teachers from three junior high schools in Faku County and verify the significant relationship between variables. Afterwards, a group of 30 teachers received a 14-week strategic plan (SP). Then, compare the quantitative results of the post strategic plan and the pre strategic plan in paired sample t-tests. Result: In multiple linear regression, studies have shown that constructivist teaching belief, perceived ease of use, value beliefs, and social influence have an impact on the behavior of teachers using educational technology. However, subjective norm and self-efficacy did not have a significant impact. Finally, the comparison results of paired sample t-tests indicate significant differences in the teachers' behavioral intention to use technology during the post strategic planning and pre strategic planning stages.

Keywords: Behavioral Intention to Use Technology, Constructivist Teaching Belief, Perceived Ease of Use, Value Beliefs, Self-Efficacy, Social Influence, Strategic Plan

Introduction

Educational technology develops with educational activities and changes with the development of education. The rise of modern computer technology has brought great changes to the international environment, production and lifestyle, and talent demand. Most countries in the world have sensed this change and opportunity, and believe that countries need to master the talents to lead this technology. However, In the Vast agricultural counties and cities of China, many schools and teachers still face many challenges in using educational technology.

Faku County is a typical agricultural county with a total of three middle school, namely East Lake No.1 Middle School, No.2Middle School, No.3 Middle School. The county government unified the construction and use of electronic whiteboards in classrooms in 2013.

Despite the excellent hardware equipment in schools, teachers still face the following difficulties when using education technology:

The first point is that older teachers do not receive training on the use of educational technology when receiving teacher education. They feel certain difficulties and inconvenience in applying and maintaining equipment. Lack of targeted and systematic seeking help after encountering difficulties.

The second point is that after experiencing the epidemic, most teachers have used online teaching methods, but the teaching effectiveness of many difficult subjects has declined, causing many teachers with strict assessment tasks to question whether the use of educational technology can improve teaching effectiveness.

The third point is that teachers not very clear about how educational technology can help students learn, how to improve their teaching level, and what benefits the use of educational technology can bring to themselves. There is also no specialized organization to promote and supervise this.

Therefore, this study used East Lake Middle School in Faku County as a sample to investigate the influencing factors of 100 teachers using educational technology, and designed a 14-week strategic plan to intervene in the influencing factors of teachers using educational technology, in order to improve their use of educational technology.

Literature Review

1. Behavioral intention to use technology

Ajzen and Fishbein (1980) defined the term as the possibility of a customer adopting a technical system. By 1989, Behavioral intention to use technology was defined as: the extent to which users intend to use technology in the future (Davis, 1989). There are three main theories related to technology acceptance behavior intention, namely TAM, TRA and TPB. Affected by relevant theories. Technology is defined as a collection of various tools based on modern computer technology, such as wireless classrooms, interactive whiteboards, digital videos, online media, online learning tools, etc. These tools can be applied by teachers or students, and enhance students' learning experience. (Richey & Klein, 2007).

2. Constructivist teaching belief

Constructivist learning theory is a branch of cognitive psychology. It is developed from the theory of cognitive psychology. It was originally a philosophical thought. Swiss psychologist Piaget first proposed the concept of constructivism in 1972. Piaget (1972) believed that when individuals interact with the outside world, they gradually build knowledge about the outside world, build their own knowledge system, and constantly enrich and improve their own cognitive structure in the process of connecting their existing experience with the outside world's new things.

H1: Constructivist teaching belief (CTB) has significant influence on teachers' behavioral intention to use technology.

3. Perceived ease of use

Davis, a famous American scholar, put forward the Technology Acceptance Model (TAM) in 1989 based on TRA and TPB. Davis（1989) defined as the ease of using a particular information system technology. Sharma and Srivastava (2020) defined perceived ease of use means that users feel it is very easy to use this technology without any additional pressure and specific efforts. Ou (2022) defined it as: the extent to which teachers

think that smart classroom teaching technology is easy to use. Teo (2013) found in the TAM model that perceived ease of use is conducive to the increase of perceived performance, that is, the easier people feel the system is used, the less time and effort will be saved in the use process, so they can complete more work or tasks under the same circumstances.

H2: Perceived ease of use (PEU) has significant influence on teachers' behavioral intention to use technology.

