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Factors Influencing Students' Interaction and Willingness in Digital Virtual Reality: Mediating Role of Attitudes

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Abstract:- In the rapidly evolving landscape of education and technology, this study aims to unravel the intricate factors influencing students' attitudes, interaction behavior, and willingness in the realm of digital virtual reality. Grounded in the principles of the Structural Equation Model (SEM) and bolstered by robust quantitative analysis, this research presents valuable insights and practical implications for the ever-changing field of educational technology and immersive digital displays. To accomplish these goals, this study engaged a sample of 456 first-year college students at Gansu Hexi University between 2021 and 2022. Employing a rigorous research framework, structured questionnaires were meticulously validated for reliability and validity, forming the foundation for the research instrument. The results of this study shed light on several critical factors that significantly impact students' attitudes, interaction behavior, and willingness within the digital virtual reality environment. Attitude emerges as a central construct, mediating the relationships between multiple independent variables and the outcomes of interest. Key influencers include Perceived Reliability, Perceived Ease of Use, Perceived Usefulness, and Perceived Entertainment, all playing pivotal roles in shaping students' attitudes and, subsequently, their interaction behavior and willingness. These findings align with established literature on technology acceptance, educational technology, and human-computer interaction, underlining the importance of perceived reliability and ease of use in fostering positive attitudes toward technology. Additionally, the study highlights the value of students' perceptions of usefulness and entertainment in shaping their engagement within the virtual reality context. Furthermore, specific indirect effects within the model underscore the intricate dynamics at play. For example, Perceived Reliability not only directly influences students' attitudes but also indirectly affects their interaction behavior and willingness through the mediating role of attitudes. This underscores the critical role of attitudes as a central construct that translates the impact of other variables into observable behaviors and engagement. In the dynamic landscape of education and technology, this research offers practical implications for educators, researchers, and designers, aiming to harness the potential of virtual interaction applications. As the intersection of technology and education continues to evolve, this study serves as a foundational pillar for optimizing the use of digital interactive exhibitions and shaping the future of experiential consumption in a digital age.

Keywords: *digital display, interaction design, virtual reality, students' interaction, students' willingness, students' attitudes*.

1. Introduction

Digital display is an evolving form of art that arises from the fusion of digital technology and artistic expression (Bishop, 2020). Broadly defined, digital display encompasses artistry in the digital realm, while its narrower interpretation pertains to artworks generated through computer-aided design (Lambert, 2019). The swift progress of digital display owes its momentum to advancements in computer technology and its pervasive integration into various domains (Bolivar & Chang, 2021). The ubiquitous presence of digital display is evident as it permeates diverse industries, generating ripple effects that transcend traditional boundaries. Sectors like clothing art design and environmental art design exemplify the profound impact of digital display (Castro et al., 2018). The infusion

of modern virtual reality technology into digital display has further expanded its horizons, seamlessly melding artistic creativity and scientific innovation (Pan & Hou, 2020). This dynamic convergence has engendered a reciprocal relationship, where art and science coalesce, generating synergistic outcomes that redefine the very essence of digital display. The development of digital technology has promoted widely use of Virtual Reality in various sector including the retail sector. According to

Cowan and Ketron (2019), major brands have implemented VR in their marketing strategies where they provide virtual experiences to the customers in knowing better their brand. This virtual experience connects consumers and the marketers better and improve better interactions between them.

2. Background Study

The new generation of human-computer interaction system represented by virtual reality equipment has the characteristics of people-oriented, multi-mode and intelligence. Formally, virtual reality is a virtual environment (VE) that uses three-dimensional computer technology to generate user navigation and interaction. The virtual environment is characterized by a continuous human-computer interaction cycle, and the user is closely coupled with the simulated environment to obtain a credible sense of immersion and presence (Cowan and Ketron, 2019). These technologies have changed the ways teachers and children behave in their everyday lives regarding communicating, entertaining and learning. The ubiquity of the internet and digital technologies has particularly changed their experiences of using the internet. The increasing infusion of digital technologies into educational settings has changed the ways teachers communicate with, choose, and structure their educational resources and even changed their teaching practices (Bourbour et al, 2020).

