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Key Factors Affecting College Students' Continuance Intention Toward E-Learning in a Public College in Guangdong, China

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Abstract

Purpose: This study examines the impact of five independent variables—satisfaction, perceived usefulness, platform engagement, performance expectation, and openness—on the intention to use e-learning platforms among students at a public university in Guangdong, China. Additionally, the study aims to identify significant differences between these variables. **Research Design, Data, and Methodology:** The research utilized the Index of Item-Objective Congruence (IOC) for validity testing and Cronbach's Alpha in a pilot test (n=30) for reliability assessment. Data from 178 students were analyzed using multiple linear regression to examine the significant relationships between variables. Subsequently, 30 students participated in a 15-week Intervention Design Implementation (IDI). Quantitative results from before and after the intervention were compared using a paired-sample t-test. **Results:** Multiple linear regression results indicated that satisfaction, perceived usefulness, platform engagement, performance expectation, and openness positively influenced students' continuance intention to use the e-learning platform. The paired-sample t-test results demonstrated significant differences in the continuance intention towards e-learning before and after the IDI intervention. **Conclusions:** This study aims to foster students' creativity and enhance their continuance intention towards using e-learning platforms through cultivating self-leadership skills in the Guangdong region. The findings provide significant empirical support for the design of user experiences and educational practices in e-learning systems.

Keywords: Continuance Intention, E-Learning, Higher Education, Intervention Design Implementation (IDI)

JEL Classification Code: I23, J28, L2

1. Introduction

The proliferation of e-learning platforms has reshaped educational dynamics, offering unprecedented access and flexibility to learners worldwide. This shift has been particularly significant in regions like Guangdong, China, where technological integration into education has rapidly accelerated. This study examines the continuance intention of college students toward e-learning at a public college in Guangdong, integrating established theoretical frameworks such as the Technology Acceptance Model (TAM) and the Expectation-Confirmation Model (ECM). These models help to elucidate the cognitive and behavioral determinants that influence students' sustained engagement with e-learning platforms.

Amidst increasing digital reliance in education, this research focuses on key variables such as satisfaction, perceived usefulness, platform engagement, performance expectation, and openness. The study aims to assess these factors' direct impacts on continuance intention and explore the efficacy of Intervention Design Implementation (IDI) in enhancing educational outcomes through structured, empirical interventions.

Understanding these dynamics becomes crucial as e-learning becomes more entrenched in the educational landscape. This research contributes to the literature by providing insights into the factors that encourage sustained use of e-learning systems, thereby supporting educational administrators and policymakers in designing more effective digital learning environments.

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2. Literature Review

2.1 Continuance Intention

Continuance intention" was defined as the individual's determined commitment to persist using a specific technology or application, highlighting the enduring nature of user-technology interactions. Vedadi and Warkentin (2016) emphasized its significance in the realm of user commitment to digital platforms, while Tam et al. (2018) and Wang et al. (2021) focused on the predisposition of users to maintain the use of mobile applications and other technological services. This notion was further contextualized by Palullungan (2022) and Dangaiso et al. (2023), who linked continuance intention to the ongoing engagement with technological solutions, particularly highlighting shifts in technology use in a post-pandemic world.

The literature on continuance intention reveals that this concept is significantly influenced by a mixture of cognitive, affective, and habitual factors, suggesting that repeated user behavior can sometimes bypass rational decision-making processes. Bhattacherjee (2001) noted the impact of users' performance expectations on their decision to continue using an information system. Further, Handayani et al. (2017) and Hsieh (2018) demonstrated the crucial role of perceived usefulness and user satisfaction in fostering continuance intention, aligning with findings by Huang and Nan (2023) that confirm these factors are critical predictors as per the expectation confirmation model (ECM). This body of research collectively underscores the complexity of continuance intention and its key drivers in information systems and technology acceptance.

