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Factors Affecting Acceptance for Online Classroom Learning of Qiandongnan Nationalities Polytechnic Students

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Abstract: The "Internet Plus" education model has integrated online classroom learning as a standard element of study in vocational college curricula. It is essential to increase the motivation of vocational students to participate in online learning to ensure the efficacy of online teaching. Therefore, it is essential to comprehend the determinants that influence the acceptance of online classroom learning. This study focuses on students from Qiandongnan Nationalities Polytechnic. It incorporates four external variables based on the TAM theory model and constructs a research model to investigate the factors influencing online classroom learning and how these components are interconnected. A survey was conducted to collect data from 375 students. The study's findings suggest that Performance Expectancy, Teacher Role, Information Quality, System Quality, Perceived Usefulness, and Perceived Ease Of Use are positively associated with the behavioral intention to adopt online classroom learning. Perceived Usefulness and Perceived Ease of Use significantly and positively affect the intention to accept online classroom learning. Teacher Role and System Quality significantly and positively influence both Perceived Usefulness and Perceived Ease of Use. Information Quality significantly and positively affects Perceived Usefulness but does not significantly and positively affect Perceived Ease of Use. Performance Expectancy does not significantly and positively impact either Perceived Usefulness or Perceived Ease of Use.

Keywords: Online classroom learning, Higher vocational students, Acceptance, TAM

1. Introduction

The integration of the Internet and informatization is progressing quickly in China, particularly in the fields of general and higher education. This trend has significantly contributed to the advancement of higher vocational education. The "China Education Modernization 2035" plan, released by the Ministry of Education in February 2019, clearly states that the informatization of vocational education is essential to nurture highly skilled talents. The aspect of educational informatization requires strengthening and is considered a vital component of overall educational technology efforts. The plan promotes the proactive advancement of digital campus infrastructure in vocational institutions, to improve teaching, practical training, research, management, and services through the use of information technology. This will help facilitate the transformation of talent development paradigms.

Qiandongnan Nationalities Polytechnic has fully implemented a blended teaching model utilizing three digital information platforms: the Vocational Education Digital Learning Center, the Vocational Education Cloud, and the Superstar Learning App. The institution has developed over 900 online courses and more than 600 hybrid courses, gradually constructing an open "Internet Plus" smart classroom environment. Nevertheless, despite the widespread promotion of online classrooms, students face difficulties in adjusting and being accepted in their online learning experiences. Especially in the realm of online education, the abundance of available courses, diversification of content, and complexity of educational resources have posed challenges for certain students in terms of adaption, thus directly influencing the efficacy of their online learning.

The acceptance of students is a crucial factor that significantly influences the efficacy of online teaching. The benefits and functions of online learning can be realized only when students wholeheartedly embrace this mode of learning and are willing to adopt it,This will lead to the transformation of future educational methods and the enhancement of online teaching quality. Consequently, this research has systematically examined and evaluated the various factors that influence learners' willingness to accept online learning. It has identified Performance Expectancy, Teacher Role, Information Quality, and System Quality as the external factors that influence the acceptance of online learning. The study, grounded in the TAM theoretical model and including the aforementioned four factors, has built a model to investigate the influence of these factors on the acceptance of online classroom learning, with students from Qiandongnan Nationalities Polytechnic as the subjects of the study, to analyze the impact of these factors on the acceptance of online classroom learning.

2. Literature Review

2.1 Technology Acceptance Model

In 1989, Davis applied the Theory of Reasoned Action and the Theory of Planned Behavior to the field of information systems to elucidate the process by which users accept information technology. This led to the formulation of the Technology Acceptance Model (TAM). In the TAM, Davis identified system design characteristic variables as external variables that serve as the initial determinants influencing individuals' decisions to utilize an information system. These variables have a direct influence on individuals' decisions to use information systems by influencing their Perceived Ease of Use and Perceived Usefulness. The users' attitudes toward using the information system are determined by the Perceived Usefulness and Perceived Ease of Use collectively. These attitudes, in conjunction with Perceived Usefulness, influence users' Behavioral Intention to Use the information system, Ultimately, this intention determines the actual usage behavior of the system. As shown in figure 1.

