

Original Paper

A Study on Satisfaction and Willingness to Continuously Participate in Business Class Virtual Simulation Competitions -- An Empirical Analysis Based on Technology Acceptance Model (TAM)

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Abstract

The combination of virtual simulation technology and innovation and entrepreneurship education can achieve the role of interaction between the environment and the real environment during students' virtual simulation, which can attract active participation of users and help college students understand the risks and opportunities faced by enterprises in the process of operation and growth, so as to improve the ability of enterprise operation and management, and deepen students' understanding of theory and practical ability. In this paper, we construct a technology acceptance model (TAM) through seven dimensions: perceived usefulness, perceived ease of use, external environment, teacher guidance, willingness to participate, satisfaction, and willingness to continue to use, and investigate students' satisfaction and willingness to continue to participate in the virtual simulation competition in some universities. The results of the data analysis show that the satisfaction and willingness to continue to participate in the virtual simulation competition play a good role.

Keywords

virtual simulation, technology acceptance model (TAM), satisfaction, willingness to continue to participate

1. Introduction

In 2021, the State Council issued the “Guidance on Further Supporting College Students’ Innovation and Entrepreneurship” to promote the mass entrepreneurship and innovation as a strong support for the innovation-driven strategy, and it was proposed that college students are the vital force of mass entrepreneurship and innovation, and it is important to support college students’ innovation and entrepreneurship. In the process of moving from innovation to entrepreneurship, the most important factor in the cultivation of college students’ entrepreneurial will and skill knowledge is entrepreneurial practice. Some universities offer courses on entrepreneurship practice mainly in the form of enterprise simulation platform course learning, through which enterprise simulation operation can exercise and improve enterprise operation and management ability. At the same time, the combination of virtual simulation technology and innovation and entrepreneurship education can achieve the role of interaction between the environment and the real environment in the virtual simulation process of students, which can attract active participation of users and help college students understand the risks and opportunities faced by enterprises in the process of operation and growth, so as to improve the ability of enterprise operation and management, deepen students’ understanding of theory and practical ability.

Virtual simulation technology is a virtual reality technology based on computer technology, simulation technology and artificial intelligence technology, and its use in experimental training in colleges and universities has gained wide consensus in the education sector and the whole society. In 2013, the Ministry of Education first proposed the task of building national virtual simulation experimental teaching centers, and in 2017, the Ministry of Education issued a notice to build national demonstration virtual simulation experimental teaching projects, which shows that the state attaches the importance of combining virtual simulation technology and education^[5]. With the deepening of virtual simulation technology and education informatization construction, many business virtual simulation competitions have emerged for economic management majors, such as the enterprise operation simulation track of the National College Student Engineering Training Comprehensive Ability Competition, the “Xuechuangbei” National College Student Entrepreneurship Comprehensive Simulation Competition and other competitions, and the relevant competition platform has been introduced by some universities to conduct courses of innovation and entrepreneurship. The relevant competition platform is introduced by some universities for teaching innovation and entrepreneurship courses. At present, the virtual simulation research in enterprise simulation operation is mainly in two aspects. The first aspect is to improve the innovation and entrepreneurship ability. Virtual simulation teaching plays an active role in cultivating students’ innovation consciousness and ability, helping students to improve their practical ability and innovation and entrepreneurial ability as a whole, and it is also the main way to improve students’ entrepreneurial and innovative ability, while the operation simulation system plays a role in promoting students’ entrepreneurial ability such as operation management ability and opportunity ability. The second aspect, learning intention and influencing factors. Yang Bing et al. verified that variables such as presence and perceived usefulness have a significant positive impact on the learning

behavior intention of virtual simulation teaching projects, and that the project development should be “tailored to the local context” because different college type samples have different performance during the virtual simulation experimental teaching project. The professional competence of learners has a positive impact on the learning effect, and the task complexity has an inverse U relationship with operational competence. Overall, the main limitations of the current stage of research are: there are fewer current research directions, and although there are more scholars researching, the main directions are only described above; although more scholars are conducting empirical research at this stage, there are limitations in the experimental data samples, and most of the scholars’ experimental samples are students of teaching programs in their units.

Based on the limitations of the current integration of virtual simulation projects and economic management majors, this paper will take students participating in each business class virtual simulation competition as the research object, and construct a technology acceptance model (TAM) to explore the satisfaction and continuous participation of business class virtual simulation competition through seven dimensions of perceived usefulness, perceived ease of use, external environment, teacher guidance, willingness to participate, satisfaction, and willingness to continue to use. The TAM was constructed to investigate the satisfaction and willingness to continue to participate in the virtual simulation competition, and then to analyze the application effect of virtual simulation education in economics and management through the perspective of the competition.

2. Theoretical Basis and Research Hypothesis

2.1 Theoretical Foundation

The main participants of the business virtual simulation competition are students of economics and management disciplines, who have a greater say in the satisfaction of the business virtual simulation competition. Students’ feedback helps the organizations to analyze the problems and make changes to meet the development of the times. The theory of student teaching satisfaction was first developed from the research results on the relationship between service quality and customer satisfaction. The research on student satisfaction in higher education was conducted earlier in western developed countries, and the survey on student satisfaction was carried out in all universities in the United States in 1994. Martensen et al. constructed a structural equation model of customer satisfaction in universities, and considered that the evaluation of student satisfaction is the fundamental requirement for continuous improvement of teaching quality in universities. Domestic scholars, in order to focus on the study of student satisfaction, constructed and tested the satisfaction model of practical teaching in colleges and universities through empirical research, which provided reference suggestions for practical teaching in colleges and universities. Yuxian Li empirically established the structural equation model of higher education student satisfaction by building six structural variables from student satisfaction and other structural variables.