4. Self-efficacy

Self-efficacy is an important concept first proposed by Albert Bandura, a famous psychologist at Stanford University, in the 1970s. Bandura (1977) defined self-efficacy as the degree of confidence that an individual has in his ability to achieve goals. He believed that human behavior is not only affected by behavior, but also affected by cognition on his own behavior ability and behavior effect. Self-efficacy regulates human activities by influencing individual cognitive process, motivation process, emotional process and selection process (Zhong & Wang, 2008).

H3: Self-efficacy (SE) has significant influence on teachers' behavioral intention to use technology.

5. Social influence

Social influence defined an individual’s beliefs about what others will think about the decision to use something, both present and in the future (Ajzen, 1985). Social influence is also one of the variables under the UTAUT model, which is used to explain users' adoption of information technology. According to UTAUT, social influence is defined as individuals who think that their peers, families and social circles are important to them, and that the adoption of information technology is valuable (Venkatesh et al., 2003). It may be your dialogue with friends, or when using the Internet for teaching is not a necessary thing, people around you are using it or think you should use it, which has a great impact on teachers. However, in some cross-cultural studies, it has been found that people of different cultures and races have different social influence.

H4: Social influence (SI) has significant influence on teachers' behavioral intention to use technology.

6. Subjective norm

In 1975, the Social Psychology Research Center introduced subjective norms (Fishbein & Ajzen, 1975). Subjective norms as: a person's opinion that most people who are important to him think that they should or should not perform a certain behavior. Subjective norm is defined as people's views on whether their important people or institutions should implement this behavior, for example, teachers think it is necessary to use educational technology because the management of the school thinks it is necessary (Teo & Lee, 2010). Armitage and Conner (2001) believe that people will be affected by the surrounding groups when they decide certain behaviors, which is related to the following, imitation, obedience and other hearts. Therefore, if important people such as parents and teachers support this behavior, he may want to do it more or less.

H5: Subjective norm (SN) has significant influence on teachers' behavioral intention to use technology.

7. Value beliefs

Pajares (1992) teachers' beliefs refer to the views that teachers hold and deeply believe in education and teaching work, teachers' role, the nature of curriculum, students' role, students' learning and other relevant educational factors in the school teaching situation Kagan (1992) pointed out that teachers' beliefs are stable and not easy to change. Therefore, with the development of science and technology, to change teachers' behavior, we must first change teachers' beliefs. Miller (2017) also pointed out in his research that the intrinsic value of community university teachers' use of technology in the classroom significantly predicted their attitudes towards the use of teaching technology.

H6: Value beliefs (VB) has significant influence on teachers' behavioral intention to use technology.

Research Methodology

1. Research Framework

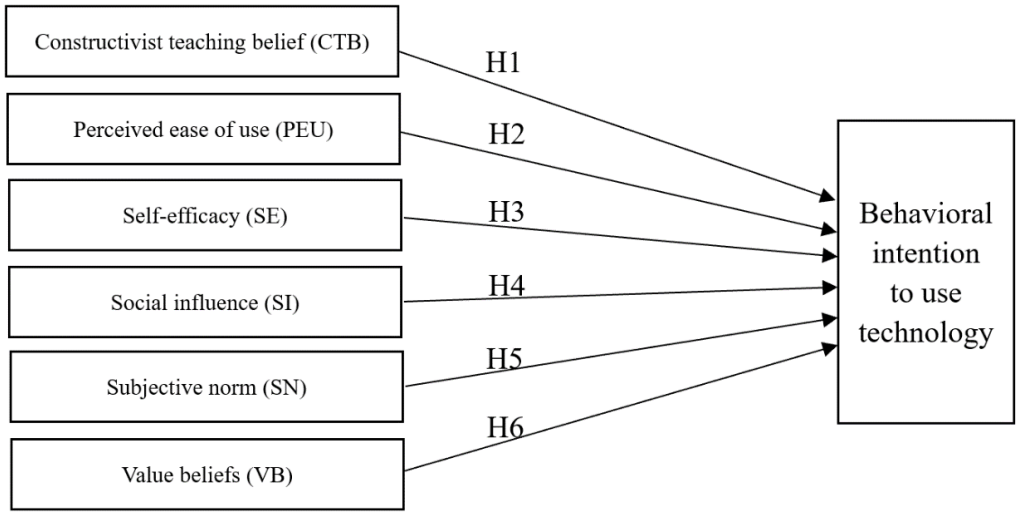

Figure 1: Conceptual Framework

H1: Constructivist teaching belief (CTB) has significant influence on teachers' behavioral intention to use technology.

