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What Factors Affect College Students' Learning Satisfaction? - A Research on Online Learning During Covid-19 in Zhumadian Vocational and Technical College

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Abstract: During the 2020 epidemic in China, online teaching was promoted, but fewer studies have investigated the learning satisfaction of college students who have been taught online on a large scale for an extended period of time. The factors that affect learning satisfaction mainly include students' basic attributes, learning resources, learning platforms and learning interactions. According to the results of the questionnaire survey, course content, course resources, platform technology, platform design, teacher-student interaction, student-student interaction, and interaction mode are the main factors affecting students' basic attributes. The survey results also showed that course content and interaction mode significantly affect students' learning satisfaction. Based on these findings, teachers should enrich course content to provide students with more practical, rich, and vivid teaching experiences. Additionally, teachers should pay close attention to their communication with students, offer timely guidance to students' learning, and provide feedback to any questions they ask.

Keywords: University students, online learning, satisfaction

1. Introduction

The "Internet+" action plan was first proposed in the government work report of the third session of the 12th National People's Congress of China, and since then, it has brought a wave of change to the country by ushering in the "Internet+" era. All sectors of China are proactively seeking effective integration with the Internet industry, thanks to this national policy. This integration forms a new driving force for China's economy and society's innovative development (Liu & Patnao, 2023). The education industry is also an active participant in the movement towards adapting to the Internet age. Many new technologies are constantly being applied in the education sector, which is causing significant changes in educational philosophy, models, methods, content, and structures (Zeng & Wang, 2021). Online learning is a new attempt by the education industry to integrate with the Internet in the context of the "Internet +" era. It resolves traditional education dilemmas such as distance limitations and time constraints, provides a more interactive way of learning, and creates interest in education (Landrum et al., 2021). The strong advocacy of national policies has led to flourishing online learning that has captured widespread attention and triggered numerous research studies in higher education (Zhang et al., 2020).

Since the onset of the Covid-19 epidemic during the Chinese New Year of 2020 in Wuhan, the Ministry of Education promptly analyzed the situation, made an informed decision, and opted to fully transition universities to online teaching. The result was remarkable: 1454 institutions nationwide implemented online learning with 1.03 million educators offering 1.07 million courses (including both theoretical and experimental). The online curriculum consisted of 12.26 million classes attended by 17.75 million students, totaling an astounding figure of 2.3 billion people. This unparalleled scale and scope of online education not only met the challenge of teaching and class suspensions brought about by the epidemic but also opened a new chapter in educational technology for higher learning institutions globally.

In 2018, Zhumadian Vocational and Technical College introduced the "Smart Classroom" comprehensive online teaching platform developed by Wind Speed Education Technology Research Institute in order to further deepen education reform and accelerate the sharing of high-quality teaching resources. By June 2022, the "Smart Classroom"

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platform had received over 3 million visits, and the school had a total of 575 online open courses available. The prevalence of the Covid-19 epidemic in China has made online learning a common method of learning for students. To meet the needs of university students and improve the quality of their training, it's important to improve their satisfaction with online learning. This includes deepening their understanding of the benefits of online learning and making the platform more user-friendly and engaging.

Literature research has identified eight factors that may influence university students' satisfaction with online learning: students' basic attributes, course content, course resources, platform technology, platform design, teacher-student interaction, student-student interaction, and interaction mode. In order to determine whether these factors impact students' satisfaction, some hypotheses were proposed based on demographic information: female university students are more satisfied with online learning than their male peers; students with prior online learning experience are more satisfied than those without; and older students report higher levels of satisfaction with online learning compared to their younger counterparts.

This research aims to 1) help teachers of online courses at Zhumadian Vocational and Technical College to understand students' ideas, identify factors affecting students' learning satisfaction, and continuously adjust and optimize their online courses according to the factors affecting students' online learning satisfaction, so as to improve the teaching quality and effectiveness of their courses; and 2) the research can help university students to better understand their own study habits and online learning, so that they can make reasonable study plans and better participate in online learning.

