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Factors Impacting Student Satisfaction in Online Design Education: A Case Study of a Public University in Nanchang, China

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Abstract

Purpose: The study was designed to explore the factors influencing the online education satisfaction of undergraduate students at Art College of Nanchang University, China. **Research design, data and methodology:** The item-objective consistency index (IOC) was used to measure the validity of the survey questionnaire, and Cronbach's alpha was used for the pilot test (n=90). The 90 valid student questionnaires were analyzed by multiple linear regression to analyze the significant relationship between variables. A 12-week Intervention Design Implementation (IDI) was conducted with 30 undergraduate students (n=30) and three faculty representatives who had experienced online education. Then, Pre- and Post-IDI quantitative results were compared using paired-sample t-tests. **Results:** The study found that teachers' competence, responsiveness, empathy, and patience significantly impacted students' online learning satisfaction. The interviews revealed that post-intervention students widely reported that the teachers' teaching content was more appealing and practical, which enhanced students' trust in the teachers and their sense of security in learning. This boosted students' emotional engagement and satisfaction. **Conclusions:** The results indicate that systematic enhancement of teachers' competence could significantly improve students' online learning experience, revealing the importance of the balance between technological empowerment and humanistic care for improving education quality.

Keywords: Online Education, Learning satisfaction, Undergraduate Students, Art College

JEL Classification Code: A22, D91, I23, L84, M10

1. Introduction

With the rapid development of cutting-edge Internet technologies, the field of education is undergoing a profound digital transformation (Mikić et al., 2022). Online education provides students with flexible learning methods and personalized learning experiences through tools such as intelligent learning systems, virtual classrooms, and online platforms. These technologies break traditional classrooms' time and space constraints, facilitate the sharing of global educational resources, and alleviate educational inequality (Faisal et al., 2023). Especially during the COVID-19 epidemic, online education has seen unprecedented growth opportunities. Schools across the globe rapidly shifted to online modes of teaching and learning to meet the challenges posed by the epidemic. This shift validated the feasibility and effectiveness of online education and opened up new possibilities for the sustainability of higher education (Adedoyin & Soykan, 2023). However, despite the remarkable success of online education during the pandemic, its practical application on a large scale has also revealed several problems, such as a lack of student engagement, difficulties adapting to technology, and a lack of emotional connection.

The practice of online education during an epidemic is both a global attempt at emergency response and a comprehensive test of the resilience of the education system (Ali, 2020). The study found that while some students achieved better results in online learning, many still faced stress and difficulties. Successful transition to online education requires a high degree of adaptability, including

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technological support, adaptation of teaching methods, and ongoing monitoring and assessment of students (Toader et al., 2021). If students lack confidence in technology or cannot make effective social connections, their learning outcomes may greatly diminish (Bower, 2019). In addition, the lack of face-to-face communication between teachers and students and between students leads to a lack of emotional support, further affecting students' learning experience (Joshi et al., 2022). Although modern information technology can rapidly update learning materials and enhance teaching and learning efficiency, its limitations in terms of emotional connection and depth of interaction still need to be emphasized.

Existing studies have largely examined online education in general education contexts, focusing on infrastructure, student motivation, and system design (e.g., Adedoyin & Soykan, 2023; Ali, 2020). However, limited research has addressed the specific challenges faced in online design or art education, which relies heavily on interactivity, emotional engagement, and practice-based learning. In this domain, teachers' humanistic qualities such as competence, responsiveness, empathy, and patience may play an even more crucial role in shaping students' satisfaction due to the nature of creative and reflective learning.

The research problem addressed in this study centers on the limited understanding of how teachers' personal attributes and interpersonal behaviors impact student satisfaction in online art and design education. While online delivery has become a normative approach in the post-pandemic landscape, it remains unclear how students in disciplines with high demands for interaction and mentorship perceive the quality of online teaching, especially in the context of Chinese public universities, where art education is undergoing rapid digital transition. Therefore, in the post-epidemic era, maintaining the temperature of education in a high-tech environment has become an important issue for the future development of online education.

