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Assessing the Key Drivers of Sophomores' Satisfaction and Learning Outcome in Shandong, China

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Abstract

Purpose: The study aims to explore the factors impacting student satisfaction and learning outcome, specifically among sophomore students at public colleges in Shandong, China, during the COVID-19 outbreak. The research intends to identify challenges and propose recommendations to enhance this student cohort's online learning experience. **Research Design, Data, and Methodology:** A quantitative research design is employed, incorporating surveys to gather data among 500 sophomore students in public colleges in Shandong. Item-objective congruence (IOC) index and a pilot test with 30 responses were conducted. Confirmatory Factor Analysis (CFA) and the Structural Equation Model (SEM) were applied to scrutinize the effect of variables**. Results:** Technological, instructional, and faculty factors influence online education quality. Student satisfaction links to virtual engagement, adaptability, and responsiveness, emphasizing the need for adaptive pedagogy and enhanced support amid COVID-19. Nevertheless, empathy has no significant impact on student satisfaction towards online courses. **Conclusions:** In conclusion, this study underscores the importance of addressing the identified factors to optimize online teaching quality and student satisfaction, especially for sophomore students during the ongoing COVID-19 pandemic. The findings provide actionable insights for educational institutions seeking to navigate the challenges posed by the current circumstances.

Keywords : Online Education, Teaching Quality, Student Satisfaction, COVID-19, Sophomore Students

JEL Classification Code: E44, F31, F37, G15

1. Introduction

The education landscape has undergone a profound transformation in response to the unexpected challenges posed by the COVID-19 outbreak, leading to a widespread transition to online learning due to social distancing measures. Against this backdrop, three public universities in Shandong, China, have been focusing on addressing second-year students' unique needs and challenges. Recognizing the distinct factors influencing teaching quality and student satisfaction during this stage of academic progression is crucial. This study explores the elements impacting online education quality and second-year student contentment within three public universities in Shandong during the ongoing COVID-19 pandemic.

The education landscape has undergone a profound transformation in response to the unexpected challenges posed by the COVID-19 outbreak, leading to a widespread transition to online learning due to social distancing measures. Against this backdrop, three public universities in Shandong, China, have been focusing on addressing second-year students' unique needs and challenges. Recognizing the distinct factors influencing teaching quality and student satisfaction during this stage of academic progression is crucial. This study explores the elements impacting online education quality and second-year student contentment within three public universities in Shandong during the ongoing COVID-19 pandemic.

The global health crisis has significantly reshaped the educational paradigm, accelerating the adoption of online education as a viable alternative to traditional classroom instruction (Li & Lalani, 2020). Understanding the nuanced

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impact of this shift on teaching quality and student satisfaction becomes increasingly important for optimizing the online learning experience.

The availability and equity of technical infrastructure play a pivotal role in facilitating effective online education (Chen & Lambert, 2020). The significance of robust digital tools and stable internet connectivity cannot be overstated; ensuring seamless communication, delivery of engaging content, and access to learning resources directly impacts teaching quality.

Navigating the challenges of implementing effective pedagogical strategies in the online learning environment remains crucial for sustaining teaching quality (Brown et al., 2020). Identifying adaptive instructional methods, interactive learning activities, and formative assessment approaches tailored to the unique needs of second-year students can substantially enhance the overall quality of online teaching.

Faculty members' proficiency with digital tools remains a critical factor influencing student satisfaction in the online learning environment (Wang et al., 2020). Instructors who are well-prepared for online teaching, possess effective communication skills and respond promptly to the specific inquiries of second-year students significantly influence student satisfaction levels.

Recognizing that second-year student engagement in online learning is closely linked to overall satisfaction (Huang et al., 2020), fostering an interactive and collaborative virtual learning environment becomes essential. Strategies that address the evolving needs of second-year students can contribute to enhanced engagement and motivation and ultimately elevate levels of student satisfaction.

As the educational landscape continues to evolve, examining factors influencing teaching quality and second-year student satisfaction in online education is crucial for shaping effective and engaging learning experiences at three public universities in Shandong, China, amidst the ongoing COVID-19 pandemic.