Technology Acceptance Model (TAM) was developed by American scholar Davis drawing on the results of expectancy theory and self-efficacy theory. TAM has been continuously verified and adjusted

by many students and gradually developed into one of the most influential and widely interpreted analytical models, and its universal applicability has been verified through a large number of theoretical and empirical studies, so it is applied in many fields such as management, psychology and education. When domestic scholars cited TAM, these two variables were translated as perceived usefulness and perceived ease of use, respectively, and their connotation interpretation was basically similar; subsequently, the translation of perceived usefulness and perceived ease of use was generally accepted in existing domestic studies. TAM is widely used in various fields of research basically with perceived usefulness and perceived ease of use as the main variable structures. Many external variables and possible complex effects should be considered when using the TAM model, and the study by Bazelet et al. emphasizes the role of variables such as external influences. Many scholars have shown that the TAM model is feasible to study “willingness to continue to participate” and its various explanations have been tested by many empirical studies.

Based on the above theories, this study will use TAM as the analysis framework and add external factors, teacher guidance, willingness to participate, and satisfaction variables according to the actual competition characteristics to construct a model of satisfaction and willingness to continue participation of students participating in business virtual simulation competitions. The business class virtual simulation competition belongs to a part of innovation and entrepreneurship education, and the current scholars mainly conduct empirical research on the satisfaction of innovation and entrepreneurship education from innovation and entrepreneurship courses. This paper will take the university students of the competition as the main research object and conduct empirical research on the satisfaction of the business class simulation competition, trying to provide reference suggestions for the improvement of innovation and entrepreneurship education in universities.

2.2 Research Hypothesis

2.2.1 Perceived Usefulness and Perceived Ease of Use

The core concepts of TAM model are “perceived usefulness” and “perceived ease of use”, and it has been verified that both perceived usefulness and perceived ease of use have positive effects on the learning behavior intention of various educational technology systems or platforms. In this paper, we will verify the relationship between satisfaction with participation and intention to continue participation through perceived usefulness and perceived ease of use. In addition, perceived ease of use also has a positive effect on perceived usefulness.

2.2.2 External Environment

The external environment can have an impact on satisfaction and willingness to continue participating. External factors have been studied in the context of satisfaction with online teaching in different disciplines and found that external factors have a positive influence on satisfaction and are key factors. Thus, this paper will empirically verify the external environment on the satisfaction and continued willingness to participate in virtual simulation competitions in the business category. Since the virtual simulation competition depends on the support of a certain platform, such as the “Learning and

Innovation Cup” which requires the support of software and servers, other variables such as the stability of the platform servers are added to the external environment. The following hypotheses were formulated.

H1: The external environment has a positive effect on perceived ease of use.

H2: There is a positive effect of the external environment on perceived usefulness.

H3: There is a positive effect of the external environment on the willingness to continuously participate, with perceived ease of use playing a mediating role.

H4: There is a positive influence of the external environment on the intention to continuously participate, and perceived usefulness plays a mediating role.

2.2.3 Teacher Guidance

During the competition process, teacher guidance can help students avoid consuming more time and energy on low-level cognitive activities such as information gathering. Teacher guidance plays a very important role in students’ learning efficiency and speed of knowledge acquisition, and it can help students understand and use the content of the competition platform quickly through teacher guidance, which can effectively improve students’ acceptance and satisfaction of the virtual simulation platform. In addition, the teacher’s guidance can reduce the students’ fear of the platform and reduce the difficulty of students’ mastery, which can increase the students’ willingness to participate in the virtual simulation competition of business. This leads to the following hypothesis.

H5: There is a positive effect of teacher guidance on perceived ease of use.

H6: There is a positive effect of teacher guidance on perceived usefulness.

H7: There is a positive effect of teacher guidance on the willingness to continuously participate, with perceived ease of use playing a mediating role.

H8: There is a positive effect of teacher guidance on the intention to continue to participate, and perceived usefulness plays a mediating role.

2.2.4 Willingness to Participate

Students’ willingness to participate has a great influence on the continued willingness to participate in the competition. Through the research on willingness to participate, we can understand how the participating students’ expectations of the competition are at the beginning. The relationship between the initial willingness to participate and the final willingness to continue to participate was found to be helpful in helping to improve and optimize the competition platform. This leads to the following hypothesis.

H9: There is a positive effect of willingness to enter on perceived usefulness.

H10: There is a positive effect of willingness to enter on perceived ease of use.

H11: there is a positive effect of willingness to participate on willingness to continue to participate, with perceived ease of use playing a mediating role.

H12: There is a positive effect of willingness to participate on willingness to keep participating, and perceived usefulness plays a mediating role.

2.2.5 Satisfaction

Satisfaction of participation is the students' comprehensive overall evaluation of the competition, and satisfaction is affected by various aspects, such as competition effect, competition service, competition harvest, etc. However, this paper focuses on the satisfaction and willingness to continuously participate in the business class virtual simulation competition, which is an innovation and entrepreneurship education, so this paper examines the satisfaction mainly from the variables of innovation and entrepreneurship education, teaching experience and teaching harvest. Meanwhile, similar studies found that students' satisfaction influences students' willingness to use and satisfaction is a key antecedent variable of continued willingness to use, but the connection between satisfaction and continued willingness to use in some factors needs to be further verified. This leads to the following hypotheses in this paper.

H13: There is a positive effect of satisfaction on perceived ease of use.

H14: There is a positive effect of satisfaction on perceived usefulness.

H15: Satisfaction has a positive effect on the intention to continue to participate, with perceived ease of use playing a mediating role.