This study focuses on the factors influencing online learning satisfaction of undergraduate students in art colleges, aiming to provide theoretical and practical support for optimizing online education. By exploring the effects of four core variables: teacher competence, responsiveness, empathy, and patience on student satisfaction, the study attempts to reveal the balance between "technology" and "humanity" in online education. As a discipline that emphasizes practice and interaction, the special characteristics of online education in art colleges provide a unique perspective for the study and a theoretical basis for establishing a scientific and effective online learning evaluation system. In addition, by deeply analyzing the impact of teachers' roles and their abilities on students' satisfaction, this study provides educators with targeted training suggestions to promote the development of online education in the direction of greater flexibility and personalization. Ultimately, this research seeks to fill a crucial gap in the literature by examining how teacher-related humanistic qualities shape student satisfaction in a post-pandemic online design education context. In the face of uncertainty and change in the future of education, this study provides a scientific path for the sustainable development of online education, which is of great practical significance for enhancing teaching quality and improving students' learning experience.

2. Literature Review

2.1 Competence

Competence encompasses evaluating professional qualifications and expertise, establishing professional standards, implementing training programs, and creating career paths. Teacher education aims to establish a predetermined register of competence, similar to other disciplines (Potolea & Toma, 2019). Teachers are expected to be proficient in their subject matter (Toma, 2018), remain current by continually updating their knowledge, and integrate core content with fundamentals from social and natural sciences to foster versatility and innovation (Hill-Jackson et al., 2019).

Teacher competence which includes professional knowledge, pedagogical skills, and teaching methods, significantly influences students' learning experiences and outcomes. Strong pedagogical and collaborative abilities enable teachers to stimulate students' interest and enhance performance (Bisschoff & Grobler, 1998). Competence is seen as a combination of expertise, beliefs, motivational orientation, and self-regulation (Wuttke & Seifried, 2017). In domains such as medical education and engineering, professional competence has been rigorously linked to student learning satisfaction and performance, suggesting that transferable teaching models emphasizing applied expertise and reflective pedagogy can benefit practice-intensive fields like art and design education. In art disciplines, a positive learning environment fosters creative thinking and practical skills, promoting academic growth and character development (Hill-Jackson et al., 2019). Moreover, effective teachers must possess solid subject knowledge, extensive teaching experience, and familiarity with the latest pedagogical theories and technologies. As Potolea and Toma (2019) suggest, learning to teach is not merely about acquiring new knowledge and skills but is a transformative, value-oriented process.

By adapting validated competence frameworks from other domains to art education, this study contributes to the

broader academic discourse on teacher effectiveness and informs cross-disciplinary professional development strategies. The hypothesis is derived from these supported studies:

H1: (Teacher) Competence has a significant effect on students' satisfaction with online learning.

2.2 Responsiveness

Teacher responsiveness refers to the ability to promptly address student problems, confusion, or challenges. In online art education, students often encounter difficulties that require timely guidance. Teachers with strong responsiveness quickly identify issues and provide solutions, ensuring smooth progress (Walker & Hoover-Dempsey, 2014). Arbaugh (2000) found that efforts to create an interactive environment, including perceived course interaction, significantly enhance learning satisfaction. Since online student–instructor connections are often intermittent, prompt responses are essential for building trust, which in turn encourages active engagement and improved outcomes (Sinclair et al., 2017).

In business education and customer service training, responsiveness has been widely studied as a determinant of satisfaction, loyalty, and engagement (Choi & Kim, 2013; Gruber et al., 2010). Applying these principles in education suggests that when instructors act as service providers responsive to student needs, satisfaction significantly increases, a perspective gaining traction in digital pedagogy. Moreover, flexible teachers can adapt lesson plans and teaching methods to meet diverse needs, offering personalized support. Maintaining open communication channels and staying observant enables educators to quickly detect and resolve student confusion (Kavanagh et al., 2020; Sinclair et al., 2017). Finally, by adjusting lessons based on student feedback, teachers ensure content relevance and enhance engagement, ultimately boosting learning satisfaction (Rajabalee & Santally, 2021).