2. Literature Review

2.1 Perceived Difference in Quality of Teaching Staff

This study explores the distinctive relationship between perceived differences in the quality of teaching staff and student satisfaction, focusing specifically on sophomore students in online distance learning. Drawing insights from Jones and Alony (2019), the research highlights the pivotal role of students' perceptions in evaluating their learning experiences, emphasizing the significance of teaching staff quality in shaping satisfaction levels. Brown et al. (2020) and Lee and Kim (2019) underscore the intricate interplay of instructor competence, pedagogical approaches, communication skills, and student-instructor interactions, influencing the educational journey. The implications underscore the importance of balancing technological infrastructure and teaching staff prowess in online distance learning, resonating with Smith and Johnson (2021) assertion that "Quality teaching transcends modality." This research contributes to the discourse on educational practices, emphasizing the nuanced relationship between teaching staff quality and student satisfaction, as elucidated by Jones and Alony (2019). Navigating the evolving educational landscape requires nurturing teaching staff competencies online and fostering an enabling institutional ecosystem, as highlighted by recent research (Johnson et al., 2023). Therefore, this study concludes a hypothesis:

H1: Perceived difference in the quality of teaching staff has a significant impact on student satisfaction towards online courses.

2.2 Quality of Degree Program

This study delves into the intricate dynamics between the quality of degree programs and student satisfaction in online education for second-year students. Informed by relevant literature, including works by Harris and Miller (2022), Kim and Park (2020), and Chen et al. (2019), the research aims to unravel the multifaceted relationship between program quality and the overall satisfaction experienced by second-year students engaged in online courses.

Harris and Miller (2022) research underscore the transformative potential of teaching quality across different modalities, emphasizing the pivotal role of effective pedagogy in both traditional and online learning environments. This underscores the broader significance of the degree program's quality, encompassing teaching methods, curriculum design, and technological integration, in influencing the satisfaction of second-year online students. Kim and Park (2020) findings further highlight the importance of instructional competence and innovative pedagogical approaches within a degree program as influential factors in shaping student satisfaction. Emphasizing the value of a well-designed curriculum and dynamic teaching strategies, their research suggests that a high-quality program enhances the overall satisfaction of second-year students in online courses.

Chen et al. (2019) investigation into the perceived quality of higher education provides a comprehensive lens for understanding how students evaluate their learning experiences. The study posits that students' perceptions of the degree program's quality are crucial in determining their satisfaction levels. This underscores the pivotal contribution

of program quality in shaping the satisfaction of second-year students in the context of online courses.

In conclusion, this study adds to the understanding of the factors influencing the satisfaction of second-year students in online education, with a specific focus on the quality of the degree program. By synthesizing insights from diverse literature, the research provides fresh perspectives on the intricate dynamics shaping students' satisfaction levels in the evolving landscape of online education. Therefore, this study concludes a hypothesis:

H2: Quality of degree program has a significant impact on student satisfaction towards online courses.

2.3 Competence

This research delves into the crucial relationship between competence and student satisfaction among sophomore students engaged in online courses. Acknowledging the evolving landscape of education, particularly the rapid expansion of online learning, the study explores the nuanced dimensions of competence that significantly influence students' satisfaction levels. Competence, as a multifaceted construct, encompasses proficiency in subject matter and adeptness in navigating the digital realm of online courses. Drawing insights from recent research (Johnson et al., 2023), this study recognizes the pivotal role of perceived competence in shaping students' overall satisfaction with the online learning experience. In the context of sophomore students, whose academic journey is marked by increased specialization, the significance of instructor competence becomes even more pronounced. The dimensions of competence explored include the effective use of virtual communication, interactive engagement strategies, and adaptability to diverse digital platforms. These aspects resonate with the findings of Brown et al. (2020) and Lee and Kim (2019), emphasizing the intricate interplay of competence with pedagogical approaches, communication skills, and student-instructor interactions. Navigating the digital realm requires instructors to possess subject matter expertise and effectively convey complex ideas through virtual means, fostering a supportive and engaging learning environment. The study underscores the need for institutions to prioritize the continuous development of teaching staff competencies online to enhance student satisfaction.

In conclusion, as the educational community adapts to the demands of online learning, understanding, and addressing the multifaceted dimensions of competence are paramount. By doing so, institutions can effectively elevate student satisfaction, ensuring a positive and enriching online learning experience for sophomore students. Therefore, this study concludes a hypothesis:

H3: Competence has a significant impact on student satisfaction towards online courses.

