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Study on Learning Satisfaction of Financial Management Courses Based on Project-Based Flipped Classroom (PjBFC)

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Abstract: In recent years, social media, smartphones, and computers have been increasingly used in classrooms. The traditional education model has been greatly challenged. This study combines the two teaching methods of project-based learning and flipped classroom into one to form the teaching model of PjBFC, and studies the students' learning satisfaction with this teaching method through TAM model. A questionnaire survey was conducted on 163 students and the SEM model was used for analysis. The results show that perceived ease of use has a positive impact on perceived usefulness. Both perceived ease of use and perceived usefulness have a positive impact on students' learning satisfaction. Perceived usefulness has a mediating role between them. PjBFC is very helpful in improving students' interest in learning.

Keywords: Project-based Flipped Classroom; Learning Satisfaction; Perceived Usefulness; Perceived Ease of Use.

1. Introduction

In the 21st century, all aspects of our lives are affected by information, technology, and the Internet. The traditional education model can no longer meet the needs of students and teaching. Project-based learning and flipped classroom teaching have been gradually introduced into classroom teaching. Scholars have not yet reached a unified definition of flipped classroom [1]. It is a teaching method that reverses the traditional roles of the classroom, allowing students to start learning outside the traditional classroom and continue, strengthen and supplement the traditional classroom during normal class time [2]. "Flipped classroom" uses asynchronous practice questions and teaching videos as homework, while group problem solving is carried out in class [3] [4] [5]. Project-based learning is a method that allows learners to participate in the design, problem solving and decision-making process [6]. In PBL, students are the main actors, and the role of the teacher is to facilitate learning rather than provide knowledge. Therefore, students have the opportunity to learn independently over a wide period of time and finally present their results [7]. PBL emphasizes active, interactive and collaborative learning, which is different from the traditional method where students passively listen to lectures [8] [9] [10]. Project-based learning (PBL) has been adopted as a teaching method to promote student inquiry and cognitive growth [11]. At the national level, Taiwan has launched a curriculum reform to encourage students to have PBL-style learning opportunities. However, both methods have disadvantages. PjBL requires a lot of time for discussion and guidance. The FC method requires student supervision when watching videos. The PjBFC method, which combines the two, makes up for the shortcomings of both. Flipped classroom teaching can put the time spent on PBL before class through online learning. Project-based learning can urge students and motivate them to complete their learning. Therefore, PjBFC is a better learning model because it combines the two advantages [12]. According to Paristiowati, Erdawati and Nurtanti, PJBFC can benefit students and promote learning enthusiasm and autonomous learning [13]. In addition, some scholars have found that the flipped classroom method can promote learning outcomes, improve students' performance, and optimize the face-to-face time of actual learning activities, which shows that students and educators are highly satisfied [14] [15]. However, in the financial management course, there are few articles that study the impact of PJBFC's teaching methods on students' learning satisfaction.

This paper applies the learning method of PJBFC to the financial management classroom. According to the Technology Acceptance Model (TAM) model, the relationship between perceived ease of use, perceived usefulness and learning satisfaction is studied.

2. Literature Review and Hypothesis

2.1. Perceived Usefulness & Perceived Ease of Use

The goal of this paper is to study the student satisfaction of the PJBFC method in the financial management classroom, based on the technology acceptance model (TAM) to explain a person's general and specific acceptance of a certain technology [16]. According to this criterion, people's beliefs, attitudes or tendencies towards technology will have an impact on the use of technology. According to the figure below, the TAM model proposes and empirically proves that perceived utility (UP), perceived ease of use (FUP), enjoyment (PD), attitude towards use (ACU) and intention to use (UI) are the most critical factors in the process of technology adoption and system use [17]. There have been many studies that have proven that perceived ease of use has an impact on perceived practicality. Perceived ease of use has a positive impact on the perceived practicality of online learning for Islamic religious education teachers, thereby improving teaching efficiency and student graduation rate [18]. Perceived ease of use has a positive impact on perceived

practicality, which supports the significant relationship between the two factors [19]. This paper makes some modifications on this model and uses two variables: perceived usefulness and perceived ease of use to study learning satisfaction.

