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A STUDY ON FACTORS AFFECTING VOCATIONAL COLLEGE STUDENTS' WILLINGNESS TO USE ONLINE LEARNING PLATFORMS IN SHANDONG PROVINCE, CHINA

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Abstract:
In today's internet-driven, information-rich era, online platforms have become a key mode of learning. By examining how the intensity of online learning platform usage affects vocational college students' willingness to use these platforms in Shandong Province, this study clarifies the factors influencing their behavior and offers valuable insights for enhancing online platform use. In this study, usage intensity is defined as the independent variable, technology readiness as the mediator, and usage intention as the dependent variable, forming a theoretical model of the factors influencing vocational college students' willingness to use online learning platforms. The results reveal that the intensity of online learning platform usage significantly influences students' willingness to use the platforms; Usage intensity has a notable impact on technology readiness; Technology readiness significantly affects usage intention; Technology readiness mediates the relationship between usage intensity and usage intention.

Keywords: usage intensity, technology readiness, usage intention, online learning platform, Shandong Province (China)

1. Introduction

1.1 Research Background

As China's educational informatization strategy advances, online learning platforms have emerged as a vital resource for vocational college students and a central focus of educational innovation and reform. In this setting, vocational college students are the principal users of such platforms (Luengo-Aravena *et al.*, 2024). Although online learning platforms greatly enhance learning convenience, they also underscore practical challenges—namely, students' limited self-awareness, discipline, and initiative—

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ultimately impacting their academic performance. Moreover, online platform usage can lead to psychological burdens—such as anxiety, depression, and panic (Hu *et al.*, 2017; Nesi & Prinstein, 2015)—which increase academic stress and may deter students from using these platforms. In turn, this reluctance affects both the quality and efficiency of online learning. To fully realize the potential of online learning platforms and boost vocational students' learning efficiency and outcomes, their proactive engagement is crucial. Only by delving into the platforms' functions, value, and impact can vocational colleges effectively advance educational innovation and reform (Gambo & Shakir, 2023). Consequently, enhancing students' willingness to adopt online learning platforms has emerged as a crucial area of study.

As a novel technological innovation of the Internet age, online learning platforms show a dynamic interplay between usage intensity and willingness to use. Studies examining willingness to use social platforms show that usage intensity, as a key antecedent, significantly influences users' intention to continue. Given these platforms' main purposes—social interaction, information sharing, and personal entertainment—usage intention is primarily driven by personal interests and social needs (Jin & Ryu, 2024). In contrast, this study centers on online learning platforms, whose primary function is to facilitate learning and knowledge acquisition. As a result, their usage motivation and behavioral patterns diverge markedly from those of social platforms. As students' usage of online learning platforms intensifies, they may receive more positive feedback, such as higher grades or a stronger sense of accomplishment (Lubis *et al.*, 2023). This positive feedback loop can also heighten students' reliance on and willingness to use these platforms (Maheshwari, 2021). Moreover, as a cutting-edge learning tool of the internet era, online learning platforms can, over sustained use, grant students access to richer learning resources, transcend time and geographic constraints, and boost individual learning efficiency, thus encouraging greater usage (Purarjomandlangrudi & Chen, 2020). While prior research underscores the positive impact of usage intensity on willingness to use, most findings are drawn from studies on social platforms or Western cultural contexts. Consequently, the behavioral patterns of Chinese students using online learning platforms—and how these patterns relate to academic performance—remain underexplored. Accordingly, this study examines how the intensity of online learning platform usage affects Chinese vocational college students' willingness to use, seeking to address existing theoretical gaps related to cultural and educational differences. The findings aim to inform the optimization and broader adoption of online learning platforms in China.