This cross-domain alignment with service responsiveness reinforces its universal applicability in improving satisfaction, supporting the academic value of integrating such models into design education. The hypothesis is derived from these supported studies:

H2: (Teacher) Responsiveness has a significant effect on students' satisfaction with online learning.

2.3 Empathy

Empathy is a teacher's ability to understand and share students' feelings and situations. Empathetic teachers maintain a positive outlook on student performance, manage problematic behaviors, and foster motivation and engagement (Wink et al., 2021). In art education, where learning is highly individualized, empathy enables teachers to understand students' unique personalities and needs, allowing them to tailor instruction based on backgrounds, interests, and goals (Tempelaar et al., 2017).

In the healthcare domain, particularly in nursing and patient care education, empathy is considered foundational for client satisfaction and psychological well-being (Neumann et al., 2011). Applying this framework to education highlights the essential role of emotional support in digitally mediated learning spaces. In online learning, where students often face emotional and psychological pressures, teacher empathy provides crucial support by reducing anxiety and stress, enhancing confidence, and promoting academic achievement (Weisz & Cikara, 2021). Parahoo et al. (2016) found that teacher empathy significantly drives academic satisfaction.

Furthermore, a positive relationship between teacher empathy and learner engagement is well documented (Wink et al., 2021). While some studies suggest that academic performance in online education is not solely dependent on the learning environment, students who perceive quality learning materials and effective student–instructor interactions report higher satisfaction and improved outcomes (Hong, 2002). Additionally, research on psychological contract theory indicates that student satisfaction assessments often focus on instructor performance rather than the learning process (Dziuban et al., 2015). Encouraging online activities such as self-assessment can further boost engagement and academic success (Strang, 2017).

Drawing parallels with other empathy-centered service models not only strengthens theoretical grounding but also demonstrates the utility of integrating socio-emotional competencies into pedagogical development, particularly for creative disciplines. The hypothesis is derived from these supported studies:

H3: (Teacher) Empathy has a significant effect on students' satisfaction with online learning.

2.4 Patience

Patience is a teacher's ability to listen, answer questions, and provide support throughout the teaching process. Patient teachers foster a positive learning environment that encourages exploration and innovation, increasing student satisfaction through clear guidance on course requirements (Sheridan & Kelly, 2010). In online learning, where students may become frustrated, patient and encouraging instructors help maintain motivation and confidence, leading to more effective learning (Vesely et al., 2007).

The importance of patience has been similarly emphasized in psychotherapy training, where supportive pacing and the ability to manage frustration are linked to

client retention and satisfaction (Norcross & Wampold, 2011). Applying this insight to education, especially in emotionally charged creative work, underscores the value of teacher patience in cultivating safe learning environments. Such teachers must possess strong emotional management, listening, and comprehension skills to understand student needs and remain calm under pressure (Voss et al., 2017). In art education, teachers must continuously update their skills to adapt to evolving teaching environments (Asoodar et al., 2016).

Moreover, students value online instructors who provide prompt feedback, address inquiries, and explain course requirements comprehensively (Sheridan & Kelly, 2010; Vesely et al., 2007). Although advanced technology offers flexible learning methods, an instructor's positive attitude toward technology encourages its acceptance despite inherent challenges (Asoodar et al., 2016). Ultimately, effective online education depends on users' attitudes toward technology (Sun et al., 2008), and the most successful online learners tend to be well-prepared and well-resourced (Lee, 2017; Spronk, 2001).