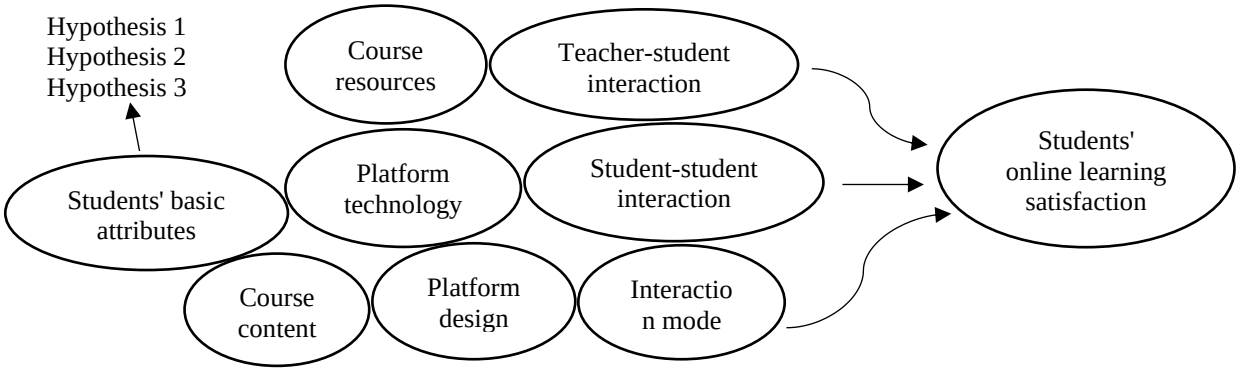

Fig. 1: Career development and placement guidance course evaluation based on CIPP model

2. Literature Review

Online learning at home is an emergency solution adopted by educational institutions at all levels during the epidemic to protect the health and safety of teachers and students, and to prevent and control the national epidemic (Ministry of Education of the People's Republic of China, 2020). Online learning at home is learner-directed, and its teaching methods and curriculum design are very different from those of face-to-face classes (Xie, 2020). It is important to pay attention to the mental health of learners, to pay attention to learner interaction, to respect the learning rules of different levels, grades, and groups of learners, and to pay attention to the arrangement of course content and activities to improve the efficiency of learners' online learning at home and ensure the effectiveness of learners' learning at home.

Online learning focuses on the connotation and composition of online learning and is mainly reflected in two aspects. First, it involves the connotation and elements of online learning. For example, Liu and Wan (2021) proposed five elements that affect online learning, including teachers, learners, online courses, related technologies, and learning activities. Through an analysis of the connotation of online learning, the meaning and methods of research, and the online course resources, research also provides an in-depth analysis of the four components of online course resources, online learning activities, online learning interactions, and online learning subjects. Second, online learning environment is constructed. Based on domestic and international research, Cheung et al. (2021) suggests that the online learning environment should include five elements: resource environment, participation experience environment, reflection environment, support environment, and social environment.

Research on learning satisfaction began in the United States, where the US Commissioner of Education tried to investigate the satisfaction of college freshmen using the CIRP (Cooperative Institutional Research Program) measurement tool. Research on online learning satisfaction is still new and involves conceptual modeling and empirical research that focus on the creation of online learning environments, learner readiness, learning interactions, and learning service support. Regarding research on online learning satisfaction, Tikva and Tambouris (2021) proposed a conceptual model based on relevant literature arguing that learners' online learning satisfaction is influenced by system quality, content quality, and other variables. In terms of empirical research, one research found that support materials and learning service support in online course learning were crucial factors affecting learning satisfaction. Another research developed a distance learning evaluation and quality monitoring system. Nugroho et al. (2021) established a teaching evaluation model in the online environment and proposed a series of learner evaluation indicators, including the degree of learning

interaction and learning resource utilization. Furthermore, research was conducted on online learning efficacy, which refers to whether learners believe that online learning can enhance learning and completion of their studies. Zhang et al. (2020) designed a comprehensive questionnaire based on various situations that may arise in online learning, and the survey results showed that university students generally believe that online learning and traditional face-to-face learning can provide the same amount of learning content, and more than half of them believe that learning with the help of both methods can achieve good learning results. Finally, Chen et al. (2020) constructed a model structure, index system, and calculation method for measuring online learner satisfaction in China based on the American customer satisfaction model.

3. Methodology

The questionnaire was organized into two parts: Socio-demographic information and Satisfaction with online learning, referenced existing research on learning satisfaction scales. This questionnaire was developed by Bolliger and Halupa (2012) based on the Online Course Satisfaction Survey (OCSS). It consisted of 24 items categorized into the following subscales: instructor, technology, course setup, inter-action, outcomes and overall satisfaction. The questionnaire used a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Some items were modified slightly according to the actual situation of this survey to improve clarity.

The final questionnaire is divided into three sections: the first section contains demographic information about the university students, including their gender, year and department. The aim is to find out whether the different basic attributes of the students have an impact on their satisfaction with online learning. The second part is the main part of this questionnaire, it contains the three dimensions that may influence students' satisfaction with online learning, namely learning resources, learning platforms and learning interactions, and is then divided into seven influencing factors: course content and course resources, platform design and platform technology, teacher-student interaction, student-student interaction and interaction style. These factors are considered to be important in influencing the quality of online learning compared to traditional learning and are the focus of this research. The last section is the overall satisfaction dimension.

The preliminary questionnaire was reviewed by experienced experts to determine the validity of the content, to optimise the question options and to modify statements that might be ambiguous and not easily understood. The research used the Cronbach's Alpha reliability coefficient method to test its internal consistency, and the results showed that the questionnaire's Cronbach's Alpha coefficient was 0.814, indicating that this questionnaire has a high degree of reliability.