2.2. Learning Satisfactory

Perceived usefulness and ease of use play a vital role in determining students' satisfaction with online learning. Studies have shown that perceived usefulness has a significant positive impact on students' satisfaction and attitude towards online learning [19] [20]. Moreover, perceived ease of use also influences people's attitude towards online learning, which in turn affects students' satisfaction [19]. Moreover, the effectiveness of teaching professional education students through online platforms is significantly affected by the ease and usefulness of online learning, which in turn increases graduation rates [21]. Tuffahati and Nugraha found that perceived usefulness and ease of use significantly enhance learning motivation, which indicates a positive impact on learning satisfaction with Google Classroom [22]. Bahaj, Aljaaidi and Ahmed found that perceived usefulness and ease of use had a positive impact on students' actual use of e-services, providing support for the TAM model in the context of business schools [23]. These findings highlight that when designing and implementing online learning systems, both usefulness and ease of use must be considered to improve student satisfaction and overall learning outcomes.

2.3. Conceptual Framework & Hypothesis

Based on the above research, the conceptual framework and hypothesis of this paper are as follows:



Fig 1. Conceptual Framework

Hypothesis 1: Perceived ease of use has a positive impact on learning satisfaction. (PEU→LS)

Hypothesis 2: Perceived ease of use has a positive impact on perceived usefulness. (PEU→PU)

Hypothesis 3: Perceived usefulness has a positive impact on learning satisfaction. (PU→LS)

Hypothesis 4: Perceived usefulness has a mediating effect on perceived ease of use and learning satisfaction. (PEU→PU→LS)

3. Methodology

3.1. Teaching Method Design

The traditional classroom teaching method is mainly teaching, and students discuss, practice and complete homework or tests after class. This study focuses on subverting the teaching method of traditional classrooms and combining the flipped classroom and project-based learning methods. According to the method [24] for students who are exposed to the hybrid project-based learning-flipped classroom teaching method, they must watch video lectures and take online quizzes before class. Therefore, the course will not be spent on covering theories, but time will be spent on discussions and demonstrations so that students can have a better perspective on the practical application of theories. Therefore, the flipped classroom of this study consists of two parts: one is to form interactive group activities inside the classroom, and the other is to study the course directly through the Internet outside the classroom. Students will watch the course videos designated by the teacher before class, and then discuss, practice and complete homework in the classroom. Project-based learning requires each group to conduct research on companies around the school. The content of the research includes the company's financial situation, the problems encountered and possible solutions. The subjects of this study are undergraduate students of investment in this school. They need to study a 32-hour financial management course. Groups of 3-4 people in each group are used to implement teaching methods such as group guidance, group discussion, and group homework. In the last week, the group needs to compile a report on the research results and make a presentation.

3.2. Research Design

Table 1. Operational Definition and Questions of Constructs

Construct	Operational definition	Questions	Source
Perceived usefulness (PU)	Students believe that the project-based-flipped classroom learning method is very helpful in acquiring new knowledge.	PU1: This way of learning in class enriches learning activities. PU2: This way of learning in class is very helpful for me to acquire new knowledge. PU3: The learning mechanism provided by this way of learning in class makes the learning process smoother. PU4: This way of learning in class helps me learn better. PU5: This way of learning in class is more useful than the traditional computer classroom.	(Hwang, Yang, & Wang, 2013) [30]
Perceived ease of use (PEU)	Students found the project-based-flipped classroom learning method easy to use.	PEU1: The kind of operating system by this way of learning in class is not difficult for me. PEU2: It only took me a short time to fully understand how to apply this way of learning in class. PEU3: The learning activities in this way of learning in class are easy to understand and follow. PEU4: I quickly learned to apply this way of learning in class.	(Hwang, Yang, & Wang, 2013) [30]
Learning satisfactory (LS)	Students' subjective satisfaction with the project-based-flipped classroom learning model.	LS1: I am satisfied with this way of learning in class. LS2: If I still have the opportunity to apply this way of learning in class, I will be happy to do so. LS3: I feel very satisfied with this way of learning in class. LS4: I think this way of learning in class satisfies my learning needs very well. LS5: I will try to apply this way of learning in class as much as possible to study courses.	(Sun et al., 2008) [31]