With the continuous enrichment of digital media, rich media is becoming the main content of digital display. Hypertext Technology Based on hyperlink replaces static fixed layout technology in the digital world. The perception brought by VR technology allows users to interact with the digital display screen through limbs and sound, to realize the interaction with the digital display system, such as "Digital Museum". In the virtual digital display, after wearing VR glasses, users experience a new three-dimensional digital display mode which is different from the plane digital display.

In the ever-evolving landscape of digital virtual reality (VR), the integration of technology acceptance and user behavior has garnered significant attention. A pivotal concept in this context is the Technology Acceptance Model (TAM), which postulates that individuals' acceptance and utilization of technology are influenced by their perceptions of its usefulness and ease of use (Davis, 1989). As digital VR gains prominence in various sectors, understanding the factors influencing students' interaction and willingness towards this technology becomes paramount. This exploration is particularly crucial considering the mediating role of attitudes, which act as a bridge between the factors of TAM and subsequent user behavior.

TAM elucidates the significance of perceived usefulness and perceived ease of use as determinants of technology acceptance (Davis, 1989). In the realm of digital VR, these factors hold profound implications for students' interaction and willingness. Perceived usefulness underscores the extent to which students believe that utilizing digital VR enhances their learning experience and augments their knowledge acquisition (Venkatesh et al., 2003). On the other hand, perceived ease of use pertains to the degree to which students perceive digital VR as user-friendly and convenient (Davis, 1989). These factors jointly shape students' attitudes towards digital VR technology.

The mediating role of attitudes between TAM factors and students' interaction and willingness is crucial in understanding the intricate interplay of psychological processes. Attitudes, as cognitive evaluations of a technology, act as an intermediary through which TAM factors influence students' behavior (Ajzen, 1991). Positive attitudes towards digital VR foster a more favorable disposition towards using the technology, consequently promoting higher levels of interaction and willingness (Venkatesh & Davis, 2000). Attitudes serve as a cognitive mechanism that processes and translates the perceived usefulness and ease of use into students' intention to engage with digital VR.

Moreover, the mediating effect of attitudes unveils a comprehensive picture of the psychological mechanism underpinning students' engagement with digital VR. As students assess the utility and ease of use of digital VR, their cognitive evaluations culminate in shaping their attitudes towards the technology (Ajzen, 1991). These attitudes, in turn, steer their subsequent behavior, including interaction patterns and willingness to embrace digital VR (Venkatesh & Davis, 2000).

In conclusion, the mediating role of attitudes between TAM factors and students' interaction and willingness in digital virtual reality illuminates the intricate psychological dynamics at play. This paradigm recognizes the pivotal role of attitudes in translating the perceived usefulness and ease of use into students' behavioral intentions. By dissecting these underlying cognitive processes, educators, practitioners, and researchers gain a more profound comprehension of the factors influencing technology acceptance and usage. Ultimately, this insight is instrumental in fostering a more immersive, engaging, and fruitful learning experience in the realm of digital virtual reality.

The research seeks to address a twofold gap in the existing literature. First, there is a lack of empirical research systematically exploring the connections between students' attitudes, interactive behavior, and willingness in the context of VR digital displays. Second, limited research has considered the moderating effects of gender differences and reading styles on the relationship between attitudes and interactive behavior within VR digital display environments. This study aims to contribute to the knowledge base on interactive learning in digital display settings and offer practical implications for pedagogical practices in the digital age. Through a meticulous exploration of the determinants shaping students' interactive behavior and willingness in VR digital display environments, the present study aims to enrich educational theories and pedagogical methodologies with valuable insights (Llobera et al., 2017; Freina & Ott, 2015). Investigating the moderating effects of gender and reading styles, this research aims to unravel the intricate interplay between these variables and their impact on student engagement and learning experiences (Chang et al., 2017; Hu & Sun, 2018). These findings can provide educators, curriculum designers, and policymakers with actionable insights to harness the potential of VR digital displays for enhancing student engagement and learning outcomes (Lei et al., 2020; Bolchini et al., 2020).