Questionnaires were distributed to a total of 421 students in the School of Economics and Management of Zhumadian Vocational and Technical College. Finally, 84 valid samples were collected.

4. Results

SPSS 21 was used for statistical analysis. Descriptive statistics were used to analyze the responses to the satisfaction scales. Eighty-four responses out of 421 were received from students, a response rate of 19.9% as shows in Table 1. In terms of the gender distribution of the sample, 41 men (48.8% of the total sample) and 43 women (51.2% of the total sample). The majority of students (70.2%, n=59) had a previous experience with online learning. The grade distribution of the sample shows that there are 32 Freshman (38.1% of the total sample), 29 Sophomore (34.5% of the total sample), 14 Junior (16.7% of the total sample) and 9 Senior (10.7% of the total sample).

Table 1: Demographic characteristics of participants

		N	%
Gender	Male	41	48.8
	Female	42	51.2
Have a previous experience	Yes	59	70.2
	No	25	29.8
Grade	Freshman	32	38.1
	Sophomore	29	34.5
	Junior	14	16.7
	Senior	9	10.7

In order to determine whether there is a significant difference in the satisfaction of online learning between the two genders of university students, the t-test is used to analyse two samples of male and female university students in terms of their satisfaction with online learning. The t-test results show that there is no significant difference of online learning satisfaction between male and female, t (82) =-0.55, p=0.59, In specific, the students of male (M=3.95, SD=0.92) are similar to the students of female (M=4.16, SD=0.65) as shown in Table 2.

Table 2: Comparison of online learning satisfaction among university students by gender

		N	M	SD	*t*	*p*
Satisfaction	Male	41	3.95	0.92	-0.55	0.59
	Female	43	4.16	0.65		

It can be surmised that university students of different genders hold similar attitudes towards the process of trying and exploring new learning styles. It should also be noted that there may be differences in information literacy between the genders, and that students in the new era should actively improve their information literacy, be willing to try new things, actively participate and enjoy the convenience brought by information development. There is also no significant difference of online learning satisfaction of whether the student has experience of online learning, t (82) =-2.64, p=0.31 as shown in Table 3.

Table 3: Comparison of online learning satisfaction among university students by have taken

		N	M	SD	*t*	*p*
Satisfaction	Yes	59	3.92	0.84	-1.02	0.31
	No	25	4.40	0.58		

One-way ANOVA was conducted to find out if there were significant differences in university students' online learning satisfaction between grade level and what kind of change. The ANOVA outcomes showed that the differences in online learning satisfaction between different grade weren't significance [F (3,80) =0.39, p=0.76>0.05] as shown in Table 4. Although the learning needs of students at different levels vary, it is clear that the content and learning outcomes of the online courses provided by the school's "Smart Classroom" online learning platform can meet the needs of students at all levels.

Table 4: Comparison of online learning satisfaction among university students by Grade

		N	M	SD	F	*p*
Satisfaction	Freshman	32	4.06	1.22	0.39	0.76
	Sophomore	29	4.34	1.01		
	Junior	14	4.14	1.10		
	Senior	9	4.17	1.13		

A Pearson correlation coefficient was computed to assess the linear relationship between the Online learning total satisfaction and the influencing factors. The analysis results indicated that there was a positive and strong correlation between Interaction style and Online learning total satisfaction, r (82) =0.80, p<0.05 (Table 5)."Students' experience and achievement" focuses on boosting students' awareness and competence in value recognition, responsibility, problem-solving, and creativity through engaging in investigation activities. "Teacher development and gain" centers on evaluating instructors' effectiveness in facilitating learning gains during activity courses. Additionally, the evaluation system includes innovation, replicability, and overall satisfaction as three-level indicators for assessing the course's overall effectiveness. Overall, product evaluation helps measure activity program success, improves course design and implementation, and enhances teaching outcomes. Table 4 show comparison of online learning satisfaction among university students by grade.

In order to further investigate the quantitative relationship between the interdependence of the variables, this research uses the seven variables of course content and course resources, platform design and platform technology, teacher-student interaction, student-student interaction and interaction style as the independent variables, using the overall satisfaction with online learning as a dependent variable, to do a multiple linear regression analysis. After stepwise regression analysis, the results show that the regression model fits well and the results are plausible, F=23.471， p<0.01 as shown in Table 6. The final 2 variables, course content and interaction style, reached the level of significance ($p < 0.05$) and were included in the regression equation. The 2 variables, course content and interaction style, together explained 66.3% of the variance in satisfaction (adjR2 = 0.663). The final predictive model was: total satisfaction＝0.422 ×x1＋0.819×x2＋0.218. (At there, x1 is Course Content, x1 is Interaction Style).