After the semester was completed, a questionnaire survey was conducted on all students who adopted the hybrid project-based learning-flipped classroom teaching method, and the questionnaire survey was analyzed using structural equation modeling. Least squares structural equation modeling (PLS-SEM) is an analytical technique used to detect or build predictive models. In particular, it is superior to the general linear structural relationship model for causal model analysis between latent variables and is very suitable for exploratory research [25] [26]. Compared with covariance-based structural equation modeling (CB-SEM), PLS-SEM is more suitable for small sample analysis. PLS-SEM is mainly used to detect whether the causal relationship has a statistically significant mutual linear relationship. It is more suitable for the construction of theoretical models. This study uses PLS-SEM as a method to study the relationship between the two. Bentler and Chou, Kline suggest that the sample size should be 10 times the number of parameters (ideally 20 times), and a sample size less than 5 times the number of parameters is insufficient for significant model effect testing [27] [28]. This study comprises 14 questions, and a total of 163 questionnaires were collected, meeting the standard.

The questionnaire was answered using a 5-point Likert scale (1. Strongly Disagree, 2. Disagree, 3. Somewhat Agree, 4. Agree, 5. Strongly Agree). This study adopted the questionnaire items from Huang [29]. The specific definitions and items for perceived usefulness (5 items), perceived ease of use (4 items), and learning satisfaction (5 items) are shown in the table 1.

4. Results

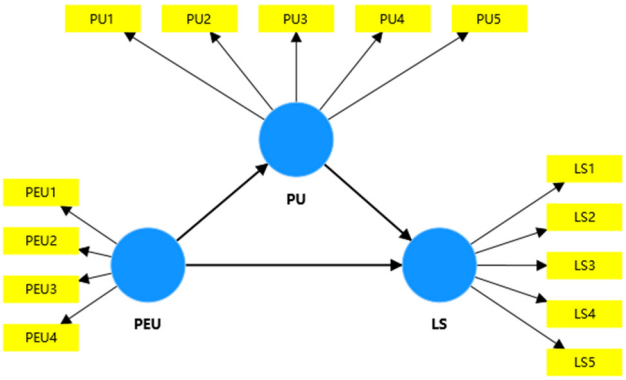


Fig 2. Research Model

4.1. Measurement Model

Table 2. Outer Loading

	LS	PEU	PU
LS1	0.739		
LS2	0.771		
LS3	0.755		
LS4	0.740		
LS5	0.845		
PEU1		0.868	
PEU2		0.842	
PEU3		0.816	
PEU4		0.849	
PU1			0.750
PU2			0.775
PU3			0.797
PU4			0.732
PU5			0.775

First, a reliability and validity analysis of the measurement model was conducted, focusing on factor loadings, VIF values, reliability, and discriminant validity.

(1) Outer loading. Outer loading refers to "the extent to which each of the items in the correlation matrix correlates with the given principal component." None of the items in this study had outer loadings below the recommended value of 0.50 [32]. The outer loadings of the model range from 0.732 to 0.868. Therefore, no items were removed.

(2) The variance inflation factor (VIF) statistic is used to assess multicollinearity among the indicators [33]. A tolerance value of 0.2 or higher, or a VIF value of 5 or lower, indicates no collinearity issues among the indicators [34]. In this study, all VIF values were less than 5, indicating the absence of collinearity problems.