With the ongoing development and enhancement of research, a variety of models such as TAM2, UTAUT, and TAM3 have arisen. The core tenet of the TAM posits that an individual's decision to embrace novel technology is mainly influenced by two factors: Perceived Usefulness and Perceived Ease of Use. Perceived Usefulness refers to an individual's belief in the ability of new technology to improve work performance or achieve specific objectives, whereas Perceived Ease of Use relates to the degree of ease and convenience an individual experiences when using new technology. These two factors directly mold an individual's attitude towards adopting technology, ultimately influencing their behavior in utilizing new technologies.

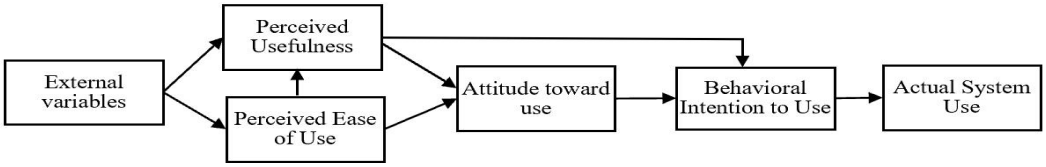

Figure 1 Technology Acceptance Model (TAM) (Davis,1989)

2.2 Technology Acceptance Model External Variables

Davis (1989) proposed that the TAM structure is influenced by external variables associated with specific technologies. TAM can analyze a wide range of factors, such as psychological, political, or organizational elements. Given the widespread use of information technology in education, more and more academics are using the Technology Acceptance Model framework to assess the degree of acceptance among learners toward online learning. Typically, researchers tailor the influencing factors and their interrelationships within the model to suit the specific context. This is done to assess the learners' acceptance of new information technologies or to investigate the mechanisms behind learners' behavioral intentions when confronted with innovative learning approaches.

2.3 Research related to the application of technology acceptance models to online learning

Wang Yu (2023) conducted a study on the factors that influence college students' intentions to accept and utilize artificial intelligence technology to assist in learning English vocabulary on mobile devices. The study concluded that performance expectancy, effort expectancy, facilitating conditions, and attitude significantly and directly influence on the intention to adopt and use AI technology for English vocabulary learning. Among these factors, attitude has the most significant influence. The intention to adopt is not significantly directly influenced by social influence, perceived enjoyment, and perceived learning resources.

Yin Hongbiao et al. (2021) explored the degree to which college students identify with online teaching and the determinants that influence this identification. The findings indicate that background characteristics such as academic department, family, and individual traits, have a relatively low but generally significant influence on the intention to accept online teaching. College students exhibit a high level of identification with online teaching. Their intention to embrace online teaching is greatly influenced by their appraisal of the cost-effectiveness of online learning, behavioral control, subjective norms, and attitude. While college students may see online teaching as lacking cost-effectiveness, this aspect significantly impacts their willingness to participate in online learning.

Bao Riqin (2017) examined that open-education learners are more likely to use mobile learning if they regard it as enjoyable, innovative, socially influential, and beneficial to their performance. The level of expected effort has a negative influence on the willingness to use, although the perceived financial cost does not have a

substantial impact on this willingness. There is no discernible disparity in the willingness to use mobile learning among learners of varying genders, academic years, and majors. However, there are notable differences in the willingness to use mobile learning based on the frequency of its use among learners.

Zhang Qianfan et al. (2015) conducted a study from the viewpoint of learners to examine the factors that influence college students' desire to participate in MOOC learning. The study discovered a positive correlation between performance expectancy, effort expectancy, social influence, and facilitating conditions and college students' intentions to engage in MOOCs. Conversely, perceived costs and financial support were found to have a negative correlation with these intentions.

Wu Huajun et al. (2020) developed a model that explores the influence of teacher support on the sustained learning intentions of MOOC learners. The model is based on the Stimulus-Organism-Response (S-O-R) framework and the Technology Acceptance Model (TAM). The findings revealed learners' persistent learning intentions are strongly influenced by their perceived ease of use, perceived usefulness, and flow experience. Additionally, the study emphasized the significant function of teacher support as a mediator.