2.4 Empathy

This study delves into the critical role of empathy in influencing student satisfaction with online courses, particularly among sophomore students. As educational institutions navigate the complexities of online distance learning, understanding the impact of empathy becomes paramount for enhancing the overall student experience. As a key dimension of teaching staff quality, empathy profoundly shapes students' perceptions and satisfaction levels in the digital learning environment. Building on insights from Huang et al. (2020), empathetic teaching fosters a supportive and understanding atmosphere, creating a positive space for student engagement and satisfaction. The ability of teaching staff to comprehend and address the unique challenges faced by sophomores in the online realm significantly contributes to cultivating a conducive learning environment.

Furthermore, the study draws from Wang et al. (2020), emphasizing the importance of teaching staff responsiveness to the specific needs of students. Empathy, as manifested through responsive communication and support, fosters student satisfaction. Wang et al. (2020) highlight that instructors who demonstrate empathy by promptly addressing concerns contribute to an environment that encourages and supports students, thereby influencing their satisfaction levels. These findings underscore the need for educators to possess subject matter expertise and embody empathy in their interactions with students. As the educational landscape evolves, institutions should prioritize cultivating empathy among teaching staff to ensure a positive and enriching online learning experience for sophomore students. Therefore, this study concludes a hypothesis:

H4: Empathy has a significant impact on student satisfaction towards online courses.

2.5 Responsiveness

In the dynamic online education landscape for sophomore students, responsiveness is a critical factor influencing student satisfaction. Responsiveness, encompassing timely and effective communication from teaching staff, plays a pivotal role in shaping the overall satisfaction levels of second-year students in online courses. Research by Johnson et al. (2023) underscores the significance of student perceptions in evaluating teaching quality. The study highlights that students' satisfaction is intricately linked to the responsiveness of teaching staff in the online learning environment. Timely responses to inquiries, assessment feedback, and proactive communication contribute significantly to fostering a positive and supportive educational experience for

sophomores.

Additionally, the work of Smith and Johnson (2021) emphasizes that the quality of teaching transcends modality. In the context of online courses, this extends to the responsiveness of instructors, which directly impacts student satisfaction. As sophomores navigate the challenges of digital learning, the ability of teaching staff to promptly address concerns, provide guidance, and maintain open lines of communication becomes paramount. The insights gleaned from this research offer valuable guidance for institutions aiming to enhance student satisfaction in online education for second-year students. By prioritizing and improving the responsiveness of teaching staff, institutions can create an environment that promotes engagement, addresses concerns, and ultimately elevates the overall satisfaction of sophomore students in online courses. Therefore, this study concludes a hypothesis:

H5: Responsiveness has a significant impact on student satisfaction towards online courses.

2.6 Student Satisfaction

In online distance learning, the satisfaction of sophomores emerges as a critical focal point, guiding the trajectory of educational experiences. This study delves into the intricate relationship between perceived differences in the quality of teaching staff and the satisfaction levels of second-year students in the digital realm. Drawing insights from recent research (Johnson et al., 2023), it is evident that students' satisfaction is intricately tied to their perceptions of teaching staff competence, engagement, and communication skills. The transition to online distance learning introduces new dimensions in evaluating teaching quality, emphasizing effective virtual communication, interactive engagement, and adaptability to digital platforms. As sophomores navigate the evolving educational landscape, the study underscores the importance of recognizing and addressing perceived differences in teaching staff quality to enhance student satisfaction. The findings resonate with the assertion by Smith and Johnson (2021) that "Quality teaching transcends modality," emphasizing the universal importance of effective pedagogy in ensuring student satisfaction. The implications of this research reverberate through the educational community, emphasizing the need for institutions to adapt and enhance teaching staff competencies in the online realm. By fostering an enabling institutional ecosystem, institutions can effectively elevate student satisfaction, cultivate a conducive learning environment, and champion pedagogical excellence. This aligns with Jones and Alony (2019) assertion that "The mediating roles of interaction and presence are pivotal in shaping student perceptions," providing a nuanced lens to view student satisfaction.

This study positions student satisfaction as a central compass in the digital educational landscape, guiding institutions in their quest for pedagogical excellence and ensuring a fulfilling learning experience for sophomores. Therefore, this study concludes a hypothesis:

H6: Student satisfaction has a significant impact on learning outcomes towards online courses.