2.2 Satisfaction

Fundamentally, satisfaction is perceived as a perceptual judgment where individuals assess the discrepancies between their expectations and the actual performance of a product or service. Tse and Wilton (1988) highlighted that satisfaction is essential for evaluating product quality and fostering customer loyalty. This concept was further detailed by Levesque and McDougall (1996) and Oliver (1999), who described satisfaction as an overarching attitude towards products or providers and a nuanced emotional response, respectively. Bhattacherjee (2001) explored the psychological basis of satisfaction, defining it as the emotional state resulting from evaluating expectations versus reality. In the educational context, Komunda and Osarenkhoe (2012) articulated satisfaction as a critical measure of the effectiveness of educational services, reflecting its varied applications across different sectors.

The literature underscores the integral role of satisfaction in influencing consumer behaviors and loyalty. Early studies by Newman and Werbel (1973) and Churchill and Surprenant (1982) identified a strong correlation between customer satisfaction and repeat purchasing behavior, establishing the foundational connection between satisfaction and consumer loyalty. Anderson and Sullivan (1993) argued that satisfaction is not transient but crucial for long-term loyalty, likened to a strategic investment by service providers. Subsequent research by Spreng et al. (1996) and Kataria and Saini (2019) reinforced that satisfaction enhances customer loyalty and mediates the relationship between brand trust and loyalty, indicating its pervasive influence on consumer relations and market strategies. Thus, the subsequent hypothesis is proposed:

H1: Satisfaction has a significant impact on students' continuance intention in e-learning.

2.3 Perceived Usefulness

Perceived usefulness, as foundational to the Technology Acceptance Model (TAM), was first elaborated by Davis (1989), who identified it as crucial for accepting and integrating new technologies. As Tojib and Tsarenko (2012) and Ozturk (2016) further refined, this evaluative judgment pertains to the expected benefits that a technological tool could offer, enhancing both personal and professional performance. Chau (2001) and Venkatesh et al. (2003) emphasized its role in setting anticipatory expectations about e-learning outcomes, marking it as a decisive factor for technology utilization. Recently, Wong et al. (2023) spotlighted its significance within Virtual Reality (VR) training contexts, highlighting its impact on enhancing learning efficiency through immersive technological applications.

The literature suggests that perceived usefulness significantly influences user engagement with technology. Igbaria (1995) noted the influence of self-efficacy on system use perceptions, which Venkatesh and Davis (2000) and Ong and Lai (2006) associated with increased adoption of online learning platforms due to their practical benefits. Schindler and Bickart (2012) and Calisir et al. (2014) demonstrated that positive feedback and the utility of educational technologies are pivotal in shaping user perceptions and decisions to adopt such technologies. Additionally, Fang et al. (2016) found that the perceived usefulness of online reviews can extend user engagement, emphasizing the importance of perceived utility in fostering prolonged interactive experiences with digital platforms. Thus, the subsequent hypothesis is proposed:

H2: Perceived usefulness has a significant impact on students' continuance intention in e-learning.

2.4 Engagement on the Platform

As detailed by O'Brien and Toms (2009), engagement on digital platforms encompasses the elements that elevate the user experience through visual design, interaction, and control. This concept, further developed by Vivek et al. (2012) and Gummerus et al. (2012), reflects the level of a user's involvement and the satisfaction derived from interacting with digital services or products. Brodie et al. (2013) and Lin et al. (2015) extended this definition to include the interactive experiences between consumers and brands and the shared responsibilities and support within online communities. Castillo et al. (2021) focused on the emotional responses from users through engagement activities like viewing or liking content, highlighting its impact on community building and brand interaction.

Research by Koufaris (2002) and Eroglu et al. (2003) illustrated how digital engagement profoundly impacts consumer behavior and experience by integrating thoughtful design elements that enhance interactivity. Jiang et al. (2010) emphasized the role of reciprocal communication in deepening user engagement, suggesting that direct interactions between platforms and users are crucial for sustained engagement. Further studies by Blasco-Arcas et al. (2013) and Fan et al. (2016) discussed engagement within educational settings and its correlation with technology dependency, respectively, underscoring the enhancement of learning and user reliability on digital platforms. Lastly, Harrigan et al. (2021) argued that engagement should be measured to evaluate its economic implications, connecting user engagement directly with the financial outcomes of digital content strategies. Thus, the subsequent hypothesis is proposed:

H3: Engagement on the platform has a significant impact on students' continuance intention in e-learning.