Drawing on established theories, this study offers practical insights for innovative student services within the digital virtual reality field (Freina & Ott, 2015; Habib & Chua, 2019). The researcher recognizes the need for further exploration in the emerging digital virtual reality field, as product formulations and service models are still developing (Chang et al., 2017). This challenge is due to the complex nature of the systems involved, hindering broader adoption and progress in digital virtual reality. Furthermore, the study seeks to make a significant contribution to the broader academic landscape by shedding light on the integration of emerging technologies within educational contexts (Sengupta & Chaudhury, 2019). It illuminates the intricate dynamics of interactive learning in the digital era, aligning with the evolving landscape of education (Chang et al., 2017; Lei et al., 2020). This research exemplifies the potential of VR digital displays as transformative tools for enriching the educational experience, reflecting the evolution of pedagogical paradigms.

The researcher employs a comprehensive approach to explore the influence of digital virtual reality on students' human-computer interactions. First, the research dissects the factors influencing student behavior during digital virtual reality interactions, providing insights into the dynamics that drive students' actions (Saraswathi & Ramakrishnan, 2021). Furthermore, the study assesses the impact of digital virtual reality on students' interaction experiences, emphasizing its potential as an effective educational tool (Koehler et al., 2018). In addition, the researcher proposes an innovative service strategy for digital virtual reality tailored to student interactions, advancing the understanding of human-computer interactions in virtual reality settings (Bolchini et al., 2020; Fuchs et al., 2017; Sengupta & Chaudhury, 2019). Drawing from the TAM model and the unique features of VR digital displays, this study aims to develop an influential factor model for students' interactive behavior in virtual reality digital display. It focuses on the interactive behavior and information acquisition process within the digital display experience in virtual reality. The study seeks to address the following research questions:

1. What factors affect students' attitudes, interaction behaviour, and willingness in the context of virtual reality digital display?

2. To what extent does attitude mediate the relationship between the factors that influence students' interaction behaviour and willingness within the digital display of virtual reality among students?

3. Conceptual Framework

The development of an influencing factors model for virtual reality reading users' interaction behavior involves an in-depth exploration of various dimensions. This model delves into the intricate relationship between several key variables, encompassing perceived information, perceived interaction, perceived usefulness, perceived ease of use, perception and reading, use attitude, and interaction behavior intention among virtual reality reading users (Davis, 1989; Davis et al., 1989; Venkatesh & Davis, 2000). It is crucial to emphasize that these variables are inherently intertwined, revealing a complex web of dependencies that influence user experiences within the virtual reality reading environment.