Table 3. Variance Inflation Factor

Construct	Variance Inflation Factor
LS1	1.802
LS2	1.906
LS3	1.919
LS4	1.784
LS5	2.407
PEU1	2.322
PEU2	2.058
PEU3	1.884
PEU4	2.061
PU1	1.857
PU2	1.946
PU3	2.012
PU4	1.712
PU5	1.824

(3) According to Marks and Karkouti, reliability is defined as the degree to which a measuring instrument is stable and consistent [35]. The two most commonly used methods for establishing reliability are Cronbach's alpha and composite reliability (CR). A Cronbach's alpha coefficient greater than 0.7 generally indicates good internal consistency of the questionnaire. Composite reliability assesses the consistency of variables within a facet and typically should be greater than 0.7 [36]. As shown in Table 4, both Cronbach's alpha and composite reliability values meet the criteria.

(4) Convergent validity refers to the extent to which multiple measures of the same concept agree. The idea is that two or more measures of the same construct should correlate highly if they are valid measures [37]. For convergent validity, the average variance extracted (AVE) for each construct should be greater than 0.50 [34]. The AVE values in this study range from 0.587 to 0.712 (Table 4), which meets the requirement.

(5) Discriminant validity refers to the extent to which measures of different concepts are distinct. Henseler, Ringle, and Sarstedt demonstrated through simulation studies that traditional methods do not reliably detect a lack of discriminant validity in common research scenarios [38]. Therefore, these authors proposed an alternative method, HTMT, to analyze discriminant validity, which was also used in this study. Kline suggested a threshold of 0.85 or less [39], while Teo, Tsai, and Yang (2013) recommended a more liberal threshold of 0.90 or less [40]. As shown in Table 5, the heterotrait-monotrait ratio values met the criterion.

Table 4. Cronbach's alpha, Composite Reliability, and Average Variance Extracted

Construct	Cronbach's alpha	Composite reliability	Average variance extracted
LS	0.829	0.830	0.594
PEU	0.865	0.866	0.712
PU	0.824	0.825	0.587

Table 5. Heterotrait - Monotrait Ratio (HTMT)

	LS	PEU	PU
LS			
PEU	0.789		
PU	0.878	0.813	

4.2. Structural Model

The structural model requires an evaluation of predictive power, predictive relevance, and goodness of fit following the use of the repeated indicator approach to reduce the model's dimensionality. Afterward, path analysis is performed to test the hypotheses.

(1) Predictive Power

The determination coefficients R square and f square in PLS are commonly used to measure the predictive power of the structural equation model. Research by Hair Jr., Babin, and Anderson and others indicated that R square has three critical values: 0.25, 0.5, and 0.75, representing weak, medium, and strong explanatory power, respectively [41]. The effect size f square represents the change in R square after removing specific exogenous variables from the model. If $0.02 < f^2 < 0.15$, it indicates a small effect; if $0.15 < f^2 < 0.35$), it indicates a medium effect; and if $f^2 > 0.35$, it indicates a large effect [42].

As shown in Table 6, the R square value for learning satisfaction is 0.593, and the R square value for perceived usefulness is 0.474, indicating both have medium explanatory power. Overall, the conceptual model exhibits a moderate degree of explanatory power. Regarding f square, the effect size of perceived ease of use on learning satisfaction is 0.124, indicating a small effect; the effect size of perceived ease of use on perceived usefulness is 0.900, indicating a large effect; and the effect size of perceived usefulness on learning satisfaction is 0.354, indicating a large effect. In summary, this model demonstrates substantial explanatory power.

(2) Predictive Relevance

Table 6. Explanatory Power

Predictors	Outcomes	R square	f square	Q square
PEU	PU	0.474	0.900	0.464
	LS	0.593	0.124	0.442
PU			0.354	

To evaluate the correlation between the endogenous factor and its indicators, Stone-Geisser's Q square value can be assessed [43] [44]. Henseler, Ringle, and Sinkovics suggested that the PLS path model performs better than the simplest benchmark if all Q square values are greater than 0 [45]. Values of 0.02, 0.15, and 0.35 indicate weak, moderate, and strong degrees of predictive relevance, respectively. As shown in Table 6, the predictive relevance for perceived usefulness is moderate (0.464), and the predictive relevance for learning satisfaction is also moderate (0.442).