H16: There is a positive effect of satisfaction on the intention to continue to participate, with perceived usefulness playing a mediating role.

3. Research Design

3.1 Questionnaire Design

Due to social factors such as epidemic prevention and control, this questionnaire will be distributed and collected online. To ensure the quality of the completed questionnaire, the questionnaire will be distributed in a targeted manner, and the research will be conducted on the relevant participating students through the virtual simulation competition group of business class. The structure of the questionnaire is divided into three parts: the first part includes the title of the questionnaire and the purpose of the questionnaire; the second part includes some information of the respondents, including the characteristics of the level type of the institution, the discipline and the grade level; the third part is the main content of the questionnaire, which is the measure of "satisfaction and willingness to continue to participate in the virtual simulation competition in business". The design of the questions was based on the existing research literature and discussions with the competition instructors, and a pre-test experiment was conducted with 20 students participating in the competition. Based on the results of the pre-test experiment and the discussion, the final questionnaire was determined as a 7-dimensional, 24-variable questionnaire, using a Likert 5-point scale to show the students' perceived attitudes toward each variable, according to "very much approve", "somewhat approve", "average approve", and "very much approve". "generally approve", "somewhat disapprove", "very disapprove", and "very disapprove", which were assigned values of 5, 4, 3, 2, and 1, respectively.

Table 1. Questionnaire Dimensions and Variable Questions

Dimension	Variable and question entry
Perceived usefulness	Q1: Do you improve your teamwork skills by Participating in competitions to improve your teamwork skills Q2: You have enriched your knowledge related to social interaction by participating in competitions Q3: The content of the competition you participated in is tightly integrated with your professional knowledge
Perceived ease of use	Q4: The platform you participated in was easy to use and simple to operate Q5: The content of the competition you participated in is easy to master Q6: Your school provides training on the content of the competition
External environment	Q7: Stability of server operation of the platform used for the competition you participated in Q8: Your school provides relevant places for practice Q9: Your school has the support of relevant documents
Teacher guidance	Q10: Instructors can answer questions enthusiastically Q11: Instructors can effectively guide simulations and programs Q12: Your school offers relevant courses for practical training and specialized teachers for teaching
Willingness to participate in the competition	Q13: Your reason for participating is to improve your own entrepreneurial and business skills Q14: Your reason for participating is to be motivated by relevant awards, comprehensive tests and other rewards Q15: You participated because you were recommended by the relevant policies and teachers and classmates Q16: The reason for your participation is that you have a strong interest in virtual simulation enterprise simulation operation
Satisfaction	Q17: The virtual simulation competition can truly simulate the operation of modern enterprises Q18: The content of the competition helps to analyze professional ability Q19: The competition enhances the ability to start or run a business Q20: Virtual simulation competition can have a good teaching experience Q21: Increased confidence and willingness to start a business after participating Q22: You have won more awards and other rewards from the competition
Willingness to continue to participate	Q23: You are willing to continue to participate in relevant competitions (if you have already won awards, etc. or other rewards) Q24: You suggest your school to offer relevant courses for elective

3.2 Data Collection and Organization

The source of data is the questionnaires filled out by the students who participated in business competitions, but at present, most of these competitions are for undergraduates, so the target research object is the undergraduates of business competitions. The focus of this research questionnaire is the selection of competition groups, mainly the A-class competition “Learning and Innovation Cup”, “Enterprise Application Simulation” and “Enterprise Competition Simulation Competition” which has a large audience. The questionnaires were collected from the competition groups. The following criteria were used to select the questionnaires: firstly, whether the questionnaires were missing items; secondly, the average time required to fill out the questionnaires was based on the pre-test experiment, and too fast an answer time would be considered as an invalid questionnaire without thinking. A total of 300 questionnaires were collected, and after screening out invalid questionnaires? 235 valid questionnaires were obtained, and the effective rate of the questionnaire was 78.33%.

The characteristics of the research subjects in the valid questionnaire mainly have the following characteristics: the participation year is mainly freshman and sophomore, the total percentage is 80.5%; most of the students participated and won only 0-2 times, the percentage of students who won 5 times or more is only 11.9%; the students who participated in the business class are mainly general undergraduate students, accounting for 86.80%; the most types of schools participating in the business class virtual simulation competition The most participating schools are comprehensive colleges and universities, accounting for 41.30%, followed by financial colleges and universities, and it is worth mentioning that the percentage of participating students in science and technology colleges is as high as 23.40%; the major discipline of participating students is management, accounting for 57.90%.

Table 2. Characteristics of Participating Students

Category	Characteristics	Frequency	Ratio
Gender	Male	109	46.40%
	Female	126	53.60%
Year	Freshman	93	39.60%
	Sophomore	96	40.90%
	Junior	35	14.90%
	Senior	11	4.70%
Number of times you have won a virtual simulation competition	0-2	177	75.30%
	3-4	30	12.80%
	5-6	9	3.80%
	More than 6 times	19	8.10%
Your school type	Double-class	16	6.80%
	General undergraduate	204	86.80%
	Specialized colleges	15	6.40%

The classification of your school	Science and Engineering	55	23.40%
	Finance and Economics	97	41.30%
	Teacher Training	12	5.10%
	Comprehensive	56	23.80%
	Other	15	6.40%
The discipline of your major	Management	136	57.90%
	Economics	58	24.70%
	Other	41	17.40%