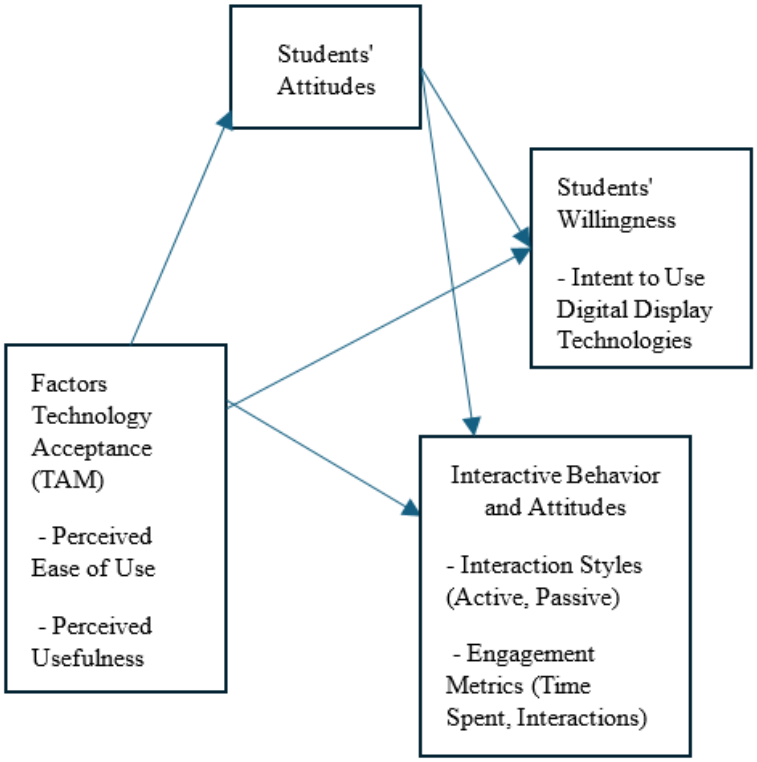

Fig. 1: The conceptual Framework

Illustrated by the visual representation in Fig. 1, the intricate interplay between virtual reality and user behavior comes to the fore (Alzahrani et al., 2020; Davis, 1989). The intricate network of connections delineated in the figure underscores the intricate synergy between each component, signifying their mutual influence on one another (Kim et al., 2017). The comprehensive scope of this model underscores the multifaceted nature of virtual reality reading experiences, where each facet bears significance in shaping users' willingness to interact with the virtual reality environment (Davis et al., 1989; Venkatesh & Davis, 2000). The conceptual framework illustrates the interplay between various factors influencing students' interaction behavior and willingness in the context of digital virtual reality. The framework incorporates both direct relationships and moderating influences, highlighting the role of attitudes as a mediator in this complex dynamic.

One of the primary contributions of this study is the development of an influential factor model that sheds light on the complex interplay between students' attitudes, interaction behavior, and willingness within the digital display of virtual reality. This model enhances our understanding of the factors driving engagement in virtual reality digital display environments. Additionally, this research provides practical insights for educators, curriculum designers, and policymakers by offering actionable recommendations to optimize the use of VR digital displays for enhancing student engagement and learning outcomes in educational settings.

4. Methodology

This study employed a quantitative research paradigm rooted in the principles of the Structural Equation Model (SEM). Quantitative methods provided a structured and rigorous framework for collecting numerical data that could be statistically analyzed to unveil patterns, correlations, and trends (Creswell & Creswell, 2018). The research approach was characterized by a cross-sectional design, which emphasized data collection at a specific time to capture participants' responses regarding the variables of interest.

In the context of this study, which aimed to investigate the factors that influenced students' interaction behavior and willingness in digital virtual reality, a survey research design was employed to collect data from a sample of college students. The research utilized a multi-stage cluster sampling method, with the primary sampling units (PSUs) defined as eligible Grade 1 students at Gansu Hexi University. A sample size of 456 Grade 1 college students was determined for this study, informed by considerations inherent to Structural Equation Modeling (SEM).

The structured questionnaire was designed to elicit responses related to students' interactive behavior in the virtual reality digital display environment. Participants' attitudes toward virtual reality digital display were measured using a validated scale. To assess participants' familiarity and competence with virtual reality technology, a questionnaire focused on virtual reality information literacy was employed. The questionnaire included 7 variables and 28 questions. Each variable consisted of 3-5 measurement items, and the questionnaire was measured on a Likert 7 scale, with answers divided into 7 levels from "very disagree" to "very agree." The literature sources used to develop the instrument included Chatzoglou et al. (2009), Chang et al. (2017), Davis (1989), Sanchezfranco et al. (2009), Kang et al. (2020), Gallino & Moreno (2018), Olssonthomas et al. (2013), Kim & Forsythe (2008), Gallego et al. (2016), and Teo & Noyes (2011).

5. Findings

Exploratory Factor Analysis (EFA) was employed, EFA was particularly beneficial when no pre-defined factor structure existed. This technique involved analyzing the interrelationships among observed variables to uncover the underlying dimensions that explained their variance. By scrutinizing factor loadings, communalities, and eigenvalues, the study aimed to capture the essential constructs influencing students' interactions. The results of the Exploratory Factor Analysis (EFA) indicated that all 28 items exhibited favorable characteristics and displayed strong associations with the dimensions, demonstrating high reliability levels that exceeded 0.95.