By adapting emotional labor frameworks from therapeutic and counseling fields, this research contributes to a deeper understanding of teacher affect in online learning and supports cross-disciplinary strategies for learner-centered instruction. The hypothesis is derived from these supported studies:

H4: (Teacher) Patience has significant effect on students' satisfaction with online learning.

2.5 Student Satisfaction

Different scholars have defined learning satisfaction from various perspectives. Some view it as an emotion or attitude experienced during learning, a sense of well-being when needs are met (Elliott & Shin, 2002; Long, 1985; Sanchez-Franco, 2009; Topala & Tomozii, 2014). Others define it as a subjective state resulting from comparing expectations with actual learning outcomes, where a larger gap leads to lower satisfaction (Arbaugh, 2000; Fernandes et al., 2013). Still, some consider it a comprehensive indicator that integrates students' experiences and self-assessments of course content, learning conditions, and teaching methods (Diep et al., 2017; Sun et al., 2008).

The literature also shows that teacher competence, attitude, feedback interaction, and students' self-efficacy are key factors affecting learning satisfaction. Studies on college students typically focus on satisfaction with classroom elements and school resources (Davis, 2017; Sivrikova et al., 2022; J.-H. Wu et al., 2010); personal learning experiences, including acquisition and expectations (Subrahmanyam, 2017; van Griethuijsen et al., 2020; C. Wu et al., 2021); and teacher feedback, particularly interactions and attitudes (Asoodar et al., 2016; Baber, 2021; Virtanen et al., 2017).

Incorporating perspectives from user experience (UX) research in IT and customer satisfaction models in business, satisfaction is increasingly understood as a multi-dimensional construct shaped by expectation management, responsiveness, and perceived value (Hassenzahl, 2010; Zeithaml et al., 1996). Applying these models to educational settings allows for more comprehensive metrics to evaluate satisfaction in online learning environments. Some scholars have integrated these dimensions to assess overall student satisfaction (Almaiah & Alyoussef, 2019; Ozkan & Koseler, 2009; Su & Guo, 2021). This integrative approach positions the current study to offer academic value not only to educational research but also to interdisciplinary efforts aimed at enhancing learner-centered service design.

3. Research Methods and Materials

3.1 Research Framework

This study develops a multidimensional theoretical framework based on existing theories and empirical studies to explore the impact of instructor competence on undergraduate students' satisfaction with online learning. The framework draws on three key studies. First, Cheng (2020) highlights the role of interactivity, course content quality, and course design quality in student satisfaction, showing that these factors indirectly influence students' willingness to continue using the course through perceived usefulness and validation. Second, Darawong and Widayati (2021) identified four dimensions—competence, reliability, responsiveness, and empathy—that significantly correlate with student satisfaction. Third, Gashi et al. (2022) developed a research model using validated factor analysis (CFA) that includes perceived usefulness (PU), perceived ease of use (PEU), computer anxiety (CA), self-efficacy (SE), system accessibility (SA), perceived interaction (PI), and perceived flexibility (PF) to identify key factors.

As shown in figure 1, the study proposes a comprehensive theoretical framework in which teachers' competence, responsiveness, empathy, and patience serve as independent variables and students' satisfaction with online learning is the dependent variable. Here, competence reflects teachers' abilities in technology integration and instructional design; responsiveness refers to their timely feedback to student needs; empathy signifies their understanding and support of students' emotional requirements in a virtual environment; and patience pertains to their attitudes and behaviors when addressing repeated questions or learning difficulties.

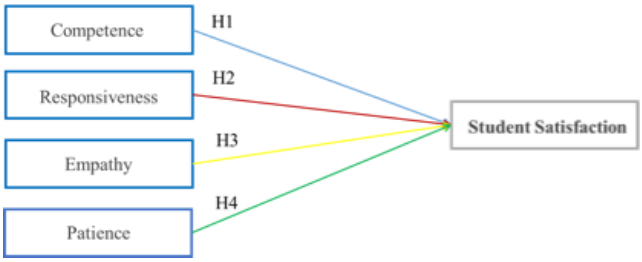

Figure 1: Conceptual Framework

3.2 Research Methodology

This study employs both empirical and quantitative analyses. A questionnaire was used to collect quantitative data from the target population using a mix of probability and non-probability sampling. Student satisfaction is a key indicator of overall academic experience, and surveys are the standard tool for measuring online learning satisfaction, with their validity and reliability well documented (Rienties, 2014).