4. Data Analysis and Hypothesis Testing

4.1 Dimensional Descriptive Analysis

Table 3. Descriptive Analysis of Perceived Usefulness and Perceived Ease of Use

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
Perceived usefulness	You have improved your teamwork skills by participating in competitions	235	1	5	4.38	0.645
	You enriched your knowledge about social interaction by participating in competitions	235	2	5	4.42	0.589
	The content of the competition you participated in is closely related to your professional knowledge	235	1	5	4.31	0.741
Perceived ease of use	The platform you participated in was easy to use and simple to operate	235	1	5	4.33	0.654
	The content of the competition you participated in was easy to master	235	1	5	3.94	0.947
	Your school provides training on the content of the competition	235	1	5	4.23	0.891

In terms of perceived usefulness, the highest mean value of 4.42 and the smallest standard deviation of 0.589 for the perception that participation in competitions enriches knowledge related to social interactions, and the data are relatively stable, with 45.11% strongly agreeing, 38.3% relatively agreeing, 14.89% generally agreeing, and 1.7% relatively disagreeing, indicating that more people strongly agree that participation in competitions enriches knowledge related to social interactions. related knowledge. This indicates that the participating students think that the business virtual

simulation competition is more useful in social interaction than other roles. In the process of participation, team formation is required, and most of the competition teams are between 3 and 4 people, and it also requires various factors such as experience exchange between teams, which enhances the social skills of participating students. The maximum mean value of perceived ease of use of the operation platform reached 4.33, and the minimum standard deviation was 0.654, 39.57% were very much approved, 37.02% were more approved, 20.43% were generally approved, 2.55% were more disapproved, and 0.43% were very disapproved, indicating that the participating students had a high degree of ease of use of the operation platform, but the mean value and Standard deviation is the smallest, 3.94 and 0.947, respectively. 32.77% are very much approved, 25.11% are generally approved, 5.11% are relatively disapproved, and 1.28% are very disapproved, indicating that the content of the competition platform is difficult for students, which provides some reference direction for the optimization of the platform.

Table 4. Descriptive Analysis of External Environment

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
External environment	Stability of the server of the platform you are using for the competition	235	1	5	4.3	0.701
	Your school provides a place to practice	235	1	5	4.21	0.898
	Your school is supported by relevant documents	235	1	5	4.31	0.759

The mean value of the server stability of the platform used in the competition in the external environment reached the maximum of 4.3, and the minimum standard deviation reached 0.701. 37.87% of the participants were very much approved, 36.17% were relatively approved, 22.55% were generally approved, 2.13% were relatively disapproved, and 1.28% were very disapproved, indicating that the server stability of the platform used in the competition had a high influence on This shows that the stability of the server used in the competition has a high degree of influence on the participants. It can also be found that the mean and standard deviation of the support of the students' schools with relevant documents are similar, in which 41.28% are very much approved, 34.47% are more approved, 20.43% are generally approved, 1.7% are more disapproved, and 2.13% are very disapproved, indicating that the external environment dimension has a higher degree of approval of the platform service and the support of the schools with relevant documents, which provides a certain degree of reference direction for the improvement of the external environment. The external environment dimension provides a certain degree of reference direction for improvement.

Table 5. Descriptive Analysis of Teacher Mentoring

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
Teacher Guidance	Instructor can answer questions enthusiastically	235	1	5	4.19	0.975
	Instructors can effectively guide simulations and programs	235	1	5	4.11	1.023
	Your school offers practical training in relevant courses, taught by specialized teachers	235	1	5	3.96	1.158

In the teacher guidance, the mean value of teacher guidance to be able to answer the questions enthusiastically reached 4.19 with the smallest standard deviation of 0.975, 42.55% were very much approved, 27.66% were more approved, 19.57% were generally approved, 7.23% were more disapproved, and 2.98% were very disapproved. It means that the overall recognition of the instructor's guidance by the participating students is high, and the answers to the instructor's questions have strong expectation, but the mean value of the school offering relevant courses for practical training and specialized teachers for teaching is low at 3.96, the standard deviation is large at 1.158, 34.89% are very much recognized, 25.53% are relatively recognized, 23.4% are generally recognized, 9.36% are relatively disapproved, and 2.98% are very disapproved. 9.36%, and 6.81% were very disapproved. It means that the universities where the students participated do not have a high recognition of the training of the competition-related courses. It provides a certain degree of reference direction for the guidance factors of teachers participating in the competition.

Table 6. Descriptive Analysis of Participation Factors

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
Entry Factors	Your reason for participating is to improve your entrepreneurial and business skills	235	1	5	4.41	0.669
	The reason for your entry has the incentive of being rewarded with relevant awards, comprehensive tests, etc.	235	1	5	4.5	0.656
	Reasons for your participation include advocacy by relevant policies and recommendations from teachers and classmates	235	1	5	4.32	0.743

Your reasons for entering include having a strong interest in virtual simulation of business operations	235	1	5	4.37	0.683
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Among the participation factors, the most important participation factor of the participating students was being motivated by the relevant awards, comprehensive tests, and other rewards, and the mean value was 4.5 with the smallest standard deviation of 0.656. 54.89% of the participants were very much approved, 31.49% were relatively approved, 11.49% were generally approved, 1.28% were relatively disapproved, and 0.85% were very disapproved, indicating that the external utilitarian participation This indicates that external utilitarian factors have a greater influence on students. The mean value of 4.41 and the standard deviation of 0.669 indicate that 47.23% of the students approve of the competition, 33.62% approve of it, 16.17% approve of it, 2.55% disapprove of it, and 0.43% disapprove of it. It indicates that most of the students are more concerned about showing gains among the psychological factors of participating in the competition. In this study, it was found that the motivational effect of gaining rewards among the factors of participation was more effective than their own interest, indicating that the psychological factor of interest is not necessarily the primary reason for participation.