2.5 Performance Expectation

Performance expectation has been fundamentally described within the framework of expectancy-value theory, where Ridgeway and Berger (1986) elucidated it as the belief in one's capability to effectively contribute to a collective task for personal or communal benefit. Compeau and Higgins (1995) further defined it as anticipating specific behavioral outcomes from one's actions, while Venkatesh et al. (2003) considered it the confidence in enhancing personal performance through technology adoption. Kao et al. (2019) later emphasized its essential role in technology adoption, highlighting its significant influence on strategic decision-making processes related to new technologies.

The impact of performance expectations on user behavior has been substantial, with diverse interpretations and practical applications across various fields. Boulding et al. (1993) and Lwoga and Komba (2015) highlighted its role within educational contexts, suggesting it influences students' perceptions of how systems can enhance their academic performance. Negative and positive stereotypes about technology, according to Kuzlak (2017) and Brandsma et al. (2020), also shape performance expectations, affecting users' attitudes toward technology adoption and their engagement with educational platforms. Thus, the subsequent hypothesis is proposed:

H4: Performance expectation has a significant impact on students' continuance intention in e-learning.

2.6 Openness

"Openness," within the scope of educational and technological frameworks, refers to an ideological emphasis on transparency and the unrestricted dissemination of knowledge (Baldwin, 2003). Benlian et al. (2015) identified openness as essential for fostering innovation on digital platforms, highlighting its role in creating inclusive, accessible, and engaging environments. This construct is further refined as a trait influencing health and decision-making, with O'Súilleabháin et al. (2018) associating it with broader wellness impacts. The contemporary view by Splitter et al. (2022) describes openness as involving transparency and active participation in decision-making processes, extending to the sharing of data and open access to scholarly outputs (Rudolph & Zacher, 2022).

Research has consistently supported the positive impact of openness on cognitive and societal growth. Romer (1986) underlined how openness facilitates economic expansion through new growth theory. Ackerman and Heggestad (1997) and Ingledew and Markland (2008) linked openness with enhanced intellectual and health-related motivations. Furthermore, Siemens and Matheos (2012) explored its cultural implications within higher education, noting its significant but nuanced influence on social and academic interactions. Studies like those by Klein et al. (2011) and Khoo and Simms (2018) have documented the variable effects of openness on social satisfaction and mental health, underscoring its complex role in shaping educational and social outcomes. Thus, the subsequent hypothesis is proposed:

H5: Openness has a significant impact on students' continuance intention in e-learning.

3. Research Methods and Materials

3.1 Research Framework

In developing the conceptual framework, the researcher incorporated three pivotal theoretical models. These include the dynamic interaction model by Cheng (2022), which focuses on the interplay between leadership and innovation; the integrative framework by Shao and Chen (2020) that explores the nexus of creativity and technology use; and the comprehensive model by Chen et al. (2018b) that examines self-leadership within digital contexts. Each of these frameworks contributed substantively to refining the conceptual underpinnings of the study. The combined insights from these models supported and developed the conceptual framework depicted in Figure 1.

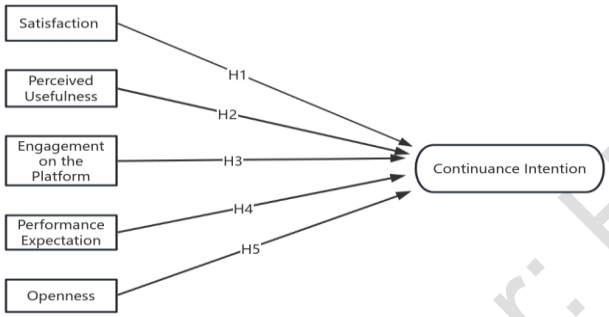

Figure 1: Conceptual Framework

H1: Satisfaction has a significant impact on students' continuance intention in e-learning.
H2: Perceived Usefulness has a significant impact on students' continuance intention in e-learning.
H3: Engagement on the platform has a significant impact on students' continuance intention in e-learning.
H4: Performance expectation has a significant impact on students' continuance intention in e-learning.
H5: Openness has a significant impact on students' continuance intention in e-learning.