(3) Goodness of Fit

The normed fit index (NFI) is another measure used to evaluate the goodness of fit, with values closer to 1 indicating a better fit. In this study, the SRMR value is 0.084 and the NFI value is 0.784. Although the SRMR slightly exceeds the recommended threshold, the results are generally acceptable based on these criteria.

Table 7. Model Goodness of Fit

Fit summary	Estimated model
Standardized root means square residual	0.084
d_ULS	0.745
d_G	0.281
Chi-square	275.693
Normed fit index	0.784

(4) Path Coefficient Analysis

The results revealed that perceived ease of use has a positive effect on learning satisfactory (β=0.310, t value=4.639, p value=0.000). Perceived ease of use has a positive effect on perceived usefulness (β=0.688, t value=16.706, p value=0.000). Perceived usefulness has a positive effect on learning satisfactory (β=0.523, t value=9.270, p value=0.000). Thus, the hypotheses H1, H2, and H3 are supported.

Table 8. Direct Relationship Results

Hypotheses	Path coefficient	$\bar{X}$	SD	t values	Findings
H1: PEU →LS	0.310***	0.306	0.067	4.639	Supported
H2: PEU →PU	0.688***	0.691	0.041	16.706	Supported
H3: PU →LS	0.523***	0.529	0.056	9.270	Supported

Note: *** means p value ≤ 0.001

Mediation analysis was performed to assess the mediating role of perceived usefulness. The results (see table 9) revealed significant partial mediating role of perceived usefulness (H4: β=0.360, t value=7.483, p value=0.000). The total effect of perceived ease of use on learning satisfactory was significant (β=0.670, t value=16.957, p value=0.000). The ratio of indirect effects to the total effect is 53.73%, which means perceived usefulness indirect affects learning satisfactory accounting for 53.73%. Hence, perceived usefulness partially mediates the relationship between perceived ease of use and learning satisfactory.

Table 9. Mediating Relationship Results (H4)

Total effect (PEU→LS)	Direct effect (PEU→LS)	Indirect effect (PEU→PU→LS)				Findings
Coefficient	Coefficient	Coefficient	SD	t value	VAF	Supported
0.670***	0.310***	0.360***	0.048	7.483	53.73%	

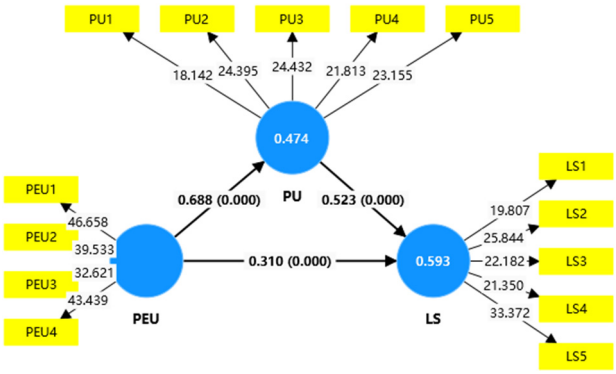


Fig 3. Path coefficient, p values, t values and R square

5. Conclusion

This paper studies the learning satisfaction of the teaching mode of project-based learning-flipped classroom. Based on the TAM model, the relationship between students' perceived ease of use, perceived usability and students' learning satisfaction is explored. The study shows that perceived ease of use and perceived usability have a positive impact on students' interest in learning. Perceived ease of use has a positive impact on perceived usability. Perceived usability has a partial mediating role. Conclusion The mixed teaching mode of project-based learning-flipped classroom has a great effect on stimulating students' interest in learning, and can also greatly improve students' learning enthusiasm and satisfaction. Students' willingness to learn is very important for learning satisfaction, which shows that the teaching methods and strategies implemented by teachers during teaching are very important, and they play a key role in maintaining learning progress and promoting the achievement of goals at each stage. The hybrid teaching mode is very helpful for learning.

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