Table 7. Descriptive Analysis of Satisfaction

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
Satisfaction	Virtual simulation competition can realistically simulate the operation of modern enterprises	235	1	5	4.29	0.736
	The content of the competition contributes to the analysis of professional competence	235	2	5	4.39	0.605
	Competition to improve the ability to start or run a business	235	2	5	4.4	0.564
	Virtual simulation competition can have a good teaching experience	235	2	5	4.41	0.588
	Increased confidence and willingness to start a business after participating in the competition	235	1	5	4.28	0.748
	You have won more awards and other prizes for your participation	235	1	5	4.02	1.096

In the satisfaction dimension, it was found that the mean value of the participating students' competition can have good teaching experience reached the maximum of 4.41, the standard deviation was less 0.588, 44.68% were very much approved, 35.74% were more approved, 17.87% were generally approved, 1.7% were more disapproved, and 0% were very disapproved, indicating that the participating students have a high recognition of this variable and think that the virtual simulation competition It can have a good teaching experience. The lowest satisfaction level is to get more awards and other rewards after participation, with a mean value of 4.02 and a standard deviation of 1.096. 36.17% strongly approve, 28.94% relatively approve, 20.43% generally approve, 9.36% relatively disapprove, and 5.11% strongly disagree. The variables of satisfaction show that although the participating students did not win more awards, they had less influence on the other variables. It provides a degree of reference direction for the satisfaction of other virtual simulation competitions.

Table 8. Descriptive Analysis of Willingness to Continuously Participate

Dimension	Variable Question	N	Minimal value	Maximal value	Mean value	Standard deviation
Continued willingness to participate	You are willing to continue to participate in relevant competitions (if you have already received awards, etc. or other prizes)	235	1	5	4.44	0.692
	You suggest the school to offer relevant courses for elective	235	1	5	4.47	0.655

In terms of willingness to continue participating, the mean value of suggesting the school to offer relevant courses for electives was 4.47, with a standard deviation of 0.655, 52.34% strongly approved, 12.34% generally approved, 2.13% relatively disapproved, and 0.43% strongly disapproved, indicating that more participating students wanted their schools to offer relevant courses and study them. In general, more students were also willing to continue to participate, with a mean of 4.44 and a standard deviation of 0.692. 51.49% strongly approved, 31.49% moderately approved, 13.62% moderately approved, 2.98% moderately disapproved, and 0.43% very disapproved. The data derived from these two variables provide a certain direction of reference for the willingness to continuously participate in the virtual simulation competition, which has a positive effect on the organization of the virtual simulation competition.

4.2 Reliability and Validity Analysis

Table 9. Dimensional Reliability Validity Analysis

Dimension	Average	Variance	α	CR
Perceived Usefulness	25.6801	10.008	0.869	0.673
Perceived ease of use	25.883	9.201	0.858	0.647
External environment	25.7752	9.331	0.857	0.693
Teacher guidance	25.9624	8.342	0.885	0.625
Willingness to participate	25.6489	9.766	0.86	0.687
Satisfaction	25.7504	9.476	0.852	0.798
Willingness to continue to participate	25.5936	9.986	0.874	0.653

The reliability of the questionnaire was measured by SPSS 23 analysis, and the main indicators of the reliability test were Cronbach's alpha coefficient and combined reliability CR. the mean value of all dimensions was between 25 and 26, and the maximum variance was 10.008 and the minimum variance was 9.201. as shown in Table 9, the minimum value of Cronbach's alpha coefficient for all dimensions was 0.857, which was higher than 0.7; the minimum value of combined reliability CR was 0.647, which was higher than 0.6. Therefore, the survey data of the questionnaire has good reliability, and the analysis results can have certain representativeness and credibility.

4.3 Hypothesis Testing

Table 10. Main Effects Test

Variables	Perceived Usefulness	Perceived ease of use
Independent variable	Model 1	Model 2
External environment	0.246**	0.349***
Teacher guidance	-0.057	0.162**
Willingness to participate	0.176**	0.104
Satisfaction	0.368***	0.224***
R	0.425	0.504
Adjusted R ²	0.415	0.495
F	42.436***	58.449***

Attention: *p<0.05, ** p<0.01, *** p<0.001

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which was higher than 0.6. Therefore, the survey data of the questionnaire has good reliability, and the analysis results can have certain representativeness and credibility.

From model 1, the external environment significantly and positively affects perceived usefulness ($a=0.246$, $p<0.01$) and hypothesis H2 is verified by the data, therefore the hypothesis holds.

From model 1, there was no significant positive effect of teacher instruction on perceived usefulness ($a = -0.057$) and hypothesis H6 was verified by the data, therefore the hypothesis did not hold.

From model 1, there is a significant positive effect of willingness to participate on perceived usefulness ($a=0.176$, $p<0.01$) and hypothesis H9 is validated by the data, therefore the hypothesis holds.

From model 1, satisfaction has a significant positive effect on perceived usefulness ($a=0.368$, $p<0.001$) and hypothesis H14 is validated by the data, therefore the hypothesis holds.

From model 2, there is a significant positive effect of external environment on perceived ease of use ($a=0.349$, $p<0.001$) and hypothesis H1 is validated by the data, therefore the hypothesis holds.

From model 2, there was a significant positive effect of teacher instruction on perceived ease of use ($a=0.162$, $p<0.01$) and hypothesis H5 was validated by the data, therefore the hypothesis holds.

From model 2, there is no significant positive effect of willingness to participate on perceived ease of use ($a=0.104$) and hypothesis H10 is not validated by the data, therefore the hypothesis does not hold.