Zhao Ying et al. (2015) incorporated perceived enjoyment as an independent variable, along with gender, academic year, and internet connection device as factors that influence or moderate the acceptance and usage behavior of MOOCs among college students. Their goal was to develop a model that could explain how college students accept and use MOOCs. The research demonstrated that performance expectancy, effort expectancy, social influence, perceived enjoyment, facilitating conditions and the intention to use all have an influence on college students' acceptance and usage of MOOCs. However, the impact of perceived enjoyment on the intention to use is influenced by the variable of gender.

3. Research Model

As stated in the preceding text, it is a verifiable truth that a significant number of students at Qiandongnan Nationalities Polytechnic are currently participating in online classroom learning. As a result, this study has determined not to categorize usage behavior as the dependent variable. Instead, it will focus on the student's willingness to accept online classroom learning. It will forecast and interpret their usage behavior by assessing the behavioral intentions of the research subjects.

By conducting a literature analysis on the application of the TAM model to online learning, the researchers have identified the following four external influencing factor variables: The four factors being referred to are Performance Expectancy (PE), Teacher Role (TR), Information Quality (IQ), and System Quality (SQ). Perceived usefulness (PU) and perceived ease of use (PEOU) are considered mediating variables, whereas Behavioral Intention (BI) is the dependent variable, as illustrated in Figure 2. Based on this framework, the study proposes the following hypotheses to analyze the relationships between these influencing factors:

H1. PE has a significant positive effect on PU.
H2. TR has a significant positive effect on PU.
H3. IQ has a significant positive effect on PU.
H4. SQ has a significant positive effect on PU.
H5. PE has a significant positive effect on PEOU.
H6. TR has a significant positive effect on PEOU.
H7. IQ has a significant positive effect on PEOU.
H8. SQ has a significant positive effect on PEOU.
H9. PEOU has a significant positive effect on PU.
H10. PU has a significant positive effect on BI.
H11. PEOU has a significant positive effect on BI.

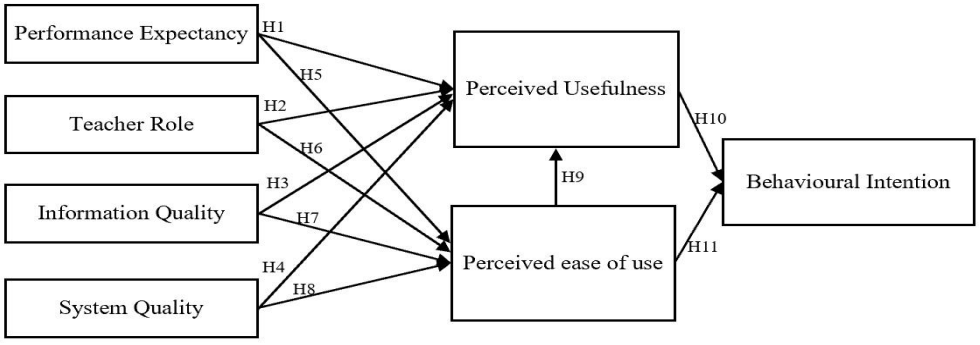

Figure 2 Research model of affecting factors on students' online classroom learning in Qiandongnan Nationalities Polytechnic

4. Research Methodology

4.1 Research Subjects

Population: Total number of students enrolled in Qiandongnan Nationalities Polytechnic: 13397.

Sample Group: Following the recommended sampling ratio by Krejcie and Morgan (1970), the sample size is 375 individuals. The samples from 11 academic faculties were divided into 3 strata using a combination of stratified and random sampling methods. For instance, freshmen, sophomores, and juniors are categorized into three distinct strata. The sample group encompasses 11 academic faculties, with a random selection of students from each stratum of a class to participate in the survey.

4.2 Research Instruments

The data collection instrument for this study is a questionnaire formulated by the researcher after reviewing pertinent scholarly literature. The questionnaire is divided into three sections: The first section gathers basic information about the respondents. The second section assesses the factors influencing the acceptance of online classroom learning, as established by this study, utilizing a 5-point Likert scale where 1 signifies strong disagreement and 5 indicates strong agreement. The third section includes two open-ended questions.