H2: Perceived ease of use (PEU) has significant influence on teachers' behavioral intention to use technology.

H3: Self-efficacy (SE) has significant influence on teachers' behavioral intention to use technology.

H4: Social influence (SI) has significant influence on teachers' behavioral intention to use technology.

H5: Subjective norm (SN) has significant influence on teachers' behavioral intention to use technology.

H6: Value beliefs (VB) has significant influence on teachers' behavioral intention to use technology.

2. Data Collection

The research process includes four different stages. In the first stage, a survey was conducted on the entire study population (n=100) to collect data on the proposed conceptual framework. Subsequently, strict testing was conducted on all hypotheses using multiple linear regression to determine their significance at a p-value threshold of <0.05. Therefore, supported hypotheses were retained, while hypotheses that did not meet the criteria were removed.

The second stage involves conducting a pre strategic plan survey among 30 teachers who voluntarily participate in this plan within the supported assumptions.

The third stage introduces the implementation phase of the strategic plan, with 30 teachers participating in a 14-week strategic plan.

In the fourth stage, 30 teachers conducted another survey and generated the data required for paired sample t-test analysis to compare the results of the pre strategic plan and post strategic plan. This comprehensive process allows for a thorough review of the research objectives and hypotheses.

3. Research Population, Sample Size, and Sampling Procedures

3.1 Research Population

The research subjects of this article come from three middle schools in Faku County, Shenyang City, Liaoning Province, China: East-Lake No.1 Middle School, East-Lake No.2 Middle School, and East-Lake No.3 Middle School.

A random survey was conducted on teachers at East Lake Middle School, and its reliability was verified through a pilot test. Subsequently, researchers conducted a survey with 112 teachers from three School, obtaining 100 valid responses. Finally, the researchers selected 30 teachers from East Lake No.2 Middle School who voluntarily participated in the strategic plan for intervention.

3.2 Sampling Procedures

Researcher conducted several sampling and relating sampling procedures were as follow:

Sampling 1: Sampling for pilot survey and pilot test

Sampling 2: Sampling for Pre-survey

Sampling 3: Sampling for Strategic Planning

4. Research Instruments

4.1 IOC Results

The researchers invited three independent experts to implement the project goal consistency index, one of whom is a Thai professor and the other two are Chinese experts. All three experts have been teaching in their teaching positions for many years and have published multiple educational articles. In this IOC process, the independent expert mark +1 indicates consistency, 0 indicates questionable, and -1 indicates inconsistency. In this study, all questionnaire items were greater than 0.67, so the researchers retained all questionnaire items.

4.2 Pilot survey and Pilot test results

Researchers randomly conducted a pilot survey on 30 teachers, asking them to fill out a survey questionnaire and provide feedback. Afterwards, researchers conducted Cronbach's Alpha internal consistency reliability test, which should have a value equal to or greater

than 0.7 (Nunnally & Bernstein, 1994). Therefore, the following table presents the high reliability approval results for each structure

Table 1: Pilot Test Result

Variables	No. of Items	Sources	Cronbach's Alpha	Strength of Association
Behavioral intention to use technology.	3	Huang et. al. (2021)	0.702	Acceptable
Constructivist teaching belief	7	Lavina Sharma and Mallika Srivastava (2019)	0.822	Good
Perceived ease of use	4	Huang et. al. (2021)	0.821	Good
Self-efficacy	4	Lavina Sharma and Mallika Srivastava (2019)	0.722	Acceptable
Social influence	5	Lavina Sharma and Mallika Srivastava (2019)	0.749	Acceptable
Subjective norm	6	Timothy and Fang Huang (2018)	0.856	Good
Value beliefs	5	Lavina Sharma and Mallika Srivastava (2019	0.869	Good

Research Finding

Empirical Results and Data Analysis

Results of multiple linear regression

Researchers conducted multiple linear regression (MLR) on a total of 100 survey questionnaire results and identified whether each hypothesis was supported. There are six research hypotheses, and based on variance inflation factor (VIF) analysis, it can be concluded that multicollinearity is not a problem because VIF values are below 5 (Hair et al., 1995). In a multiple linear regression model with six independent variables, R-squared (R^2) Can account for 80.6% of creativity variability.