As seen in model 2, satisfaction has a significant positive effect on perceived ease of use ($a=0.224$, $p<0.001$), and hypothesis H13 is validated by the data, so the hypothesis holds.

At this point, the model can be constructed based on model 1 and model 2.

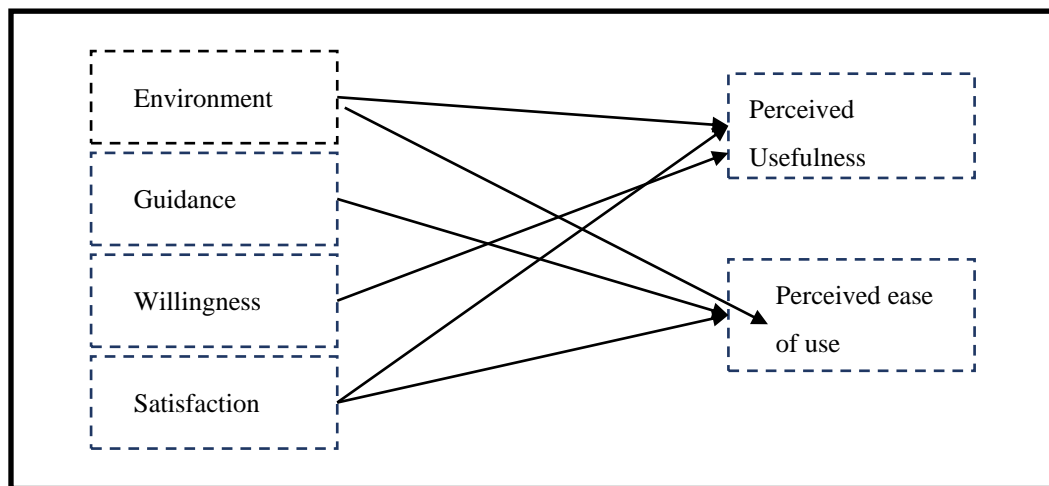


Figure 1. Test Model 1

Table 11. Mediation Effect Test

Variables	Continued willingness to participate							
Independent variable	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
External Environment	0.218***				0.194*			
Teacher Guidance		0.144**				0.076		
Willingness			0.545***				0.558***	
Satisfaction				0.679***				0.685***
Intermediate variables								
Perceived usefulness	0.35**	0.407***	0.169**	0.049				
Perceived ease of use					0.318***	0.4***	0.148**	0.039
R	0.249	0.232	0.425	0.503	0.218	0.2	0.421	0.503
Adjusted R ²	0.242	0.225	0.42	0.499	0.211	0.193	0.416	0.498
F	38.431*	34.972*	85.815*	117.488*	32.324*	28.977*	84.255*	117.261*
	**	**	**	**	**	**	**	**

Attention: *p<0.05, ** p<0.01, *** p<0.001

As seen in model 3, the external environment significantly and positively affects the intention to continue participating ($a_1=0.218$, $p<0.001$) and the perceived usefulness mediator significantly and positively impresses the intention to continue participating ($a_2=0.35$, $p<0.01$), hypothesis H4 is verified by the data and therefore the hypothesis holds.

As seen in model 4, teacher guidance significantly and positively influenced the willingness to consistently participate ($a_1=0.144$, $p<0.01$) and perceived usefulness mediated a significant positive impression of the willingness to consistently participate ($a_2=0.407$, $p<0.001$), hypothesis H8 was verified by the data and therefore the hypothesis holds.

As seen in model 5, willingness to participate significantly and positively affects willingness to continue participating ($a_1=0.545$, $p<0.001$) and perceived usefulness mediates significantly and positively impressions willingness to continue participating ($a_2=0.169$, $p<0.01$), hypothesis H12 is verified by the data and therefore the hypothesis holds.

As seen in model 6, satisfaction significantly and positively influenced the intention to continue participating ($a_1=0.679$, $p<0.001$) and perceived usefulness mediated non-significant positive

impression of the intention to continue participating ($a_2=0.049$), hypothesis H15 was not verified by the data and therefore the hypothesis did not hold.

As seen in model 7, the external environment significantly and positively influenced the intention to continue participating ($a_1=0.194$, $p<0.05$), the perceived ease of use mediator did not significantly and positively impress the intention to continue participating ($a_2=0.049$), and hypothesis H3 was not validated by the data and therefore the hypothesis did not hold.

As seen in model 8, teacher guidance did not significantly and positively affect the willingness to consistently participate ($a_1=0.076$,) and perceived ease of mediation significantly and positively impressed the willingness to consistently participate ($a_2=0.004$, $p<0.001$), hypothesis H5 was not validated by the data and therefore the hypothesis did not hold.

As seen in model 9, satisfaction significantly and positively affects the intention to continue participating ($a_1=0.685$, $p<0.001$) and perceived ease of use mediates a significant positive impression of the intention to continue participating ($a_2=0.039$,), hypothesis H15 is verified by the data and therefore the hypothesis holds.

As seen in model 10, willingness to participate significantly and positively influenced willingness to continue participating ($a_1=0.558$, $p<0.01$) and perceived ease of use mediated significantly and positively impressed willingness to continue participating ($a_2=0.148$, $p<0.001$), hypothesis H11 was not validated by the data and therefore the hypothesis did not hold.

From model 3-10 it is possible to model.