Students' personal attitudes also shape their willingness to use online platforms. According to the Theory of Planned Behavior, technology readiness is an attitudinal factor, indicating that students' positive or negative perceptions of online learning platforms can shape their willingness to use them (Parasuraman & Colby, 2015). The Technology Readiness Index describes an individual's inclination to adopt new technologies, shaped by both psychological motivators and inhibitors, and represents a holistic psychological state (Parasuraman & Berry, 1985). Optimism and innovativeness

function as motivators, whereas discomfort and insecurity serve as inhibitors. Technology readiness is a critical predictor of new technology adoption (Parasuraman & Colby, 2015). It captures an individual's inclination or intent to employ new technologies to accomplish goals in daily life or work, representing a vital personality characteristic (Robinson, 2021). As an emerging learning tool, online learning platforms elicit perceptions and evaluations from students that ultimately shape their attitudes toward platform use. Students who display optimism and innovativeness are generally more inclined to adopt online learning platforms. Conversely, discomfort and insecurity can prompt skepticism toward online platforms, diminishing students' willingness to engage with them. Hence, technology readiness exerts a notable impact on students' inclination or willingness to use online learning platforms to achieve academic goals (Tondeur *et al.*, 2019). Willingness to use online learning platforms manifests as a psychological stance driven by a blend of motivational and inhibiting forces. Technology readiness stands as a vital determinant of students' willingness to adopt online learning platforms. While prior work confirms that usage intensity positively affects willingness to use online learning platforms, studies often lack depth and breadth—especially concerning empirical investigations that factor in individual attitudes. Under the Theory of Planned Behavior, the intention to use is shaped by more than just behavioral frequency (e.g., usage intensity); it also depends on attitude, subjective norms, and perceived behavioral control. Within this model, technology readiness—an essential attitudinal dimension—underscores the pivotal role of psychological drivers in fostering willingness to adopt new technologies (Tondeur *et al.*, 2019). Existing studies primarily examine behavioral factors—such as how usage intensity creates a positive feedback loop that strengthens willingness—yet provide insufficient insight into students' psychological states during online platform use (Mamun, 2022). Hence, applying the Theory of Planned Behavior alongside technology readiness to explore the antecedent role of usage intensity on students' willingness to use online learning platforms can address critical gaps in the literature.

Online learning platforms afford students convenient means of interactive learning, effectively overcoming the usual limitations of time and location. Naturally, online learning platforms represent creative innovations of the modern age, featuring interactivity, novelty, and entertainment—qualities that significantly boost students' engagement and innovation skills (Sangwan *et al.*, 2024). Building on prior work and guided by the Theory of Planned Behavior, this study investigates the factors shaping the willingness of vocational college students in Shandong Province to use online learning platforms alongside the path relationships among key variables—an inquiry of considerable scholarly value. As China advances its modern education agenda, online learning platforms are poised to become indispensable tools for students in vocational colleges (Cho *et al.*, 2017). Students' willingness to adopt online platforms in vocational colleges not only shapes the effectiveness and quality of their online learning but also influences the trajectory of China's educational modernization (Kumar, 2022).

Vocational college students' attitudes toward new technologies directly influence both their willingness to use online learning platforms and their learning efficiency, making these attitudes a vital driver of innovation in vocational education. With ongoing technological progress, people's attitudes toward technology ultimately dictate their readiness to adopt new innovations. When vocational college students encounter online learning platforms—a novel technology—those who are optimistic and innovative tend to embrace these platforms, leveraging them to boost learning efficiency and fulfill academic tasks. In contrast, if the platforms provoke discomfort or insecurity, students' enthusiasm wanes, reducing their willingness to use them (Mariusz *et al.*, 2017). Amid China's ongoing efforts to advance vocational education, colleges strive to develop highly skilled talent with optimism and innovation. Examining students' technology readiness and its impact on their willingness to use online learning platforms reveals their attitudes toward new technologies, enabling institutions to harness the platforms' full value, foster students' optimism and creativity, and mitigate discomfort or insecurity (Neofytou *et al.*, 2020).

The 2023 statistical report on Shandong Province's education indicates that Shandong is home to 84 vocational colleges and 1.2724 million associate-degree students—figures that place it at the forefront of vocational education in China (Wang, 2021). Following the Shandong Provincial Department of Education's 2017 Implementation Plan for Online Open Course Construction, vocational colleges have vigorously advanced the development of online open course platforms, providing students with convenient digital learning tools (Kim *et al.*, 2019). Nevertheless, many vocational college students have relatively weaker self-directed learning skills and motivation, leaving them less self-driven in online environments compared to traditional classrooms. This shortcoming diminishes their proactive engagement with online platforms. In conclusion, this study targets vocational college students in Shandong Province, China, constructing a new research model that positions online learning platform usage intensity as the independent variable, technology readiness as the mediator, and willingness to use as the dependent variable. Through this framework, it investigates the mechanisms driving students' willingness to adopt online learning platforms.