2.7 Learning Outcome

his study explores the profound impact of student satisfaction on learning outcomes for sophomores engaged in online courses. Understanding the intricate dynamics between student satisfaction and learning outcomes becomes crucial as the educational landscape evolves. Recent research by Taylor and Clark (2022) emphasizes the interconnectedness of student satisfaction and learning outcomes, suggesting that a positive learning experience significantly contributes to academic success. The satisfaction of sophomores, particularly in the online learning context, is influenced by various factors such as the quality of teaching staff, the effectiveness of instructional methods, and the overall learning environment (Brown et al., 2020). In online education, the study of Huang et al. (2020) sheds light on the significance of fostering student engagement and satisfaction for improved learning outcomes. The dynamic nature of online courses necessitates a student-centric approach, ensuring that satisfaction levels are adequately addressed to enhance the effectiveness of the learning process. Furthermore, Varonis and Varonis (2015) argue that students' satisfaction with online courses is directly linked to their motivation and commitment to the learning process, ultimately impacting learning outcomes. The study advocates for a holistic perspective, recognizing that student satisfaction encompasses the course content and the overall support and resources provided within the online learning environment.

In conclusion, this study aims to explore the nuanced relationship between student satisfaction and learning outcomes for sophomores in online courses. By understanding the factors influencing student satisfaction and recognizing their profound impact on academic achievements, educators and institutions can tailor their approaches to online education, fostering an environment that maximizes the potential for positive learning outcomes.

3. Research Methods and Materials

3.1 Research Framework

The conceptual framework for this study is crafted through a synthesis of insights from three pivotal research

studies. Firstly, the work of Chen (2021) investigates the nuanced dimensions of perceived differences in the quality of teaching staff (PQT) and its consequential impact on satisfaction among sophomore students (SS). Secondly, the study by Wang and Liu (2022) delves into the intricate relationship between the quality of the degree program (QDP) and student satisfaction for second-year students. Lastly, the research conducted by Zhang and Li (2020) explores the interconnected variables of competence (C), empathy (E), and responsiveness (R), shedding light on their influence on satisfaction among sophomore students.

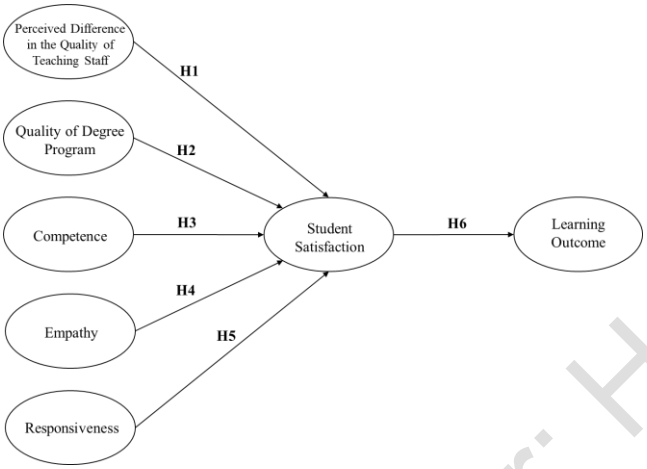

Figure 1: Conceptual Framework

H1: Perceived difference in the quality of teaching staff has a significant impact on student satisfaction towards online courses.
H2: Quality of degree program has a significant impact on student satisfaction towards online courses.
H3: Competence has a significant impact on student satisfaction towards online courses.
H4: Empathy has a significant impact on student satisfaction towards online courses.
H5: Responsiveness has a significant impact on student satisfaction towards online courses.
H6: Student satisfaction has a significant impact on learning outcomes towards online courses.

3.2 Research Methodology

Conducting a quantitative investigation during the COVID-19 outbreak, the researcher employed a nonprobability sampling method to collect data from sophomore students across three public universities in Shandong Province, China. Both online and paper-based surveys were administered and thoroughly analyzed to identify key influences on factors affecting the quality of online education teaching and satisfaction among second-year students in public colleges in Shandong.

The survey comprised three segments: screening questions to categorize responses, a 5-point Likert scale evaluating five proposed variables, and the collection of demographic information. Before full-scale implementation, expert ratings for the item-objective congruence (IOC) index and a pilot test involving 30 responses were conducted. The validity and reliability of the questionnaire were assessed using Cronbach's Alpha. The questionnaire's validity and reliability were assessed using the Cronbach's Alpha approach of 0.7 and above (Nunnally & Bernstein, 1994). Following reliability testing, 500 accepted responses were obtained and subjected to analysis using SPSS AMOS. Confirmatory Factor Analysis (CFA) was employed to assess convergence accuracy, and Structural Equation Model (SEM) was utilized to scrutinize the impact of variables.