Table 2: The multiple linear regression of six independent variables on creativity

Variables	Standardized Coefficients Beta	t	P-value	VIF	R	R Square
Constructivist teaching belief	0.242	3.314	0.001	2.56	0.898	0.806
Perceived ease of use	0.224	2.530	0.013	3.75		
Self-efficacy	-0.067	-0.959	0.340	2.55		
Social impact	0.301	3.101	0.003	4.54		
Subjective norm	0.007	0.111	0.912	1.92		
Value beliefs	0.285	3.435	<.001	3.31		

Therefore, H3: Self-efficacy (SE) has no influence on teachers' behavioral intention to use technology (β=-0.067, P<0.340).H5: Subjective norm (SN) has no influence on teachers' behavioral intention to use technology (β=0.007, P<0.912). These two hypotheses were not supported in multiple linear regression (MLR) analysis, and the results showed rejection of these two hypotheses. H1: Constructivist teaching belief (CTB) has significant influence on teachers' behavioral intention to use technology (β=0.242, P<0.001). H2: Perceived ease of use (PEU) has significant influence on teachers' behavioral intention to use technology (β=0.224, P<0.013). H3: Social influence (SI) has significant influence on teachers' behavioral intention to use technology (β=0.301, P<0.003). H6: Value beliefs (VB) has significant influence on teachers' behavioral intention to use technology (β=0.285, P<0.001). The four are supported by the multiple liner regression (MLR) results. Therefore, the hypotheses were developed in stage based on multiple linear regression analysis's results. Afterwards, Strategic Planning was conducted to follow below hypotheses:

H7: There is a significant difference in behavioral intention to use technology between Pre-Strategic Plan and Post-Strategic Plan stages.

H8: There is a significant difference in constructivist teaching belief between Pre-Strategic Plan and Post-Strategic Plan stages.

H9: There is a significant difference in perceived ease of use between Pre-Strategic Plan and Post- Strategic Plan stages.

H10: There is a significant difference in social influence between Pre-Strategic Plan and Post-Strategic Plan stages.

H11: There is a significant difference in value beliefs between Pre-Strategic Plan and Post-Strategic Plan stages.

H12: There is a significant difference in behavioral intention to use technology between Pre-Strategic Plan and Post-Strategic Plan stages.

Implementation of strategic plans

This strategic plan lasts for 14 weeks, from the 1th to the 3th week, in order to enhance the values and beliefs of teachers and strengthen constructivist teaching belief, including reading out the honors that schools and individuals have received for educational technology and watching excellent courses on the use of educational technology. The 5th to 7th weeks is aimed at improving the perceived ease of use of teachers, using collective explanations and individual assistance forms to explain the use of teacher technology and help each teacher solve their own problems. The 8th to 12th week is a form of group mutual assistance, aimed at enhancing social influence and helping teachers establish mutual aid groups, so that they can receive timely help when encountering problems in the future. The 13th to 14th weeks is the achievement display stage, showcasing the lesson preparation results in this strategic plan, using the results to enhance teachers' recognition of the use of educational technology. The specific weekly implementation is shown in the table below:

Table 3: Specific Implementation Table of Strategic Plan

No.	Time and Duration	Implementation Keywords
1	Week1	Explain the importance of educational technology by school leaders. Announce the honors received by the school for using educational technology within 1-2 years. Overall explanation of what assistance this study can provide to teachers and the steps to be taken.
2	Week2	Observing, learning, and discussing excellent educational technology public courses
3	Week3	Guide teachers to recognize the advantages and disadvantages of using educational technology. Teachers share their confusion and unforgettable events in teaching
4	Week4	Donate educational technology tools to schools to reduce teachers' burden of lesson preparation, and explain their usage methods for teachers to apply in practice.
5	Week5	Recommend practical educational network resources and guide teachers to use them
6	Week6-7	Provide separate guidance for teachers' questions and difficulties.
7	Week8-12	Group communication, and each member optimizes their own courseware.
8	Week13-14	Teachers share excellent courses and summarize them