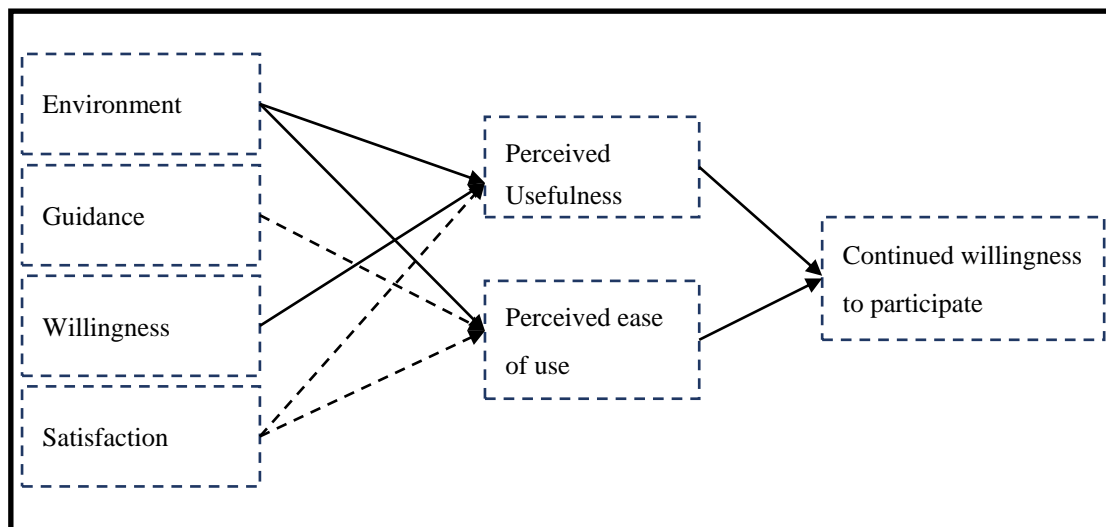


Figure 2. Test Simulation 2

4.4 Discussion of Empirical Results

4.4.1 Direct Effect

The data and models in Table 10 and Figure 1 show that there are positive effects of external environment, willingness to participate, and satisfaction on perceived usefulness, and negative effects

of instructors on perceived usefulness; positive effects of external environment, instructors' guidance, and satisfaction on perceived ease of use, and no significant positive effects of willingness to participate on perceived ease

4.4.2 Indirect Effects

External environment, teacher guidance, and willingness to participate had a significant positive effect on willingness to consistently participate mediated by perceived ease of use, while satisfaction did not have a significant positive effect on willingness to consistently participate mediated by perceived ease of use; external environment and willingness to participate had a significant positive effect on willingness to consistently participate mediated by perceived usefulness, while teacher guidance and satisfaction did not have a significant positive effect on willingness to consistently participate mediated by perceived usefulness.

5. Research Summary

5.1 Research Summary

The research on students' satisfaction with the competition and their willingness to continue to participate in the virtual simulation competition in the business category revealed that the overall satisfaction was high and the willingness to continue to participate was good, but there were some problems with students' perceived usefulness in terms of teacher guidance and satisfaction.

1. Teacher guidance did not have a significant positive effect on perceived usefulness, indicating that during the competition, teacher guidance was more focused on teaching operations and other aspects, neglecting useful aspects such as the innovation and entrepreneurship dimensions that the competition specifically wanted to exercise. Teacher guidance did not have a significant effect on sustained participation mediated by perceived usefulness, further validating the neglect of the intrinsic usefulness of the competition by teachers during the competition process.
2. There was no significant effect of willingness to participate on perceived ease of use, but there was a significant effect of willingness to sustain participation mediated by perceived usefulness and perceived ease of use, indicating that although students did not perceive the ease of the competition before participating, they only found it useful. However, after the competition, they perceived the usefulness and ease of use of the competition and were willing to continue to participate.
3. The satisfaction of the participating students did not have a significant positive effect on the willingness to continue participating, mediated by the perceived usefulness, but the satisfaction had a significant positive effect on the willingness to continue participating. Therefore, the satisfaction of the participating students was not mainly due to the usefulness of the competition, but to other aspects.

5.2 Innovations

1. The satisfaction of this study is mainly evaluated from the perspective of innovation and entrepreneurship. Due to the increased demand for innovative and entrepreneurial talents in the country and society, the purpose of the competition is mainly to cultivate talents for social needs. The

evaluation of satisfaction of the competition from the perspective of innovation and entrepreneurship can side-respond to the current satisfaction evaluation of some students on innovation and entrepreneurship education.

2. Through the analysis of literature, it is found that the current research on the satisfaction of innovation and entrepreneurship education is mainly based on the research of teaching design and related courses, such as how to design the innovation and entrepreneurship education courses, students' satisfaction with the practical training of innovation and entrepreneurship, and other aspects. This study is different from the existing research results in terms of the satisfaction study of innovation and entrepreneurship education from the perspective of competition.

3. In the process of virtual simulation teaching, most of the virtual simulation teaching is mainly based on disciplines such as science and technology, such as, medical class, computer class and other majors. The main reason for this status quo is the characteristics of the disciplines, science and technology majors have greater demand for simulation experiments compared with humanities and social science majors. And the available data samples of relevant economic class virtual simulation competition research are only for the students of their scholars' units. In this paper, the empirical study on virtual simulation teaching of business class, the sample data are mainly students participating in various business class simulation competitions, supplementing the demand of humanities and social science majors for virtual simulation technology and expanding the scope of data samples.

5.3 Suggestions and Outlook

5.3.1 Research Recommendations

Through the research study, it was found that the role of teacher guidance is relatively limited, and also interviews with students of pre-test experiments found that most of the instructors in the business class virtual simulation competition play a lesser role in explaining how to operate the platform and other aspects in the program and content. Throughout the process from registration to participation, the improvement of the competition performance is mainly the communication and practice with other participating students. Teachers should master the operation method of the platform used in the virtual simulation competition and explain the operation rules and operation plan, so that they can solve the problems encountered by the participating students and help them to improve the competition performance.