1.2 Research Questions

Building on the preceding research background and objectives, this study raises the following research questions:

1) Do vocational college students in Shandong Province, China, exhibit differences in online learning platform usage intensity, technology readiness, and willingness to use, according to different background variables?
2) Does online platform usage intensity among vocational college students in Shandong Province influence their willingness to use?
3) Does usage intensity on online platforms impact the technology readiness of vocational college students in Shandong Province?

4) Does technology readiness for online platforms among vocational college students in Shandong Province affect their willingness to use?
5) Does technology readiness mediate the relationship between usage intensity and willingness to use among vocational college students in Shandong Province?

2. Literature Review

2.1 Theory of Planned Behavior

Under the Theory of Planned Behavior (TPB), behavioral attitude, subjective norms, and perceived behavioral control all exert positive influences on an individual's behavioral intention. Attitude describes a person's positive or negative feelings toward a specific behavior—essentially, the conceptual outcome of one's evaluation of that behavior. Its core elements are often viewed as a function of the individual's salient beliefs about the behavior's consequences (Ajzen & Cote, 2008). Subjective norm denotes the social pressure an individual perceives concerning whether to perform a particular action. Essentially, it reflects how much influence key individuals or groups wield over a person's decision to engage in that behavior (La Barbera & Ajzen, 2020). Perceived behavioral control captures how difficult or easy an individual believes it is to undertake a specific behavior. It reflects one's perceived capability to execute the behavior, rooted in the individual's understanding of the controllable factors involved (Ajzen, 2002). As people perceive greater access to resources and opportunities coupled with fewer external barriers, their sense of perceived behavioral control becomes more robust.

Specifically, perceived behavioral control reflects how much command or mastery an individual anticipates having when performing a given action (Ajzen, 2002). The more intensively an individual uses an online platform, the greater their sense of control or proficiency, which subsequently shapes their willingness to keep using it (Jin & Ryu, 2024). Greater operational proficiency diminishes technical hurdles and learning challenges, bolstering students' self-confidence and indirectly fueling their intention to use the platform (Deng *et al.*, 2021). High usage intensity not only motivates students to participate in online learning; it also bolsters their identification with and reliance on the platform, ultimately enhancing their willingness to use it (Jin & Ryu, 2024). In conclusion, the TPB framework suggests that usage intensity and technology readiness hold critical, logical roles in determining students' willingness to adopt online learning platforms.

2.2 Impact of Usage Intensity on Willingness to Use

In online crowdsourced delivery contexts, the strength of users' online interaction bonds positively influences their willingness to adopt online delivery (Yuen *et al.*, 2022). The same study defines online interaction bonding as the intensity of a user's engagement with the platform. A higher level of bonding fosters greater trust in the platform and a stronger inclination to adopt online delivery. Within an online purchasing context, Yuan *et al.* (2020) demonstrate that stronger "supra-social" B2B relationships help B2B firms and their customers establish and sustain enduring ties, thereby bolstering customers'

repurchase intentions. During the COVID-19 pandemic, Bohórquez *et al.* (2024) observed that fitness centers adapted their services to an online model. In a study of 745 participants, perceptions of service quality and the perceived value of e-fitness offerings shaped users' intentions to adopt these services online.

Under the Theory of Planned Behavior, perceived behavioral control reflects the degree to which an individual feels in command—or competent—when undertaking a particular action (Ajzen, 2002). The greater an individual's usage intensity on a platform, the stronger their sense of control or proficiency becomes, ultimately shaping their willingness to use it (Jin & Ryu, 2024). Growing proficiency decreases technical hurdles and learning complexities, enhancing students' self-confidence and indirectly spurring their willingness to use the platform (Deng *et al.*, 2021). High usage intensity not only motivates student engagement in online learning but also amplifies their sense of connection and reliance on the platform, ultimately boosting their willingness to continue using it (Jin & Ryu, 2024). In essence, as usage intensity rises, students deepen their understanding of an online learning platform's value and functions, fostering a stronger bond and more enduring relationship with the platform. This heightened familiarity, in turn, encourages their proactive engagement and reinforces their overall willingness to use it.