3.2 Research Methodology

In the initial phase, purposive sampling was employed to select specific groups pertinent to the study's focus. This was followed by stratified random sampling to ensure representativeness across various strata within the population. Lastly, a combination of purposive and convenience sampling targeted accessible participants who met the research criteria (n=188). Subsequently, data were collected to develop the proposed conceptual framework, and all hypotheses were rigorously tested through multiple linear regression to ascertain their significance at a threshold p-value of <0.05. As a result, all five hypotheses were supported and retained.

In the second stage, with all hypotheses supported, purposive sampling was used to select 30 students from these five colleges for the pre-IDI questionnaire. Of these, 15 were chosen for pre-IDI interviews. The IDI was then implemented with the 30 participants to enhance their efficiency in utilizing online learning resources in future learning endeavors.

In the final phase, post-IDI, the 30 students in the experimental class were asked to complete a post-IDI questionnaire again, and 15 were randomly selected for interviews. Paired sample t-tests were conducted to compare results before and after the IDI. This comprehensive process thoroughly evaluated the study's objectives and hypotheses.

3.3 Research Population, Sample Size, and Sampling Procedures

3.3.1 Research Population

Employing purposive sampling, students from the first through fourth years who had previously engaged in E-learning were selected from five faculties at a public university in Guangdong: Faculty of Mathematics and Computing, Faculty of Coastal Agriculture, Faculty of Shipping and Maritime Studies, and Faculty of Marine Studies. According to the university's 2023 data, these faculties collectively enroll 15,358 students. A sample of 188 students, representing 1.22% of the total population from these faculties, was chosen for this study. Of these, 178 provided valid responses to the distributed paper questionnaires, as verified by the researchers.

3.3.2 Sample size

Hair (2008) suggests that a sample size of 30 to 500 is sufficient for most studies. In the initial diagnostic phase, the sample size was 30 for the reliability test and 188 for the multiple linear regression test. At the IDI stage, 30 students were selected for this study as participants in implementing the IDI. In the post-IDI phase, 30 students will serve as respondents, and research information will be collected using the same research methodology as in the pre-IDI phase.

3.3.3 Sampling Procedures

The researcher employed a multi-stage sampling approach to ensure the robustness of the study design:

Sampling 1: Pilot Survey and Pilot Test

Initially, 30 students were randomly selected for a pilot survey and test. The objective was to collect feedback on the survey questionnaire to refine its structure and content based on the students' responses.

Sampling 2: Pre-Survey

For the primary phase of the study, 188 students were sampled from five faculties at a public university in Guangdong to participate in a pre-survey. Of these, responses from 178 students were confirmed as valid, ensuring a reliable basis for further analysis.

Sampling 3: Sampling for IDI (Intervention Design Implementation)

In the intervention phase, 30 students who volunteered were randomly chosen to participate in the IDI, aiming to assess the effectiveness of the intervention in a controlled setting. This sampling strategy facilitated the evaluation of targeted educational interventions within the study.

3.4 Research Instruments

3.4.1 Design of Questionnaire

The development of the survey questionnaire was meticulously structured into three distinct phases to ensure methodological rigor and relevance to the target population:

Step 1: The researcher derived initial items for the questionnaire from three previously published articles that provide foundational insights into the survey's thematic focus (Chen et al., 2018; Cheng, 2022; Shao & Chen, 2020).

Step 2: The survey questions were adjusted to align with the specific context of students at a public university in Guangdong, China. This step involved refining the language and content to reflect the participants' unique cultural and educational settings.

Step 3: Implementation of the IOC (Item Objective Congruence)

3.4.2 Components of Questionnaire

Demographic Section: This initial segment comprised three questions aimed at gathering basic information such as gender, grade level, and major. The purpose of this section was to acquire demographic data that would facilitate stratification in the later stages of data analysis.

Main Survey Section: The core of the questionnaire featured 22 items on a 5-point Likert scale, from "Strongly Disagree" to "Strongly Agree" (Likert, 1932). These items were designed to evaluate aspects such as satisfaction with the online learning experience, enjoyment and benefits derived from online education, perceptions of learning efficiency and goal achievement, sense of community, and freedom in using online resources. This setup ensured comprehensive coverage while maintaining clarity and conciseness to allow for straightforward responses, thereby effectively gauging college students' willingness to persist with online learning and identifying the underlying motivations and obstacles.