To meet the intrinsic demand of students for business class virtual simulation competition courses in order to make the willingness of continuous participants satisfied. Under the current rapid development of virtual simulation teaching technology and the background of university reform, schools with conditions can set up virtual simulation teaching centers for business classes, which can meet students' willingness for continuous participation and also enhance students' innovation and entrepreneurship to prepare for meeting social demands.

5.3.2 Limitations

The data sample of this research study has some limitations, due to various reasons such as the

epidemic, the sample data is small probably the data of some dimensions and variables do not represent a larger number of students, the perceptions of different competitions are different, this study did not distinguish between competitions, which may have an impact on the perceptions of a certain competition, and the next study should distinguish between different competitions.

This research mainly studied satisfaction and willingness to continue to participate, although the characteristics of participating students were counted but not studied, and the next relevant research studies should add other dimensional variables such as the results achieved in the competition and the rewards of participation.

References

- Bazelais, P. et al. (2018). Investigating the Predictive Power of TAM:A Case Study of CEGEP Students' Intentions to Use Online Learning Technologies. *Education and Information Technologies*, (23). <https://doi.org/10.1007/s10639-017-9587-0>
- Chen, Y., & Gao, J. (2021). How to improve the learning effect of virtual simulation experimental teaching program? --Analysis based on 159 questionnaires of international economics and trade majors. *Modern Educational Technology*, 31(05), 75-81.
- Fokides, E. (2017). Pre-service teachers intention to use MUVES as practitioners - A structural equation modeling approach. *Journal of Information Technology Education: Research*, 16, 47-68. <https://doi.org/10.28945/3645>
- Gao, Yuan, & Huang. (2017). R.-H. Interpretation and Insights from the 2017 New Media Consortium China Higher Education Technology Outlook:Horizon Project Regional Report. *Electrochemical Education Research*, 38(04), 15-22.
- Han, Y. Z. (2006). A review of satisfaction survey methods for college students in the United States. *Comparative Education Research*, (06), 60-64.
- Holden, R. J., & Karsh, B. T. (2010). Methodological Review: The Technology Acceptance Model: Its past and its future in health care. *Journal of Biomedical Informatics*, 43(1), 159-172. <https://doi.org/10.1016/j.jbi.2009.07.002>
- Huang, Z. X., & Du, J. C. (2020). Research on students' satisfaction with the quality of innovation and entrepreneurship courses in "double first-class" universities. *Journal of East China Normal University* (Education Science Edition), 38(12), 33-41.
- Huang, Z. X., & Huang, Y. J. (2019). Exploring new quality evaluation of innovation and entrepreneurship education--an empirical study from 1231 higher education institutions in China. *Education Research*, 40(07), 91-101.
- Li, W., Huang, Y., & Yang, F. (2018). A study on college students' willingness to adopt mobile news clients and its influencing factors--based on technology acceptance model and innovation diffusion theory perspective. *Books and intelligence*, (04), 62-71.

- Li, Y. Q. (2017). Research on higher education student satisfaction based on structural equation model. *Exploration of Higher Education*, (02), 45-50.
- Ma, X. N. (2018). Application of virtual reality technology in innovation and entrepreneurship education. *China University Science and Technology*, (09), 95-96.
- Martensen, A., Grnholdt, L., Eskildsen, J. K., & Kristensen, K. (2000). Measuring Student Oriented Quality in Higher Education: Application of the ECSI Methodology. *Sinergie-Rapporti di Ricerca*, 18, 371-383.
- Qin, H. X., Li, Z., & Zhou, J. H. (2020). Satisfaction with online teaching and learning in different disciplines and willingness to continue using it-an empirical analysis based on the Technology Acceptance Model (TAM). *Educational Research*, 41(11), 91-103.
- Rogers, P. J. (2005). Logicmodels in Sandra Mathison (ed) Encyclopedia of Evaluation. 232. *Beverly Hills*. CA: Sage Publications.
- Sun, Y. R., Yang, M., & Jiang, G. (2016). Research on the construction of a model of satisfaction of practical teaching in colleges and universities based on structural equations. *Exploration of Higher Education*, (01), 74-81.
- Wei, S. G., & Wu, K. Y. (2021). The development and transmutation of China's innovation and entrepreneurship education policy from the perspective of progressive decision theory. *Modern Education Management*, (12), 19-28.
- Yang, B., Liu, L., Zhu, X. G., & Tiong-Thye Goh. (2019). Study on the factors influencing the learning behavior intention of virtual imitation training system - taking enterprise operation virtual imitation training system as an example. *China Distance Education*, (05), 26-36+92.
- Yang, W. Z., Zhang, L., Lu, X. J., & Zhang, L. C. (2013). Using business operation simulation system to cultivate students' entrepreneurial ability. *Laboratory Research and Exploration*, 32(04), 203-205+249.
- Yao, S. D., Fang, Z. G., Chen, L., Wang, N., & Quan, Y. L. (2019). The role of virtual simulation in OBE practice teaching and innovation and entrepreneurship. *Experimental Technology and Management*, 36(06), 229-233.
- Yin, J., Li, L. L., Qi, X. L., Ge, S. L., & Qian, P. (2022). Research on the influence factors of learning effect of virtual simulation teaching system. *Modern Educational Technology*, 32(01), 64-74.
- Zhuo, Z. L. (2020). Research on the quality satisfaction improvement of innovation and entrepreneurship education for students in Guangdong, Hong Kong and Macao Bay Area universities. *Journal of East China Normal University (Education Science Edition)*, 38(12), 53-63.