In conclusion, this study posits the following hypothesis:

H1: Among vocational college students in Shandong Province, China, higher online learning platform usage intensity significantly influences their willingness to use.

2.3 Impact of Usage Intensity on Technology Readiness

As a novel online learning technology, online learning platforms can spark diverse attitudes among students—ranging from optimism and innovativeness to discomfort and insecurity (Zgheib *et al.*, 2023). Studies show that how intensively users engage with new technologies influences their level of technology readiness (Aboelmaged, 2014). Zgheib *et al.* (2023) suggest that online learning requires sophisticated technical skills, and the more frequently teachers employ online methods, the better prepared they become—manifesting heightened enthusiasm for online instruction. Pramanik *et al.* (2024) note that with continued scientific and technological advancements, technology usage grows more pervasive, giving rise to a range of attitudes toward emerging innovations.

Students' technology readiness is significantly shaped by how intensively they use online learning platforms. Through repeated use, students become increasingly familiar with the platform's interface and functionalities, boosting their adaptability and confidence in new technologies (Zhang, 2023). Ongoing practice allows students to gather extensive experience using online learning tools. This reduces perceived technological barriers while elevating their acceptance of, and sense of control over, technology—ultimately bolstering their technology readiness (Damerji & Salimi, 2021). Consequently, greater usage intensity typically equates to stronger technology readiness, instilling in students a higher degree of confidence and ease when confronted with other emerging technologies (Ginting *et al.*, 2024). In sum, higher usage intensity propels students from

passive adaptation to active exploration, thereby boosting their technology readiness and creating a robust foundation for future tech-driven learning and application. Consequently, it is reasonable to hypothesize that usage intensity on online learning platforms strongly affects the technology readiness of vocational college students.

Therefore, we propose the following hypothesis:

H2: Higher usage intensity significantly influences technology readiness among vocational college students in Shandong Province, China.

2.4 Impact of Technology Readiness on Willingness to Use

The adoption of science and technology in higher education has grown increasingly common—particularly following COVID-19, which significantly transformed modern higher education and teaching practices. Universities have actively pursued innovative strategies, including fully online instruction, blended learning, and other e-learning formats. The abrupt arrival of COVID-19 compelled students to shift from in-person to online learning, positioning virtual instruction as a critical area of development in modern higher education (Tondeur *et al.*, 2019). The shift in instructional methods and students' corresponding attitudes toward it directly influence their willingness to use online platforms, which in turn shapes the success of such platforms' adoption and implementation. Despite today's proliferation of information technologies—many of which university students encounter—some remain cautious about online learning, fearing it may diminish learning efficiency (Dewart *et al.*, 2020). Individuals' capacity to assess and utilize new technologies strongly correlates with their attitudes and willingness to adopt them. Those who are more supportive of emerging technologies typically exhibit higher digital and technical literacies, making them more open and eager to engage with new solutions (Gause *et al.*, 2022). For instance, vocational college students—who often display robust skills in evaluating and leveraging new technologies—are generally more receptive to online learning formats and show more positive attitudes and willingness to adopt digital platforms. Technology readiness comprises four dimensions—optimism, innovativeness, discomfort, and insecurity. Optimism and innovativeness act as motivational drivers that boost students' readiness to use online learning platforms, thereby raising their willingness to engage. By contrast, discomfort and insecurity serve as inhibitors; as these traits intensify, students' technology readiness declines, diminishing their propensity to adopt online learning platforms (Mark *et al.*, 2019).

Accordingly, this study posits:

H3: Among vocational college students in Shandong Province, China, technology readiness significantly influences their willingness to use online learning platforms.