The questionnaire was reviewed by the instructor and improved according to the suggestions, three experts were invited to test the IOC assessment of the questionnaire for content accuracy and consistency, and then the reliability test was carried out on the pre-test of the questionnaire which demonstrated a high level of reliability.

4.3 Data Collection

An online questionnaire was crafted using the Wenjuanxing platform. From June 14, 2024, to June 21, 2024, a total of 375 students at Qiandongnan Nationalities Polytechnic received and completed a questionnaire.

4.4 Data Analysis

Data statistical description and analysis were performed using SPSS 26.0 software.

5. Findings

5.1 Demographic information of respondents

The survey questionnaire provides statistics regarding the personal basic information of the respondents as depicted in Table 1. The gender distribution reveals that there are 267 female students (71.2%) and 108 male students (28.8%). An analysis of the grade composition indicates a fairly even distribution of freshman, sophomore, and junior students representing 33.87%, 32.27%, and 33.87% respectively. The surveyed students hail from 11 different faculties, with 5 faculties having a participation rate above 9% and 6 faculties below this threshold. The proportion of respondents from each faculty corresponds to the enrollment distribution of current students at Qiandongnan Nationalities Polytechnic. According to the poll, 90.1% of the surveyed students have stated that they feel adequately prepared to engage in online classroom learning.

Table 1 Statistics of respondents' basic personal information

Demographic variables	Options	Frequency	Percentage (%)
Gender	Male	108	28.80
	Female	267	71.20
Grade	Freshman	127	33.87
	Sophomore	121	32.27
	Junior	127	33.87
Faculty	Faculty of Finance and Economics	31	8.27
	Faculty of Nursing	56	14.93
	Faculty of Architectural Engineering	31	8.27
	Faculty of Stomatology	27	7.20
	Faculty of Clinical Medicine	43	11.47
	Faculty of Tourism and Business Management	34	9.07
	Faculty of Ethnic Culture and Creative Industries	18	4.80
	Faculty of Biological and Environmental	39	10.40

	Engineering		
	Faculty of Internet of Things Technology	30	8.00
	Faculty of Pre-school Education	31	8.27
	Faculty of Pharmaceutical Technology	35	9.33
Readiness of equipment and network required for online learning	Yes	338	90.13
	No	37	9.87
Total		**375**	**100**

5.2 Descriptive statistics of respondents' opinions

Table 2 summarizes the descriptive analysis of students' responses to 42 survey items. The mean values for all variables are greater than 4.000, indicating that students have a favorable perception of online classroom learning. Among these variables, students consider Information Quality to be the greatest influencing factor on their willingness to accept online classroom learning, followed by System Quality. The standard deviation values range from 0.671 to 0.717, demonstrating that the data is highly concentrated and very close to the mean.

Table 2 Descriptive statistics for overall variables

(N=375)

Dimension	Items	M	SD	Cronbach's Alpha
Performance Expectancy	6	4.113	0.703	0.943
Teacher Role	6	4.156	0.705	0.969
Information Quality	6	4.174	0.687	0.973
System Quality	6	4.159	0.678	0.969
Perceived usefulness	6	4.150	0.671	0.966
Perceived ease of use	6	4.157	0.685	0.977
Behavioural Intention	6	4.088	0.717	0.967
Total	**42**	**4.142**	**0.661**	**0.984**

5.3 Reliability of the Instruments

Reliability is a crucial measure for evaluating the consistency and reliability of a survey instrument's results. A high level of reliability suggests that the questionnaire's measurements are more stable and trustworthy. In assessing the reliability of an attitude scale, the standard approach is to compute Cronbach's alpha coefficient; a score above 0.7 is considered acceptable for reliability (Sekaran & Bougie, 2013). The internal consistency analysis of the questionnaire's sample data in this study, as depicted in Table 2, shows that the alpha values for the seven dimensions range from 0.943 to 0.977, with an overall alpha value of 0.986, demonstrating that the survey instrument possesses a high degree of reliability.