Prior to data collection, the questionnaire's content validity and reliability were confirmed through an Item-Objective Consistency (IOC) test and a Cronbach's Alpha pilot test. It was then distributed online via "WENJUANXING" to undergraduate students at the Art College of Nanchang University, and the demographic characteristics of respondents with online learning experience were analyzed. Subsequently, 90 samples were selected via stratified random sampling for multiple linear regression (MLR) analysis to identify the key factors affecting students' satisfaction.

Additionally, a 12-week intervention (IDI) will be conducted, with both qualitative and quantitative methods used to assess changes between the pre- and post-intervention phases. Paired-sample t-tests will evaluate the impact of various factors on student satisfaction, while in-depth interviews will examine psychological changes in teachers and students, highlighting improvements in teaching and shifts in students' attitudes toward online learning.

3.3 Research Population, Sample Size, and Sampling Procedures

3.3.1 Research Population

Nanchang University, a comprehensive university located in Jiangxi Province, China, as of December 2022, there are 892 undergraduate students in the Art College of Nanchang University, which includes 251 freshmen, 224 sophomores, 200 juniors, and 217 seniors. The target population of this study was all undergraduate students from the College of Arts of Nanchang University, with an age range of 18 to 24 years old, who had an online learning experience, which was done to ensure that the participants could make a more realistic assessment of their satisfaction with online learning. The choice of the Art College as the study population was based on its disciplinary specificity: art education emphasizes practicality, interactivity, and personalized instruction, which makes applying online education in this field uniquely challenging.

3.3.2 Sample Size

A stratified random sampling method was used to determine the sample size for this study. According to Soper's (2006) SEM a priori sample size calculator, the recommended minimum sample size is 425 at 0.05 probability level based on the parameters of 7 latent and 30 observed variables. The questionnaires were sent to 504 students and screened for valid responses. After verification, 25 freshmen, 23 sophomores, 20 juniors, and 22 sophomores, totaling 90 samples, were selected from the eligible responses for multiple regression tests to determine the strength and significance of the relationship between the factors.

Subsequently, 30 students were selected as the experimental group to participate in the Intervention Design Implementation (IDI) phase.

3.3.3 Sampling Procedure

This study employed both probability and non-probability sampling methods. A questionnaire using a five-point Likert scale (strongly agree, agree, fair, disagree, strongly disagree) was distributed online to the target group. The sampling process was conducted in three stages:

Stage 1: Purposive Sampling – Students from the College of Arts at Nanchang University were selected based on relevance to the study.

Stage 2: Stratified Random Sampling – Students were categorized by academic year (freshmen, sophomores, juniors, and seniors), with samples drawn from each group.

Stage 3: Purposive and Convenience Sampling – Undergraduate art students with online learning experience were deliberately selected, and questionnaires were distributed online for convenience.

After multiple linear regression analysis, 30 students were selected as the experimental group. In the pre-IDI stage, the "WENJUANXING" application collected quantitative data, and in-depth interviews were conducted with faculty representatives and 10 randomly selected students. In the post-IDI stage, the same students retook the questionnaire and participated in follow-up interviews to assess changes in satisfaction and evaluate the intervention's impact.

3.4 Research Instruments

3.4.1 Questionnaire Design and Components

The researcher designed the questionnaire in four steps to ensure accuracy and effectiveness. First, screening items were included to identify invalid responses, collect demographic information, and establish a structured data management system for accurate recording and organization.