2.5 The Mediating Role of Technology Readiness

Technology readiness functions as an emotional response to new technology adoption, assessing how readily individuals embrace emerging technologies. High usage intensity can heighten students' awareness of an online learning platform's value, potentially

fostering optimism and innovativeness and thereby boosting their willingness to use it. Conversely, if students detect more drawbacks as usage intensifies, they may develop discomfort or insecurity, ultimately undermining their willingness to continue using the platform (Rao & Wan, 2020). Accordingly, technology readiness serves as a mediator between usage intensity and willingness to use online learning platforms. This perspective is echoed in related research: Hong and Park (2023) assert that consumers' supportive or opposing attitudes toward self-driving cars hinge on their technology readiness. Optimism and innovativeness foster a positive inclination toward autonomous vehicle use, while discomfort and insecurity discourage adoption, ultimately determining willingness to use. Durst *et al.* (2022) examined the factors underpinning technology readiness before and after the COVID-19 crisis, revealing that optimism, innovativeness, discomfort, and insecurity predict technology readiness. In times of crisis, employees displaying optimism and innovation spur new technology development and application, whereas those experiencing discomfort and insecurity hamper these efforts. A similar dynamic unfolds among vocational college students. With higher usage intensity, those who are optimistic and innovative perceive greater value from online learning platforms, bolstering their willingness to use them. In contrast, students prone to discomfort or insecurity focus on negative aspects, which diminishes their willingness to use these platforms. Accordingly, this study proposes:

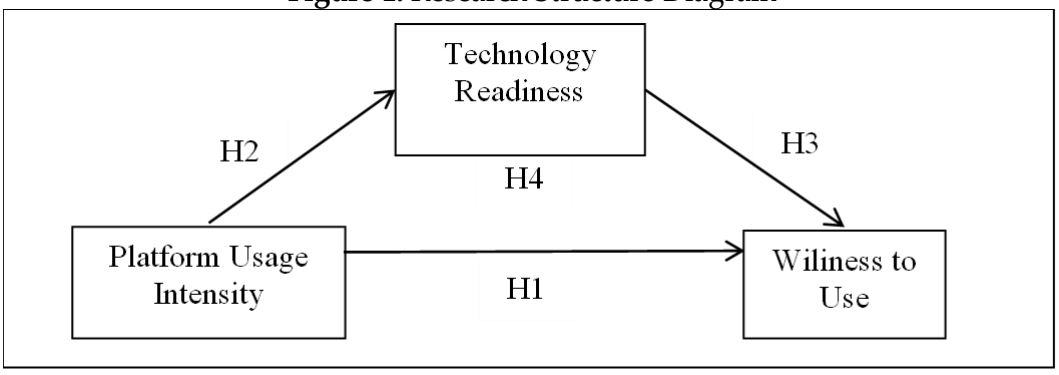
H4: Technology readiness mediates the impact of online learning platform usage intensity on willingness to use among vocational college students in Shandong Province, China.

3. Material and Methods

3.1 Research Framework

This study utilized a questionnaire survey to assess the willingness of vocational college students in Shandong Province to use online learning platforms, treating usage intensity as the independent variable and technology readiness as the mediator. The detailed research framework is depicted in Figure 1.

Figure 1: Research Structure Diagram



3.2 Research Participants

The study included two public and two private institutions located in different regions of Shandong Province, ensuring a broad and representative sample of vocational college students. A convenience sampling approach was used. The researchers leveraged personal contacts to reach institutional leaders at the four colleges, distributing questionnaires after securing approval from administrators and counselors. The survey was administered via the "Wenjuanxing" online platform, allowing students to complete it anonymously by scanning a QR code or clicking a link. Of the 800 questionnaires distributed, 164 were invalid, leaving 636 valid responses—a valid response rate of 79.5%.

3.3 Research Instruments

Three research instruments were employed. The Exercise Behavior Intensity Scale by Zhu *et al.* (2021) was modified to form the Online Learning Platform Usage Intensity Scale. The scale consists of four items representing a single dimension, assessed through four indicators: usage time, usage frequency, engagement level, and persistence. Each item is rated on a five-point scale. The Online Platform Usage Intensity Scale had a Cronbach's alpha of .877 and a KMO of .823, with a significant Bartlett's test. Factor loadings ranged from .810 to .841, and a single factor accounted for an eigenvalue of 2.759, explaining 68.971% of the variance. The Technology Readiness Scale (Parasuraman & Colby, 2015) was adopted, comprising 36 items across four dimensions: optimism (10 items), innovativeness (7 items), discomfort (10 items), and insecurity (9 items). Optimism and innovativeness are scored positively, while discomfort and insecurity are reverse-scored, all on a five-point rating scale. The scale achieved a Cronbach's alpha of .951, with a KMO of .939 and a significant Bartlett's test. All factor loadings surpassed .500, and factor eigenvalues were 6.125, 5.997, 5.989, and 4.218, cumulatively explaining 62.026% of the variance. The Willingness to Use Remote Online Learning Platform Scale (Natasia *et al.*, 2022) was adopted, featuring 7 single-dimension items derived from a well-validated measure and rated on a five-point scale. The Willingness to Use Scale reported a Cronbach's alpha of .909 and a KMO of .907, with Bartlett's test significant. All factor loadings were above .500, and the single factor had an eigenvalue of 4.151, explaining 59.295% of the variance.