3.4.3 IOC Results

This study employed an expert review to validate the questionnaire against the research objectives and the definitions of terms, using the Item-Objective Congruence (IOC) index with ratings: +1 for congruent, 0 for questionable, and -1 for incongruent. Five specialists conducted independent evaluations, including two university associate professors in pedagogy (Expert 1 and Expert 2) and three external educators with doctoral degrees (Expert 3, Expert 4, and Expert 5). During the review, each question on the PC scale, comprising 22 items, received an average rating above the 0.67 threshold, leading to the unanimous decision to retain all items. These experts, all based in China, brought critical insights from their extensive academic and practical experiences to refine the questionnaire effectively.

3.4.4 Pilot survey and Pilot test results

The questionnaire, composed of 22 items, underwent reliability testing with 30 respondents. Following the Item-Objective Congruence (IOC) evaluation, all items were retained, demonstrating satisfactory reliability scores: Satisfaction (0.790), Perceived Usefulness (0.857), Engagement on the Platform (0.798), Performance Expectation (0.748), Openness (0.796), and Continuance Intention (0.603). As Sekaran (1992) suggests, a Cronbach's alpha coefficient of 0.60 or above is considered acceptable; therefore, all 22 items were preserved.

Table 1: Pilot Test Result

Variables	No. of Items	Sources	Cronbach's Alpha	Strength of Association
Satisfaction	4	Bhattacherjee (2001)	0.790	Acceptable
Perceived usefulness	4	Venkatesh et al. (2003)	0.857	Good
Engagement on the platform	3	Gummerus et al. (2012)	0.798	Acceptable
Performance expectation	4	Ridgeway and Berger (1986)	0.748	Acceptable
Openness	4	Benlian et al. (2015)	0.796	Acceptable
Continuance intention	3	Wang et al. (2021)	0.603	Questionable

4. Results and Discussion

4.1 Results

4.1.1 Demographic Profile

The researcher outlined the demographic profile of the entire research population (n=178) and provided specific

details of the subset of students (n=30) who participated in the IDI, as illustrated in Table 2.

Table 2: Demographic Profile

Entire Research Population (n=178)		Frequency	Percent
Gender	Male	97	54.5%
	Female	81	45.5%
Time of enrollment	2020.09	17	9.55%
	2021.09	16	8.99%
	2022.09	33	18.54%
	2023.09	112	62.92%
Major Category	Humanities and Social Sciences	82	46.07%
	Science and Technology	96	53.93%
Total		**178**	**100%**
IDI Participants (n=60)		**Frequency**	**Percent**
Gender	Male	14	46.67%
	Female	16	53.33%
Course	2020.09	6	20.00%
	2021.09	12	40.00%
	2022.09	9	30.00%
	2023.09	3	10.00%
Major Category	Humanities and Social Sciences	17	56.67%
	Science and Technology	13	43.33%
Total		**30**	**100%**

4.1.2 Results of multiple linear regression

The researcher conducted a Multiple Linear Regression (MLR) on 178 survey responses, confirming support for all five hypotheses. The results indicated that Perceived Usefulness, with the highest standardized coefficient (Beta) of .246, was the most influential variable on continuance intention, followed by Satisfaction at a Beta of .222. Engagement on the Platform, Performance Expectations, and Openness also significantly impacted continuance intention, albeit with lower Beta values. The t-values for all independent variables exceeded 2, rejecting the null hypothesis and confirming their significant impact on continuance intention. Perceived Usefulness, with a p-value of .005, strongly influenced continuance intention. The regression model explained 70.5% of the variance in continuance intention, as evidenced by an R-squared value of .705. This underscores the importance of enhancing service satisfaction, utility perception, user engagement, performance expectations, and openness to sustain platform usage. Additionally, the Variance Inflation Factor (VIF) values, which assess multicollinearity, ranged from 2.09 to 4.89 for the variables, all below the threshold of 5, indicating no significant multicollinearity.