Therefore, we can venture to speculate that course resources, platform design, platform technology, teacher-student interaction and student-student interaction have negligible impact on university students' satisfaction with online learning compared to course content and interaction methods. The reason for this is that good course content is the core of the course, while the essence of learning is communication between teachers and students, and whether communication is more effective is the focus of students' attention. Therefore, teachers should continue to enrich their courses, improve the practicality, richness and vividness of the courses, and at the same time pay attention to the improvement of the way of communication with students, timely guidance of students' learning and timely feedback of the problems raised by students.

Table 5: Correlation between the total satisfaction and satisfaction subscales among influencing factors

	Course content	Course resource	Platform design	Platform technology	Teacher & student	Student & student	Interaction style	Total
Course Content	1							
Course Resource	.741**	1						
Platform Design	.494**	.431**	1					
Platform Technology	.131	.210	.400**	1				
Teacher & Student	.046	-.023	.027	.291**	1			
Student & Student	-.033	-.014	-.016	.222*	.641**	1		
Interaction style	-.049	-.110	.074	.186	.396**	.254**	1	
Total	.128	-.035	.087	.149	.311**	.117	.796**	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6: Parametric test results of linear regression models for learning overall satisfaction

Model	Unstandardized coefficients		Standardized coefficients	*t*	*p*	95.0% Confidence interval for β	
	β	SD. Error	Beta			Lower bound	Upper bound
(Constant)	0.218	0.613		0.356	0.723	-1.004	1.440
Course content	0.422	0.144	0.302	2.926	0.005	0.135	0.709
Interaction style	0.819	0.072	0.175	11.302	0.000	0.675	0.964
Model summary	R^2=0.655, $adjR^2$=0.663, F=23.471						

As to whether they would continue to choose online learning as a learning method in the future, 41 students chose "Strongly Agree", accounting for 48.8.4% of the total, while 16 students chose "Agree", accounting for 19.0% of the total. The number of students who chose these two options alone was 19.0%. The number of students who chose these two options alone reached 57, or 67.8% of the total number of students as shown in Table 7. This shows that online learning has become a trend, and the state, society and universities should recognize this trend and prepare for it, so as to improve the level of online learning in China in all aspects. At the same time, whether university students will continue to choose online learning in the future can also verify the satisfaction of university students with online learning to a certain extent. If the majority of students continue to choose online learning, it means that students are generally satisfied with online learning as a learning method; on the contrary, it means that students are not very satisfied with online learning as a learning method.

Table 7: Comparison of online learning satisfaction among university students by Have taken and Grade

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
N	1	17	9	16	41
%	1.2	20.2	10.7	19.0	48.8

5. Discussion

Empirical research on online learning satisfaction is a relatively new topic in China, and the factors that influence online learning and online learning satisfaction criteria are still being explored (Wang et al., 2021). Due to the lack of relevant theories, research conditions and personal energy, there are some shortcomings in this research. Firstly, although the questionnaire reliability was good, no validity test was conducted, making the accuracy of the questions in the questionnaire uncertain. Secondly, the respondents only consisted of students from the School of Economics and Management of Zhumadian Vocational and Technical College, and the levels of online learning of students from different

majors were not the same, thus limiting the sample representation. Thirdly, the research method was mainly based on questionnaires, and there was no in-depth understanding of the deep-seated reasons affecting students' satisfaction with online learning (Liu & Sun, 2020). It is possible that other influencing factors could be discovered through in-depth interviews. Lastly, problems were raised based only on the results of the data analysis, without further exploration of solutions.

Based on the extent of these research shortcomings, future related studies can be improved by focusing on the following aspects: firstly, the design of the questionnaire should be more detailed, and the quality of the questionnaire should be enhanced. Secondly, expand the scope of the research population, together with qualitative research, such as interviews with students, open-ended survey questions and observational research, in order to expand the feasibility and depth of the research findings. Thirdly, to further research the countermeasures to improve students' satisfaction with online learning in the follow-up (Siaw & Jiang, 2021).

6. Conclusion

This research presents the objectives of the research by tracing the background of the emergence of online learning. By synthesizing the research on "online learning satisfaction" conducted by Chinese scholars, eight factors that may affect university students' satisfaction with online learning were identified: basic attributes, course content, course resources, platform technology, platform design, teacher-student interaction, student-student interaction, and interaction mode, with a total of four dimensions. Based on the literature research, a hypothesis was formulated, and the questionnaire was expanded accordingly. A random sample of university students from the School of Economics and Management at Zhumadian Vocational and Technical College was chosen as the research object, resulting in 84 valid questionnaires, and the collected data were statistically analyzed using SPSS. The regression equation revealed that two factors, course content and interaction style, had a significant association with university student satisfaction. However, given that the focus of this research differs from that of other scholars, the factors that did not enter the regression equation do not imply that they have no effect on university students' satisfaction with online learning; further empirical research is needed.

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