3.4 Data Processing and Analysis

Following the collection of questionnaires, all responses were screened and invalid entries removed, leaving only valid data for further analysis. SPSS and AMOS were employed for descriptive statistics, reliability assessment, confirmatory factor analysis (CFA), correlation analysis, and structural equation modeling (SEM).

3.5 Research Ethics

This study followed Articles 20 and 21 of Section 3.2.2 in the 2015 National Policy and Guidelines for Human Research by the Thai National Research Council (NRCT). Throughout the study, researchers were required to safeguard participants' personal and

sensitive data and ensure participants were informed about how their private information would be protected, including who could access it and under what conditions. Participation was entirely voluntary, with the study carefully respecting participants' privacy, emotional well-being, and personal choices.

4. Results and Discussion

4.1 Sample Demographics

Out of 800 distributed questionnaires, 164 were invalid, leaving 636 valid responses for a 79.5% valid response rate. Table 1 details the distribution.

Table 1: Sample Demographics

Item	Option	Frequency	Percentage (%)
Gender	Male	331	52.044
	Female	305	47.956
Grade	1st Year	204	32.075
	2nd Year	248	38.994
	3rd Year	184	28.931
Institution type	Public	302	47.484
	Private	334	52.516
Which online learning platform do you use?	MOOC	212	33.333
	Chaoxing	176	27.673
	Tsinghua Online	162	25.472
	Others	86	13.522

4.2 Common Method Bias

Harman's single-factor test was employed, conducting an exploratory factor analysis on unrotated factors. The first principal component explained 34.709% of the variance—below the 40% threshold—indicating that common method bias is not a major concern.

4.3 Confirmatory Factor Analysis

Table 2 indicates that $\chi 2/df = 1.281$ (below 3), GFI = .921, and AGFI = .913 (both exceeding .900). IFI, CFI, and TLI all surpass .900, and RMSEA stands at .021 (under .100). These results confirm an acceptable model fit per the established criteria.

Table 2: Model Fit Indices

Index	Chi-Square/df χ^2/df	GFI	AGFI	IFI	TLI	CFI	RMSEA
Cutoff	<3	>.900	>.900	>.900	>.900	>.900	<.100
Value	1.281	.921	.913	.982	.981	.982	.021

4.4 Correlation Analysis

This study initially employs Pearson correlation to examine the interrelationships among the study's key variables. Willingness to use and usage intensity of the online platform

exhibit a correlation coefficient of 0.593 ($p < .001$), demonstrating a strong positive relationship. Willingness to use also correlates positively with technology readiness ($r = 0.589$, $p < .001$), underscoring a meaningful positive association.

Table 3: Correlation Analysis

	Online Platform Usage Intensity	Technology Readiness	Willingness to Use
Online Platform Usage Intensity	1		
Technology Readiness	0.502***	1	
Willingness to Use	0.593***	0.589***	1

Note: ***p < .010

4.5 Structural Equation Model

Using AMOS for structural equation modeling, we tested the proposed relationship between online platform usage intensity and willingness to use. The path from usage intensity to willingness to use yielded a coefficient of .398 (C.R. = 8.327, $p < .001$). Hence, H1, asserting a significant effect of usage intensity on students' willingness to use online learning platforms, is confirmed.

For the hypothesis regarding the relationship between online learning platform usage intensity and technology readiness, the path coefficient from usage intensity to technology readiness is .594 (C.R. = 11.155, $p < .001$). Thus, H2, which posits a significant effect of online learning platform usage intensity on technology readiness, is upheld.