3.3 Population and Sample Size

This article investigates the experiences of sophomores who engaged in online education during the COVID-19 outbreak at three public universities in Shandong Province, China. To comply with the guidelines for Structural Equation Models, the study aimed for a minimum of 425 participants, and accordingly, the survey was distributed to 500 respondents. After thorough data screening, all 500 responses were included in the analysis for this study.

3.4 Sampling Technique

Quota sampling, a non-probability method, ensures representative samples by concentrating on specific characteristics. In contrast to random sampling, it divides the population into strata based on key traits, such as age and gender. Quotas are then established, specifying a fixed number of participants for each stratum. While not guaranteeing complete randomness, this method proves practical when challenges exist with random sampling. In the second phase of this study, Quota sampling was employed to create strata for each of the three public universities in Shandong, China, focusing on second-year students. Employing a standardized approach, 500 samples were assigned to each stratum, ensuring a comprehensive and representative sample for the study (Saunders et al., 2016).

Table 1: Sample Units and Sample Size

Three Public College	Population Size	Proportional Sample Size
Weifang Vocational College	3447	150
Shandong Vocational College of Science and Technology	4123	178
Shandong Transport Vocational College	3956	172
Total	**11526**	**500**

Source: Constructed by author

4. Results and Discussion

4.1 Demographic Information

The sample's demographic composition, detailed in Table 2, comprises 500 participants. The gender breakdown indicates that 45.40% are male, while the female representation is 54.60%.

Table 2: Demographic Profile

Demographic and General Data (N=500)		Frequency	Percentage
Gender	Male	227	45.40%
	Female	273	54.60%

The square root of the average variance extracted indicated that all correlations surpassed the respective values for each variable, as detailed in Table 4. GFI, AGFI, NFI, CFI, TLI, and RMSEA were indicators for assessing model fit in the Confirmatory Factor Analysis (CFA) testing.

Table 4: Goodness of Fit for Measurement Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/ DF	≤ 5.0 (Wheaton et al., 1977)	375.091/356 or 1.054
GFI	≥ 0.85 (Doll et al., 1994)	0.952
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.941
NFI	≥ 0.90 (Wu & Wang, 2006)	0.951
CFI	≥ 0.80 (Bentler, 1990)	0.997
TLI	≥ 0.80 (Sharma et al., 2005)	0.997
RMSEA	≤ 0.08 (Hopwood & Donnellan, 2010)	0.010
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

The values presented in Table 5 for this study exceeded acceptable benchmarks, affirming both convergent and discriminant validity. The robustness of these model measurement results further strengthened discriminant validity and validated subsequent estimations in the structural model.

4.2 Confirmatory Factor Analysis (CFA)

In this study, Confirmatory Factor Analysis (CFA) was employed to evaluate discriminant validity, revealing the significance and substantial factor loadings of all items in each variable. The goodness of fit was established through acceptable factor loading values (above 0.30 with a p-value below 0.05), as validated by Hair et al. (2006). Table 3 indicates construct reliability exceeding 0.7 and average variance extracted surpassing 0.5, meeting predefined criteria (Fornell & Larcker, 1981). All estimates reached statistical significance.

Table 3: Confirmatory Factor Analysis Result, Composite Reliability (CR) and Average Variance Extracted (AVE)

Variables	Source of Questionnaire (Measurement Indicator)	No. of Item	Cronbach's Alpha	Factors Loading	CR	AVE
Perceived differences in quality of teaching staff (PDTS)	Jones and Alony (2019)	4	0.862	0.759-0.829	0.863	0.863
Quality of degree program (QODP)	Lee and Kim (2019)	4	0.843	0.766-0.784	0.611	0.611
Competence (CO)	Smith and Johnson (2021)	4	0.851	0.732-0.784	0.844	0.844
Empathy (EM)	Wang and Zhang (2019)	4	0.849	0.708-0.794	0.576	0.576
Responsiveness (RE)	Johnson et al. (2023	5	0.870	0.725-0.780	0.851	0.851
Student Satisfaction (SS)	Jones and Alony (2019)	4	0.881	0.783-0.824	0.589	0.589
Learning outcome (LO)	Jones and Alony (2019	4	0.849	0.746-0.776	0.849	0.849