Second, each of the five key variables, teacher competence, responsiveness, empathy, patience, and student satisfaction was refined into four specific items to enhance measurement precision. A five-point Likert scale was used to ensure quantifiable and comparable data.

Third, the questionnaire was distributed both online and offline, with participants receiving a clear explanation of the study's purpose.

Lastly, to improve user experience and data quality, questions were formulated concisely with a logical flow, and the estimated completion time was limited to 10 minutes to enhance response rates.

3.4.2 IOC Results

Scale design is fundamental to data analysis, and the IOC process involves experts rating each item on a scale from -1 to +1: agreement (+1), doubtful (0), and disagreement (-1). By calculating the IOC value for each question, the quality of construction and content can be assessed, ensuring the questionnaire's applicability for data collection (Bollen, 1989). In this study, five experts evaluated the questionnaire: three were education specialists, including two university professors, and one was an expert from the Institute for Educational Research (IER). All dimensions in this study scored above the 0.67 criterion, hence measurement items can be retained.

3.4.3 Reliability and Validity

Cronbach's Alpha (CA) was used in this study to assess the reliability of the questionnaire (Cronbach, 1951). A random sample of 90 participants was selected for the reliability test. The results shown in the Table 1 below indicate that all items passed the reliability test with scores of 0.6 or higher (Nunnally & Bernstein, 1994).

Table 1: Pilot Test Result

Variable	No. of Items	Cronbach's Alpha	Strength of Association
Competence (C)	4	0.864	Good
Responsiveness (R)	4	0.725	Acceptable
Empathy (E)	4	0.834	Good
Patience (P)	4	0.858	Good
Satisfaction (S)	4	0.938	Excellent

4. Results and Discussion

4.1 Demographic Profile

Table 2 presents the frequency analysis of Art College students involved in the multiple regression analysis (n=90) and the IDI (n=30).

Table 2: Demographic Profile

Entire Research Population (n=90)		Frequency	Percentage
Gender	Male	42	46.7
	Female	48	53.3
Grade	Freshman	25	27.8
	Sophomore	23	25.6
	Junior	20	22.2
	Senior	22	24.4
IDI Participants (n=30)		**Frequency**	**Percentage**
Gender	Male	13	43.3
	Female	17	56.7
Grade	Freshman	10	33.3
	Sophomore	8	26.7
	Junior	8	26.7
	Senior	4	13.3

4.2 Multiple Linear Regression

In the multiple linear regression analysis, stratified sampling was used to select 90 valid questionnaire responses from undergraduate students at the College of Arts, Nanchang University. The results of the analysis are presented in Table 3.

Table 3: The Multiple Linear Regression of Four Independent Variables on Student Satisfaction

Variable	Standardized Coefficients Beta Value	t-value	p-value	VIF	R^2
Competence	0.341	4.204	0.000*	1.724	0.859
Responsiveness	0.194	2.27	0.029*	1.914	
Empathy	0.253	3.008	0.005*	1.859	
Patience	0.350	4.019	0.000*	1.989	

Note: p-value <0.05*

Multiple regression analysis using SPSS showed that all p-values were less than 0.05, indicating a significant effect of all four independent variables on the dependent variable. The R-squared value (0.859) suggests that the independent variables explain 85.9% of the variance in online learning satisfaction. The standardized regression coefficients were all positive, confirming a positive relationship. Among them, competence (0.341), empathy (0.253), and patience (0.35) had a greater impact than responsiveness (0.194). The findings support the following hypotheses:

H1: Teacher competence has a significant effect students' online learning satisfaction.

H2: Teacher responsiveness has a significant effect students' online learning satisfaction.

H3: Teacher empathy has a significant effect students' online learning satisfaction.

H4: Teacher patience has a significant effect students' online learning satisfaction.

A multicollinearity test showed variance inflation factor (VIF) values were all below 5, indicating no multicollinearity issues and a well-constructed model (Hair et al., 1995).