Regarding the relationship between technology readiness and willingness to use, the path coefficient is .444 (C.R. = 8.246, $p < .001$). Therefore, H3, which asserts that technology readiness significantly influences willingness to use online learning platforms, is confirmed.

Table 4: Path Analysis Results

Path			Std. Estimate	Estimate	S.E.	C.R.	*p*
Technology Readiness	←	Platform Usage Intensity	.594	.399	.036	11.155	.000
Willingness to Use	←	Platform Usage Intensity	.398	.354	.043	8.327	.000
Willingness to Use	←	Technology Readiness	.444	.587	.071	8.246	.000

4.6 Mediation Effect

The Bootstrap method can directly test whether a mediation effect exists using the null hypothesis H0: ab = 0. If the confidence interval for ab includes zero, a mediation effect is not supported. The path analysis indicated significant results, prompting a further check for mediation within these significant paths. Using AMOS, the study ran a Bootstrap procedure with 5,000 resamples at a 95% confidence interval to compute the standardized specific mediation effects. Results revealed a direct effect of .398 ($p < .001$), a total effect of .661 ($p < .001$), and an indirect effect of .263 ($p < .001$), confirming the presence of a mediation effect. Table 4.14 indicates that the total effect (platform usage intensity → willingness to use) is significant, confirming technology readiness as a partial mediator. Consequently, H4—asserting a mediating role of technology readiness in the link

between usage intensity and willingness to use among vocational college students in Shandong Province—holds true.

Table 5: Mediation Effect

	Path	Effect Value	Bias-corrected 95%			Effect Ratio
			Lower	Upper	p	
Indirect Effect	Platform Usage Intensity → Technology Readiness → Willingness to Use	.263	0.197	0.343	.001	39.790%
Direct Effect	Platform Usage Intensity → Willingness to Use	.398	0.289	0.499	.001	60.210%
Total Effect	Platform Usage Intensity → Willingness to Use	.661	0.581	0.730	.001	-

Note: Data sourced from this study.

5. Conclusion

5.1 Impact of Online Learning Platform Usage Intensity on Willingness to Use

Based on the results, the intensity of online platform usage among vocational college students in Shandong Province significantly influences their willingness to use, thus supporting H1. Higher usage intensity promotes greater satisfaction and trust in the platform, which, in turn, bolsters students' intention to continue using it. Moreover, the interactivity and social aspects of online platforms significantly affect students' willingness to use them. Greater usage intensity fosters more interaction with classmates and instructors, forming a tight-knit learning community—consistent with Marfuah *et al.* (2022). This community affiliation not only cultivates positive learning attitudes and values but also facilitates knowledge sharing and mutual support. On the platform, students can discuss academic questions, exchange insights, and even engage in group work or project-based tasks. These interactions not only boost learning outcomes and innovation but also strengthen team collaboration and social skills (Durst *et al.*, 2022). Consequently, higher usage intensity bolsters students' sense of community belonging, prompting them to value and depend on the online platform more deeply, thereby reinforcing their willingness to use it. In turn, this confirms that online learning platform usage intensity significantly impacts students' willingness to use.

5.2 Impact of Online Learning Platform Usage Intensity on Technology Readiness

According to the results, higher online learning platform usage intensity among vocational college students in Shandong Province significantly influences their technology readiness, thus validating Hypothesis H2. Amid rapid progress in information technology—particularly the broad uptake of internet technologies, 5G, and AI—vocational college students in Shandong Province have cultivated strong digital skills from an early age. Thanks to this technological edge, students can quickly adapt to online learning platforms and make full use of features like group tasks and collaborative discussions, boosting both their engagement and enthusiasm. Such proactive attitudes

and behaviors unequivocally elevate their technology readiness. Additionally, in seeking broader and more practical teaching resources, students naturally increase their reliance on online learning platforms, which in turn enhances their technology readiness (Geng *et al.*, 2019).