Table 3: The multiple linear regression of five independent variables on continuance intention

Variables	Standardized Coefficients Beta	t-value	p-value	VIF	R	R Square
Satisfaction	.222	2.42	.017	4.89		
Perceived usefulness	.246	2.83*	.005	4.42		
Engagement on the platform	.169	2.31*	.022	3.13	.839	.705
Performance expectation	.166	2.29*	.023	3.05		
Openness	.156	2.61*	.010	2.09		
Satisfaction	.222	2.42*	.017	4.89		
Dependent variable: Continuance Intention						

Note: p-value <0.05*

Therefore, H1: Satisfaction had a significant impact on Continuance Intention. H2: Perceived Usefulness had a significant impact on Continuance Intention. H3: Engagement on the Platform had a significant impact on Continuance Intention. H4: Performance Expectation had a significant impact on Continuance Intention. H5: Openness had a significant impact on Continuance Intention. These five hypotheses were supported by the Multiple Linear Regression (MLR). Hypotheses were progressively formulated based on the outcomes of the Multiple Linear Regression (MLR) analysis. Subsequently, the Intervention Design Implementation (IDI) was analyzed by these hypotheses:

H6: There is a significant mean difference in "Satisfaction" between pre- IDI and post- IDI stages.

H7: There is a significant mean difference in "Perceived Usefulness" between pre- IDI and post- IDI stages.

H8: There is a significant mean difference in "Engagement on the Platform" between pre- IDI and post- IDI stages.

H9: There is a significant mean difference in "Performance Expectation" between pre- IDI and post- IDI stages.

H10: There is a significant mean difference in "Openness" between pre- IDI and post- IDI stages.

H11: There is a significant mean difference in "Continuance Intention" between pre- IDI and post- IDI stages.

4.2 IDI Intervention Stage

The multiple linear regression analysis outcomes facilitated the development of hypotheses H6 through H11. Subsequently, an Intervention Design Implementation (IDI) action research program was structured to unfold in three distinct phases, as illustrated in Figure 2.

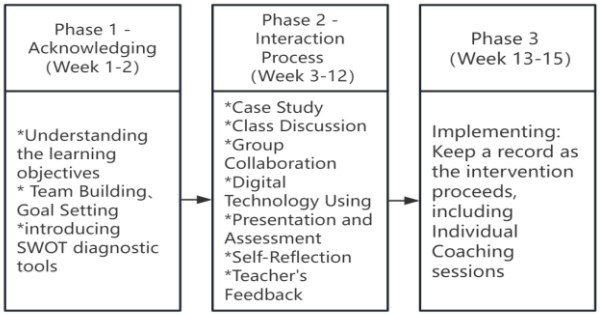

Figure 2: IDI Activities

4.3 Results Comparison between Pre-IDI and Post-IDI

The researcher conducted paired-sample t-tests on six variables to determine differences in students' self-leadership and creativity between the pre-and post-IDI phases. The results are detailed in the tables below, illustrating the paired-sample t-test analysis for these variables.

Table 4: Paired-Sample T-Test Results

Variables	Mean	SD	SE	t-value	df	p-value	Mean difference
Satisfaction							
Pre-IDI	2.83	0.240	0.0438	-13.46	29.0	<.001	-1.525
Post-IDI	4.36	0.560	0.1022				
Perceived Usefulness							
Pre-IDI	2.87	0.320	0.0584	-12.66	29.0	<.001	-1.517
Post-IDI	4.38	0.615	0.1123				
Engagement on the Platform							
Pre-IDI	2.92	0.398	0.0727	-11.05	29.0	<.001	-1.333
Post-IDI	4.26	0.530	0.0968				
Performance Expectation							
Pre-IDI	3.27	0.296	0.0541	-11.35	29.0	<.001	-1.000
Post-IDI	4.28	0.539	0.0984				
Openness							
Pre-IDI	3.51	0.551	0.1006	-7.48	29.0	<.001	-0.858
Post-IDI	4.37	0.439	0.0802				
Continuance Intention							
Pre-IDI	3.16	0.477	0.0871	-8.00	29.0	<.001	-1.022
Post-IDI	4.18	0.516	0.0942				

From table 4, there was a significant difference in Satisfaction between pre-IDI (M=2.83, SD=0.240, SE=0.0438) and post-IDI (M=4.36, SD=0.560, SE=0.1022) condition; t (29) =-13.46, p <.001 (<0.05) and the mean difference was -1.525. Therefore, the hypothesis "H6: There is a significant difference in 'Satisfaction' between the Pre-IDI and Post-IDI stages" was supported.