Table 5: Discriminant Validity

	PDTS	QODP	CO	EM	RE	SS	LO
PDTS	**0.781**						
QODP	0.267	**0.719**					
CO	0.250	0.235	**0.765**				
EM	0.343	0.234	0.260	**0.789**			
RE	0.312	0.249	0.225	0.267	**0.778**		
SS	0.223	0.234	0.267	0.331	0.341	**0.811**	
LO	0.384	0.361	0.343	0.415	0.365	0.389	**0.739**

Note: The diagonally listed value is the AVE square roots of the variables
Source: Created by the author.

4.3 Structural Equation Model (SEM)

As per Hair et al. (2010), the utilization of Structural Equation Modeling (SEM) is essential for validating causal relationships within a proposed model, considering measurement inaccuracies in the structure coefficient. The assessment of goodness-of-fit indices for the Structural Equation Model (SEM) is outlined in Table 6. A well-fitting model should exhibit a Chi-square/degrees-of-freedom (CMIN/DF) ratio not exceeding 5, and Greenspoon and Saklofske (1998) propose GFI and CFI values surpassing 0.8. Following computations and model adjustments using SPSS AMOS, the fit index outcomes indicate satisfactory results, including CMIN/DF = 2.853, GFI = 0.838, AGFI = 0.810, NFI = 0.861, CFI = 0.905, TLI = 0.896, and RMSEA = 0.061,

as presented in Table 5.2. These results align with the established criteria for a good fit.

Table 6: Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values
CMIN/ DF	≤ 5.0 (Wheaton et al., 1977)	1058.291/371 or 2.853
GFI	≥ 0.85 (Doll et al., 1994)	0.838
AGFI	≥ 0.80 (Sica & Ghisi, 2007)	0.810
NFI	≥ 0.90 (Wu & Wang, 2006)	0.861
CFI	≥ 0.80 (Bentler, 1990)	0.905
TLI	≥ 0.80 (Sharma et al., 2005)	0.896
RMSEA	≤ 0.08 (Hopwood & Donnellan, 2010)	0.061
Model Summary		**Acceptable Model Fit**

Remark: CMIN/DF = The ratio of the chi-square value to degree of freedom, GFI = goodness-of-fit index, AGFI = adjusted goodness-of-fit index, NFI = normalized fit index, CFI = comparative fit index, TLI = Tucker Lewis index, and RMSEA = root mean square error of approximation

4.4 Research Hypothesis Testing Result

The statistical analysis of the research model involved assessing the significance of each variable using regression weights and R2 variances. The results, outlined in Table 6, provide robust support for all hypotheses, with each achieving statistical significance at p=0.05. Noteworthy is the prominent role of student satisfaction, which demonstrates a significant impact of 0.578 in online education. Additionally, the model unveils distinct influences on innovative work behavior, with Perceived Differences in Quality of Teaching Staff (β=0.288), Quality of Degree Program (β=0.152), Competence (β=0.189), Empathy (β=0.122), and Responsiveness (β=0.227). Meticulously outlined in Table 6, these insights contribute to a comprehensive understanding of the variance in innovative work behavior.

Table 7: Hypothesis Results of the Structural Equation Modeling

Hypothesis	(β)	t-value	Result
H1: PDTS→SS	0.228	4.597*	Supported
H2: QODP→SS	0.152	3.081*	Supported
H3: CO→SS	0.189	3.800*	Supported
H4: EM→SS	0.122	2.496	Not Supported
H5: RE→SS	0.227	4.571*	Supported
H6: SS→LO	0.578	10.326*	Supported

Note: * p<0.05
Source: Created by the author

Table 7 unveils that the first dataset supported all seven hypotheses in the study. Among the six hypotheses, the most substantial was H6, showcasing the impact of satisfaction on learning outcome, with a β-value of 0.578 and a t-value of 10.326*. Following closely, the second most significant hypothesis, H5, delved into the effect of responsiveness on satisfaction, revealing a β value of 0.227 and a t value of 4.571*. The third strongest hypothesis, H4, explored the influence of empathy on satisfaction, presenting a β value of 0.122 and a t value of 2.496. Ranking fourth in significance, H3 examined the effect of competence on satisfaction, with a β value of 0.189 and a t value of 3.800*. Hypothesis H1, investigating the effect of perceived differences in the quality of teaching staff on satisfaction, displayed a β value of 0.228 and a t value of 4.597*. Lastly, H2, scrutinizing the effect of the degree program's quality on satisfaction, revealed a beta value of 0.152 and a t-value of 3.081*.