Researchers conducted paired sample t-test analysis on the four variables to determine whether there were differences between them in the pre-strategic plan and post-strategic plan stages. In summary, the table below illustrates the paired sample t-test analysis for the four variables, as follows:

Table 4: illustrated the results of paired-sample t-test analysis of pre-strategic plan(SP) and post- strategic plan (SP)comparison per follows:

Variables	Mean	SD	SE	p-value
Behavioral intention to use technology				
Pre-SP	3.36	0.632	0.1153	<0.01
Post-SP	4.43	0.412	0.0752	
Constructivist teaching belief				
Pre-SP	3.89	0.441	0.0804	<0.01
Post-SP	4.56	0.388	0.0708	
Perceived ease of use				
Pre-SP	3.45	0.562	0.1027	<0.01
Post-SP	4.21	0.496	0.0906	
Social influence				
Pre-SP	3.58	0.588	0.1074	<0.01
Post-SP	4.48	0.429	0.0783	
Value beliefs				
Pre-SP	3.53	0.828	0.1511	<0.01
Post-SP	4.41	0.497	0.0907	

According to paired-sample t-test results demonstrated above; researcher came up with following conclusions. First, all five variables had significant mean difference between post-SP stage and pre-SP stage. Second, researcher found out that there was significant increase on teachers' behavioral intention to use technology between the pre-SP and post-SP phases.

Suggestion

Although this study provides some research value on what factors affect teachers' use of educational technology and how to improve their willingness to use educational technology. But its limitations must be acknowledged to guide future research in this field.

Sample size and demography: This study collected 100 valid samples, but the sample size is limited for understanding the vast group of Chinese teachers. Therefore, in future research, the total sample size should be expanded and more teachers from different educational backgrounds, age groups, and cultural backgrounds should be selected to evaluate the generalizability of the research results.

Variables and Relationships: The focus of this study is on six specific independent variables and one dependent variable. Future research can explore more independent variables and their potential interactions, providing a more comprehensive perspective on the factors that influence Teachers' behavioral intention to use technology.

Conclusion

Although most Chinese teachers have conducted teaching in the form of online courses during the epidemic. However, in many rural areas with inadequate facilities, the popularization of online courses has suddenly arrived, and many teachers have not been prepared for it. The epidemic will pass, but the information age is inevitable. Our students and teachers should have the ability to apply advanced electronic teaching equipment

and software. This article delves into the factors that affect teachers' use of educational technology. How to intervene in these factors to improve teachers' acceptance of educational technology.

The electronic teaching equipment in schools should be regularly optimized. The maintenance of equipment is a relatively professional task, so when there are problems with the equipment, many teachers will feel helpless, which greatly affects the perceived ease of use. Therefore, schools should have dedicated personnel regularly optimize teaching equipment.

The training for teachers to use educational technology should be detailed. When training older teachers, it is necessary to provide prompts and annotations for each step, and the training content should be segmented and start with basic training. The difficulties encountered during the teacher training process should be guided promptly, and the steps should be repeated multiple times.

Establishing mutual assistance groups can greatly assist teachers. Teachers also have a need for friendship and recognition in their work, so they are also influenced by those around them. If this group is led by teachers who are good at using educational technology, other teachers will feel that they can receive some support and assistance. It can motivate teachers and reduce anxiety. And enhance teachers' self-awareness towards problem-solving.

Training should focus on the transformation of results. Training should be provided to help teachers design micro courses that can participate in competitions, or excellent courses at various levels using educational technology, or teaching plans for use during classes. This can allow teachers to see their true changes and the results that can truly help them, thereby consolidating their use of educational technology.

Emphasizing the incorporation of constructivist teaching beliefs, the core is student-centered, emphasizing the active exploration, discovery, and appreciation of knowledge by students. Teachers are the leaders and helpers of student learning. Building such values can free teachers from the mindset of "only fraction theory" and prioritizing knowledge dissemination efficiency, thus attempting new teaching methods and techniques.

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