There was a significant difference in Perceived Usefulness between pre-IDI (M=2.87, SD=0.320, SE=0.0584) and post-IDI (M=4.38, SD=0.615, SE=0.1123) condition; t (29) =-12.66, p <.001 (<0.05) and the mean difference was -1.517. Therefore, the hypothesis "H7: There is a significant difference in 'Perceived Usefulness' between the Pre-IDI and Post-IDI stages" was supported.

There was a significant difference in Engagement on the Platform between pre-IDI (M=2.92, SD=0.398, SE=0.0727) and post-IDI (M=4.26, SD=0.530, SE=0.0968) conditions; t (29) =-11.05, p <.001 (<0.05) and the mean difference was-1.333. Therefore, the hypothesis "H8: There is a significant difference in 'Engagement on the Platform' between the Pre-IDI and Post-IDI stages" was supported.

There was a significant difference in Performance Expectation between pre-IDI (M=3.27, SD=0.296, SE=0.0541) and post-IDI (M=4.28, SD=0.539, SE=0.0984) condition; t (29) =-11.35, p <.001 (<0.05) and the mean difference was-1.000. Therefore, the hypothesis "H9: There is a significant difference in 'Performance Expectation' between the Pre-IDI and Post-IDI stages" was supported.

There was a significant difference in Openness between pre-IDI (M=3.51, SD=0.551, SE=0.1006) and post-IDI (M=4.37, SD=0.439, SE=0.0802) condition; t (29) =-7.48, p <.001 (<0.05) and the mean difference was-0.858. Therefore, the hypothesis "H10: There is a significant difference in 'Openness' between the Pre-IDI and Post-IDI stages" was supported.

There was a significant difference in Continuance Intention between pre-IDI (M=3.16, SD=0.447, SE=0.0871) and post-IDI (M=4.18, SD=0.516, SE=0.0942) condition; t (29) =-8.00, p <.001 (<0.05) and the mean difference was-1.022. Therefore, the hypothesis "H11: There is a significant difference in 'Continuance Intention' between the Pre-IDI and Post-IDI stages" was supported.

The paired-sample t-test results led to the following conclusions: First, significant mean differences were observed across all six variables between the pre-IDI and post-IDI stages. Second, students' Continuation Intention

significantly increased following the implementation of the IDI intervention.

5. Conclusions, Recommendations and Limitations

5.1 Conclusions & Discussions

This research was conducted to examine the sustained usage behaviors of students within an e-learning system at a public university in Guangdong, China, to evaluate the critical drivers that influence students continued use of e-learning platforms. The study provides strategic insights for educational policymakers and the academic community to enhance education and enrich learning. Through a rigorous examination of the factors affecting students' continuance intention toward e-learning, this research utilized a comprehensive Intervention Design Implementation (IDI) model. The findings underscored the significant impact of key variables—satisfaction, perceived usefulness, engagement on the platform, performance expectation, and openness. These factors play a crucial role in sustaining user engagement, and the IDI model has also proven effective in enhancing educational outcomes, thereby demonstrating its utility in fostering an improved educational environment.

The study commenced with a SWOT analysis during the pre-IDI phase to tailor a conceptual framework specific to the educational environment's needs. The validity of the survey instruments was established using the Item-Objective Consistency Index (IOC), ensuring alignment with the research's objectives. A pilot study involving 30 students assessed the survey's reliability, confirming the questions' consistency and applicability for the target audience. This phase was critical for setting the groundwork for further detailed analysis.