5.4 Correlation statistics of variables

Table 3 summarizes the results obtained from the Pearson correlation statistical analysis conducted on the influencing factors of the research. At a significance level of 0.01, there is a statistically significant correlation among the seven variables. The factor that is most closely correlated with the willingness to accept is perceived usefulness, followed by perceived ease of use.

Table 3 Pearson correlation statistics of factors affecting

	BI	PU	PEOU	PE	TR	IQ	SQ
BI	1						
PU	0.932**	1					
PEOU	0.930**	0.949**	1				
PE	0.837**	0.854**	0.849**	1			
TR	0.849**	0.881**	0.873**	0.917**	1		
IQ	0.875**	0.918**	0.897**	0.900**	0.936**	1	
SQ	0.904**	0.946**	0.930**	0.876**	0.883**	0.931**	1

**. At the 0.01 level (two-tailed), the correlation is significant.

5.5 Hypothesis testing

Table 4 summarizes the results obtained from the regression analysis conducted to validate the research hypotheses. Except for Hypothesis 1 (H1) which states that PE has a substantial significant positive effect on PU, Hypothesis 5 (H5) which states that PE has a significant positive effect on PEOU, and Hypothesis 7 (H7) which states that IQ has a significant positive influence on PEOU, that three hypotheses are not established, all other hypotheses have been confirmed.

Table 4 Summary of results of research hypothesis validation

No	Hypothetical	B	t	p	Validation results
H1	PE has a significant positive effect on PU	-0.04	-0.924	0.356	Not Established
H2	TR has a significant positive effect on PU	0.125	2.545	0.011*	Established
H3	IQ has a significant positive effect on PU	0.191	3.351	0.001**	Established
H4	SQ has a significant positive effect on PU	0.675	15.18	0.000**	Established
H5	PE has a significant positive effect on PEOU	0.003	0.068	0.946	Not Established
H6	TR has a significant positive effect on PEOU	0.195	3.394	0.001**	Established
H7	IQ has a significant positive effect on PEOU	0.061	0.909	0.364	Not Established
H8	SQ has a significant positive effect on PEOU	0.700	13.46	0.000**	Established
H9	PEOU has a significant positive effect on PU	0.930	58.12	0.000**	Established
H10	PU has a significant positive effect on BI	0.535	9.181	0.000**	Established
H11	PEOU has a significant positive effect on BI	0.477	8.359	0.000**	Established

* $p<0.05$ ** $p<0.01$

6. Discussion

6.1 Performance Expectancy has no significant positive effect on perceived usefulness and perceived ease of use

This research result indicates that the influence of Performance Expectancy on Perceived Usefulness and Perceived Ease of Use may not be directly significant and could be affected by a variety of intervening variables and moderating variables. Davis (1989) pointed out in his research that the positive influence of Perceived Ease of Use on Perceived Usefulness can be weakened by the mediating role of experience. The online learning experience of vocational college students, which is due to a series of reasons such as weaker online learning ability, autonomous learning ability, poor learning autonomy, and ineffective improvement of learning effectiveness, may lead to a lower Performance Expectancy. This, in turn, could cause them to perceive bias in the usefulness and ease of use of online classroom learning and thus be unwilling to engage in it. Vocational college students have different and specific expectations for online classroom learning, which may be related to their learning motivation, experience, and personal preferences. Therefore, the relationship between the influence of Performance Expectancy on Perceived Usefulness and Perceived Ease of Use requires further research in specific contexts, taking into account these factors.

6.2 Teacher role has a significant positive effect on perceived usefulness and perceived ease of use

This study's findings align with the research are consistent with those of Wu Huajun et al. (2020) investigation: Teachers' technical and cognitive support have a direct influence on the perceived ease of use and perceived usefulness for MOOC learners. By enhancing cognitive support, teachers can significantly influence perceived ease of use, which subsequently affects students' learning intentions. Enhancing the level of technical support can help teachers improve perceived ease of use and perceived usefulness, and further influence

students' willingness to learn. This underscores the crucial significance of teachers in facilitating online classroom learning. They provide technical support to assist students with operational challenges and information technology issues encountered during learning, while also focusing on enriching students' emotional experiences to foster a positive and relaxed learning environment. Such support not only helps students overcome learning barriers but also sparks and sustains students' enthusiasm for learning, reinforcing their perception of the ease of use and usefulness of online education.