4.3 IDI Intervention Stage

The IDI period of this study lasted 12 weeks. Based on the analysis of questionnaire results, as well as the reliability, validity, and MLR data collected during the pre-IDI period, the IDI model is presented in Figure 2.

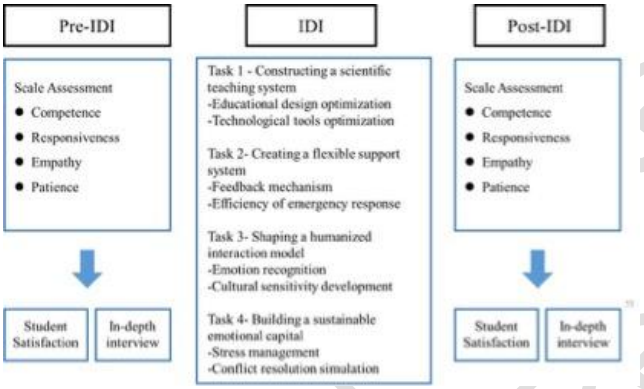

Figure 2: Intervention Design Implementation Model

4.4 Results Comparison between Pre-IDI and Post-IDI

This study conducted paired-sample t-tests to analyze all five variables—teacher competence (C), responsiveness (R), empathy (E), patience (P), and student satisfaction (S)—to determine improvements between the pre-IDI and post-IDI phases. Table 4 presents the results of the paired-sample t-tests for these variables.

Table 4: Paired-sample T-test Results

Variable	Mean	SD	t-value	p-value
Competence				
Pre-C	2.89	0.291	-10.41	0.000
Post-C	3.48	0.278		
Responsiveness				
Pre-R	2.77	0.377	-17.754	0.000
Post-R	3.60	0.259		
Empathy				
Pre-E	2.73	0.324	-13.049	0.000
Post-E	3.47	0.276		
Patience				
Pre-P	2.63	0.32	-13.26	0.000
Post-P	3.48	0.289		
Satisfaction				
Pre-S	3.04	0.389	-15.794	0.000
Post-S	3.94	0.284		

The paired-sample t-test results summarizing the effectiveness of the intervention in improving teacher competence, responsiveness, empathy, patience, and student satisfaction are as follows:

There was a significant improvement in teacher competence from Pre-IDI (M = 2.89, SD = 0.291) to Post-IDI (M = 3.48, SD = 0.278); $t(29) = -10.41$, $P < 0.05$*.

There was a significant improvement in teacher responsiveness from Pre-IDI (M = 2.77, SD = 0.377) to Post-IDI (M = 3.6, SD = 0.259); $t(29) = -17.754$, $P < 0.05$*.

There was a significant improvement in teacher empathy from Pre-IDI (M = 2.73, SD = 0.324) to Post-IDI (M = 3.47, SD = 0.276); $t(29) = -13.049$, $P < 0.05$*.

There was a significant improvement in teacher patience from Pre-IDI (M = 2.63, SD = 0.32) to Post-IDI (M = 3.48, SD = 0.289); $t(29) = -13.26$, $P < 0.05$*.

There was a significant improvement in student satisfaction from Pre-IDI (M = 3.04, SD = 0.389) to Post-IDI (M = 3.94, SD = 0.284); $t(29) = -15.794$, $P < 0.05$*.

These results indicate a statistically significant improvement in all measured variables—teacher competence, responsiveness, empathy, patience, and student satisfaction—between the pre-IDI and post-IDI phases, confirming the effectiveness of the intervention.

5. Conclusions and Recommendation

5.1 Conclusions

This study examined the impact of four independent variables—teacher competence, responsiveness, empathy, and patience—on student satisfaction with online learning. Using both quantitative and qualitative methods, data were collected from 504 undergraduate students at the Art College of Nanchang University. A stratified sample of 90 students was analyzed through multiple linear regression to verify the significance of the relationships between variables. The validity of the measurement instrument was ensured through the Index of Item-Objective Congruence (IOC), and reliability was tested using Cronbach's Alpha. Additionally, a 12-week intervention (IDI) was conducted with 30 students, and paired-sample t-tests compared pre- and post-IDI data.