Subsequent data collection from a purposeful sample of 188 students, yielding 178 valid responses, enabled a detailed multiple linear regression analysis. This analysis validated the significant influences of key variables—satisfaction, perceived usefulness, platform engagement, performance expectation, and openness—on continuance intention. The Intervention Design Implementation (IDI) phase involved targeted activities to enhance student engagement and interaction, applying theoretical constructs to real-world educational settings through workshops and interactive sessions promoting active learning and collaboration.

During the Intervention Design Implementation (IDI) phase, 30 students participated in a series of targeted interventions. In the subsequent post-IDI phase, a paired sample t-test was employed to quantitatively assess the effectiveness of these interventions by comparing data collected before and after the intervention. This analysis revealed significant enhancements in student engagement and interaction, substantiating the positive impact of the interventions on the efficacy of e-learning.

The study's findings highlight the critical role of specific variables in sustaining student engagement with e-learning platforms and demonstrate the effectiveness of structured interventions in enhancing educational outcomes. This research contributes significantly to the theoretical and practical understanding of e-learning dynamics, providing a comprehensive model for enhancing student engagement and continuity in digital learning environments.

5.2 Recommendations

Given the insights from this research, several strategic recommendations are proposed to amplify the efficacy and long-term viability of E-learning platforms. These recommendations are designed to address the challenges identified, thereby refining students' educational experiences and ensuring that E-learning surpasses traditional educational benchmarks in various settings.

Improving the technological infrastructure is pivotal for the successful deployment of E-learning systems. Investments in robust broadband connections and advanced Wi-Fi setups are critical to providing all students with stable internet access, which is crucial to reducing disruptions in E-learning (Seetal et al., 2021). Modernizing learning platforms with cutting-edge technology ensures compatibility across different devices and supports the latest multimedia educational tools. Regular updates and diligent maintenance of these platforms are essential to avoid obsolescence and ensure a seamless, interactive educational experience.

Enhancing interactive elements within E-learning systems is essential for fostering community and engagement. Implementing real-time communication tools like live chat and video conferencing significantly enriches the learning experience by facilitating instantaneous interactions between students and instructors (Bhardwaj et al., 2021). Moreover, integrating interactive features such as quizzes, simulations, and gamification keeps students engaged and reinforces learning, making educational processes enjoyable and effective. Continuous updates and support for these interactive elements are crucial to keeping up with technological advances and adapting to students' evolving educational needs.

Providing extensive support services is crucial in E-learning environments to assist students in overcoming the challenges of online education. Academic support through accessible tutoring and advisory services greatly enhances students' engagement with and understanding of course materials. Furthermore, establishing a 24/7 help desk ensures

that technical issues do not hinder educational progress, which is vital for maintaining a smooth and effective learning environment (Venkatesh & Davis, 2000).

Promoting digital literacy and skills is essential for students to navigate modern E-learning contexts effectively. Organizing regular workshops and seminars can prepare students for the demands of digital learning, equipping them with the necessary skills to engage successfully with online platforms (Dunleavy et al., 2008). These educational efforts are pivotal in ensuring that students are familiar with and proficient in using modern digital tools and resources.

Encouraging a culture of lifelong learning is critical in today's ever-changing global landscape. Developing initiatives that promote self-directed learning skills prepares students for continual education and adaptation (Holt & Challis, 2007). These programs are essential for fostering a lifelong learning mindset and equipping students with the skills to independently seek knowledge and adapt to their evolving personal and professional environments.

5.3 Limitations for Future Research

This study identifies critical influences on students' continuance intention toward E-learning but notes the need for broader research to deepen understanding and enhance digital learning practices. The reliance on quantitative analysis provided robust statistical insights but may have overlooked students' complex emotional and cognitive responses toward digital learning. Future studies should integrate qualitative methods to enrich understanding and add depth to the findings, as McCrudden and Marchand (2020) suggested.

The research also highlighted the limitations of current E-learning technologies, which may need to fully incorporate the latest advancements like AI and adaptive learning systems. As indicated by Alnaqbi and Yassin (2021), future research should examine how these technologies can personalize learning and improve outcomes.

Moreover, the study's short-term focus might not capture long-term E-learning trends and outcomes. As noted by Scott (2013), longitudinal research is essential to understanding the sustained impact of digital education strategies over time.

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