6.3 Information quality has a significant positive effect on perceived usefulness and no significant positive effect on perceived ease of use

The results of this study are similar to those of Howell (2014): the use of helpful course resources can enhance the perceived usefulness of MOOC learners. The study conducted by Zen Liqian and Jiang Lei (2021) further highlighted that the quality of learning content has a substantial and favorable influence on perceived usefulness. During online classroom learning, if students feel that online classroom learning offers ample, comprehensive, up-to-date course content that aligns with their learning requirements, they are more likely to believe that these courses provide substantial help for their learning. This positive perception strengthens their sense of the usefulness of the courses.

The information quality does not significantly and positively influence perceived ease of use. The study's result suggests that information quality may not directly have an influence on the perceived ease of use and that the influence may be subject to various intervening and moderating variables. Wang Qi and Chen Meimei (2023) pointed out that if users are already very familiar with the content of online learning, the improvement in information quality will not significantly affect their perceived ease of use. It means that students' perception of information quality is influenced by their cognition and experience, which may result in the relationship between information quality and perceived ease of use not being as significant as expected.

6.4 System quality has a significant positive influence on perceived usefulness and perceived ease of use

The results of this study are similar to those of Zen Liqian and Jiang Lei (2021): The stability, smoothness, and adaptability of the MOOC system have a more pronounced impact on perceived ease of use. The recognition of MOOCs by college students can be improved by enhancing the quality of information systems and providing convenient conditions. When students are satisfied with the system quality of online classrooms, it can enhance the perceived usefulness and perceived ease of use of online classroom learning. By continuously optimizing and improving the system quality of the online classroom learning platform, including aspects such as the system's functionality, reliability, response speed, and ease of operation, students' trust and reliance on the online classroom learning system can be strengthened, thereby improving their perceived usefulness and perceived ease of use of online classroom learning.

6.5 Perceived ease of use has a significant positive influence on perceived usefulness

The results of this study align closely with the research conducted by Zhu Feng (2022): In the process of using the Superstar Learning App platform, college students perceive that the ease of use of the platform has a positive influence on the perception of usefulness. In other words, the easier students find the platform to use, the more likely they are to consider it as having practical value. This indicates that as students' perception of the ease of use of online classroom learning improves, their perception of the usefulness of online classroom learning will also increase, hence boosting their willingness to accept online classroom learning.

6.6 Perceived usefulness and perceived ease of use have a significant positive influence on Behavioral Intention

The results of this study are similar to the research conducted by Liu Wei et al. (2021) about the factors and mechanisms that influence the intention to use online teaching among normal university students: The perceived usefulness and perceived ease of use of online teaching by students in normal colleges directly and significantly positively influence their future willingness to use online teaching. When students believe that online classroom learning helps them acquire knowledge and improve learning efficiency, they are more likely to accept and use it. Similarly, if students perceive online classroom learning as user-friendly and comprehensible, they will be more inclined to use online classrooms for learning, as these platforms reduce the barriers in the learning process. The perceived usefulness and ease of use of online classroom learning jointly influence the students' acceptance of online classroom learning. Educators and platform developers need to pay attention to and optimize these two variables to ensure that online classroom learning can meet students' learning needs and be user-friendly. This will promote students' adoption and sustained usage of online classroom learning.

7. Conclusion

The research findings indicate that Performance Expectancy, Teacher Role, Information Quality, System Quality, Perceived Usefulness, and Perceived Ease of Use are correlated with Behavioural Intention. Among these, perceived usefulness and perceived ease of use are direct influencing factors affecting the acceptance of online classroom learning by students at Qiandongnan Nationalities Polytechnic, having a significant positive impact on the acceptance of online classroom learning. The teacher's role and system quality significantly and positively affect perceived usefulness and perceived ease of use. Information quality has a significant positive impact on perceived usefulness but does not significantly and positively affect perceived ease of use. Performance Expectancy does not have a significant positive impact on perceived usefulness and perceived ease of use.

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