The results showed a significant improvement in students' perceptions of teacher competence, responsiveness,

empathy, patience, and overall satisfaction after the intervention, confirming its effectiveness. Post-intervention interviews with three faculty members and 10 students further explored their perceptions of training effectiveness and learning satisfaction.

Findings indicate that the core value of online education lies not in technological sophistication, but in its ability to support students' holistic development. While advances in technology expand possibilities, education remains fundamentally about human interaction and understanding. Improving learning satisfaction requires the collaborative efforts of institutions, teachers, and students, balancing technology and human engagement.

The study concludes that instructor competence—including technology integration and course design—is crucial for enhancing online learning satisfaction, while responsiveness significantly improves the learning experience. Though empathy and patience take longer to develop, they play a vital role in providing emotional support and fostering a positive learning environment. These findings validate teacher competence as central to online education and offer practical guidance for improving educational practices.

5.2 Recommendations

The study confirms that improving teacher competence, responsiveness, empathy, and patience significantly enhances student satisfaction with online learning. Based on these findings, recommendations for strengthening online education focus on teacher training, platform optimization, and student support services.

Enhancing Teacher Training: Teacher competence is a key factor in effective online learning. Training should focus on curriculum design, guiding teachers in structuring content, integrating interactive elements, and adopting innovative assessment methods. Student support skills should be developed through active listening training, enabling teachers to track progress and provide timely interventions. Technology proficiency should be reinforced through hands-on workshops covering screen sharing, real-time collaboration, and online assessment tools. Emergency response training should prepare teachers for technical or classroom challenges through scenario simulations. Regular training sessions, classroom simulations, role-playing, and peer evaluations should be combined with a feedback loop, where student satisfaction surveys and teaching data analysis inform continuous improvement.

Optimizing Online Learning Platforms: Platform usability and technical reliability impact student satisfaction. Improvements should focus on simplified interface design, enhanced interactive features (discussion forums, real-time Q&A, online polling), and mobile optimization for flexible learning access. System stability should be strengthened to minimize lags and crashes, with prompt technical support available. The platform should evolve into an intelligent, interactive, and personalized learning ecosystem through continuous technological improvements.

Strengthening Student Support Services: A comprehensive support system should cover academic, psychological, technical, and community needs. Academic support should be tiered, with a focus on study habits for new students and practical skills for seniors. Psychological support should include an Online Psychological Station for anonymous counseling, stress management courses, and teacher training to identify students in distress. Technical support should feature an easily accessible FAQ knowledge base and short instructional videos to assist students struggling with technology. Community support should be reinforced through virtual learning communities, discipline-based study groups, and peer mentoring programs with a points-based incentive system.

Student support should be proactive and personalized, using big data analysis to predict student needs and deliver targeted resources in advance. By integrating prevention, intervention, and continuous improvement, online education can achieve a balance between technology and human engagement, enhancing the overall learning experience.

5.3 Limitation and Further Study

This study has limitations that future research should address. First, the sample representativeness is limited, as data were collected from students in a single art college, which may not fully reflect the experiences of students from different disciplines and backgrounds. Second, the study's timeframe was short, capturing only a specific period, which may not account for changes in student satisfaction over time. Future research should expand the sample size and extend data collection periods to achieve more generalizable findings.

For the future of online education, technology and human-centered approaches must be better integrated. User experience should be improved, with AI-driven platform enhancements that align with teachers' and students' needs. Teacher training should be ongoing, covering curriculum design, emotional support, and technology use. Ethical considerations must also be strengthened, ensuring responsible data use, privacy protection, and transparent management of student learning data.

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