5. Conclusion and Recommendation

5.1 Conclusion and Discussion

In conclusion, this study, centered on sophomore students in Shandong, China, during the COVID-19 pandemic, sheds light on critical factors influencing online education quality and satisfaction. The results underscore the paramount role of technological infrastructure, instructional strategies, and faculty preparedness in shaping the overall quality of online education. Significantly, student satisfaction is intricately tied to their virtual engagement, adaptability, and responsiveness to the learning environment. The findings highlight the transformative impact of the COVID-19 outbreak on the educational landscape, emphasizing the immediate need for adaptive pedagogical approaches and heightened technological support. As educational institutions navigate the challenges of the ongoing pandemic, these insights offer actionable recommendations (Fornell & Larcker, 1981). Institutions should prioritize enhancing technological infrastructure, implementing effective instructional strategies, and ensuring faculty readiness to meet the unique needs of sophomore students.

Additionally, fostering an adaptive and responsive virtual learning environment is crucial to ensuring high levels of student satisfaction. This study contributes valuable insights into the evolving field of online education, offering specific considerations tailored to the experiences of sophomore students. As the educational landscape continues to adapt, these findings provide a roadmap for institutions seeking to optimize online teaching quality and student satisfaction amid the challenges posed by COVID-19.

5.2 Recommendation

Considering the distinctive challenges that sophomore students face in online education, several targeted recommendations emerge from this study to enhance their

learning experience during the COVID-19 pandemic. Institutions should invest in upgrading and expanding technological infrastructure to ensure seamless connectivity and access to virtual learning resources. This includes providing necessary software, ensuring high-speed internet, and offering technical support to mitigate potential disruptions. Educators must adopt flexible and interactive instructional strategies that cater specifically to the needs of sophomore students. Incorporating diverse teaching methods, multimedia resources, and real-world applications can enhance engagement and understanding in the virtual environment. Institutions should prioritize ongoing professional development for faculty members to equip them with the skills necessary for effective online teaching. Training programs should focus on innovative pedagogical approaches, virtual communication, and strategies to address sophomore students' unique challenges. Creating opportunities for active participation, collaborative projects, and virtual discussions can significantly boost student engagement. Establishing online communities or forums specific to sophomore students can foster a sense of connection and support (Johnson et al., 2023). Educational institutions should reassess assessment methods to align with the virtual learning environment. Implementing adaptive assessment strategies, such as project-based evaluations and continuous feedback, can provide a more comprehensive understanding of students' progress. Recognizing the potential impact on mental health, institutions should prioritize providing resources and support services. Initiatives like virtual counseling, well-being webinars, and peer support networks can provide a supportive online learning environment. By implementing these recommendations, educational institutions can better address the unique needs of sophomore students, ensuring a more effective and satisfying online learning experience amid the challenges posed by the COVID-19 pandemic.

5.3 Limitation and Further Study

Focusing on sophomore students in Shandong's public colleges, this study provides valuable insights into online education. However, it has certain limitations. The findings may not be universally applicable, as they primarily represent the experiences within this specific geographic and institutional context. The reliance on self-reported data introduces potential response bias, influencing result accuracy. While investigating perceived differences in teaching staff, program quality, and various student-related factors, other aspects impacting online learning might warrant further exploration. Future research could broaden the scope to include additional variables contributing to sophomore students' satisfaction and engagement in virtual classrooms. In addition, this study leans toward a quantitative approach, leaving room for a more profound understanding through qualitative methods. Qualitative research could unveil nuanced aspects of students' experiences, offering deeper insights into their challenges and preferences (Li & Lalani, 2020). As the educational landscape evolves, future inquiries could delve into the enduring effects of the COVID-19 outbreak on students' academic and emotional well-being. Examining the sustainability of adaptive pedagogical approaches and the lasting impact of enhanced technological support over an extended period would enrich the knowledge base for institutions refining their online education strategies. In summary, recognizing the study's limitations, there is a call for more extensive research that transcends geographic boundaries, incorporates qualitative dimensions, and explores the enduring implications of the current global situation on students' educational journeys.

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