5.3 Impact of Technology Readiness on Willingness to Use

The results show that technology readiness significantly influences vocational college students' willingness to use in Shandong Province, thereby supporting Hypothesis H3. As vocational colleges enhance their research capacities, more technological innovations are being converted into practical teaching resources and learning tools—often characterized by high utility and convenience. Equipped with higher technology readiness, students can make more effective use of these tools, boosting both learning outcomes and overall experience. This positive feedback loop further reinforces their desire to adopt technological solutions. Moreover, vocational colleges in Shandong Province actively partner with enterprises and research institutes, leveraging resource-sharing and information exchange to accelerate the practical application of technological breakthroughs. By expanding these industry–academia–research collaborations, vocational colleges both elevate their research capacity and provide students with more hands-on experience and learning resources. As students witness technology's convenience and advantages in real-world scenarios, their technology readiness rises further, ultimately boosting their willingness to embrace technological products (Ningsih & Sari, 2021).

5.4 The Mediating Role of Technology Readiness

The results indicate that technology readiness serves as a mediator in the relationship between usage intensity and willingness to use online learning platforms among vocational college students in Shandong Province, thus confirming Hypothesis H4. As information technology advances swiftly, online learning platforms have gained broad adoption in vocational colleges, becoming a vital channel for students to gain knowledge and improve their skills (Mamun, 2022). Fueled by rapid technological advances, online learning platforms have emerged as novel learning tools. Compared to traditional teaching methods, these platforms not only heighten students' learning interest but also foster their autonomous learning abilities (Allo, 2020). In vocational colleges, students typically use online learning platforms to access course materials, complete online assignments and exams, and engage in virtual discussions. Such tasks require a certain level of technical skill, including platform familiarity and command of online tools (Febrianto *et al.*, 2020). As students frequently engage with online learning platforms, they gain more hands-on experience and gradually boost their technology readiness. This heightened readiness allows them to wield digital tools with greater confidence and skill, thereby reinforcing their willingness to use these platforms.

6. Recommendations

6.1 Strategies to Enhance the Intensity of Online Learning Platform Usage

To bolster online platform usage intensity, schools should prioritize optimizing the user environment and fortifying technical support services. For starters, institutions can partner long-term with platform developers, having technical experts deliver regular training sessions so that faculty and students fully grasp platform functionalities. Introductory courses geared toward newcomers and less tech-savvy students can also ensure a swift, confident adoption of the platform. Moreover, schools should implement an effective tech support infrastructure that blends online and offline assistance. This might entail creating a dedicated support center, offering online customer service channels, or assigning on-call technical mentors so that students can easily obtain help whenever needed. Delivering prompt and convenient tech support effectively boosts students' usage frequency and sustained engagement with the platform.

6.2 Promoting the Construction of a Digital Campus

Schools should systematically chart a course for digital transformation and comprehensively upgrade their information infrastructure. First, schools must work toward campus-wide network coverage, emphasizing fast and stable connections in high-usage areas such as dormitories and libraries. Next, schools should adopt advanced instructional tools—smart boards and digital learning devices, for example—to merge traditional teaching with technology and foster a hybrid online-offline learning environment. Moreover, schools should hold regular digital skills sessions—technology seminars, case studies, and specialized workshops—to acquaint faculty and students with using digital tools and understanding their real-world applications.

6.3 Addressing the Digital Divide Among Students

Schools must implement various measures to help disadvantaged students overcome this digital divide. First, schools can create dedicated funds to subsidize or directly supply needed devices—like tablets or laptops—to students with financial challenges. Meanwhile, schools can offer communal digital resources at no cost, such as library computer terminals or projectors in study rooms, ensuring broader student access. Next, to tackle disparities in internet access, schools might set up off-campus Wi-Fi hotspots or partner with telecom operators to provide data subsidies for students in regions with limited home internet. Finally, schools should offer foundational tech training for students with lower technology readiness, covering platform navigation skills and digital learning strategies.

7. Study Limitations and Future Prospects

As educational technologies advance and online learning platforms are continuously updated, student behaviors, motivations, and readiness levels may shift. Therefore, the

temporal relevance of this study's findings must be carefully evaluated. Given rapid technological shifts and changing student behaviors, a longitudinal approach with periodic data collection is warranted to capture evolving patterns of online platform usage, maintaining the study's relevance and forward-looking perspective.

Although this study focuses on students' technical adaptability and usage behaviors, it pays less attention to familial influences—a potential limitation. Future inquiries should incorporate family-level variables—such as economic status, parental attitudes, and tech support—into the research model to gain a more holistic understanding of students' online learning behaviors.

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Conflict of Interest Statement
The authors declare no conflicts of interest.

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