The data screening process revealed that there were no missing data points, ensuring the completeness of the dataset. Although a few outliers were detected, they were deemed acceptable given the sample size and the study's objectives. However, it is important to note that the data did not exhibit a normal distribution, as indicated by the significant Kolmogorov-Smirnov test results. Therefore, in light of this departure from normality, the researcher has opted to utilize Partial Least Squares Structural Equation Modeling (PLS-SEM) as the analytical approach for this study. PLS-SEM is particularly well-suited to handle non-normally distributed data and is a suitable choice in such cases. The results of the Partial Least Squares Structural Equation Modeling (PLS-SEM) conducted to address the two research questions displayed in Figure 2. The path model exhibited an excellent fit to the data, as indicated by several key statistics. The chi-square statistic, often used as an indicator of model fit. (Table 1), was found to be non-significant, suggesting a good fit between the model and the data. Additionally, the Root Mean Square Error of Approximation (RMSEA) statistic, which measures the discrepancy between the model and observed data, was within a tolerable range. Furthermore, the Comparative Fit Index (CFI) and the Normed Fit Index (NFI) statistics both demonstrated values that indicated a favorable fit between the model and the data. The statistics for the saturated model and the estimated model, including SRMR, d_ULS, d_G, Chi-square, and NFI, were very similar, suggesting that the estimated model effectively represents the relationships within the data.

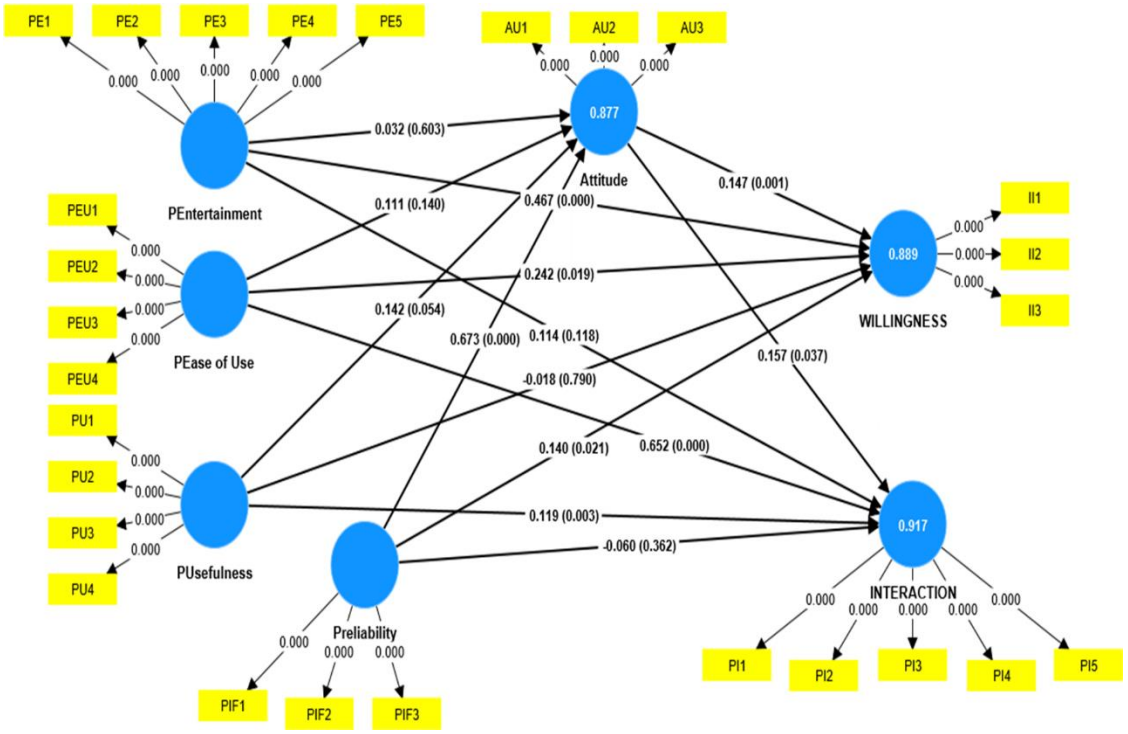

Fig. 2: The path model using (PLS-SEM)

Table 1, Model Fit

	Saturated model	Estimated model
SRMR	0.013	0.013
d_ULS	0.063	0.063
d_G	0.566	0.566
Chi-square	1410.081	1409.743
NFI	0.951	0.951

Table 2, The Path Coefficients for direct and indirect effects

	Original sample (O)	T statistics (|O/STDEV|)	P values
Attitude -> INTERACTION	0.157	2.082	0.037
Attitude -> WILLINGNESS	0.147	3.221	0.001
Perceived Ease Of Use -> Attitude	0.111	1.475	0.140
Perceived Ease Of Use -> INTERACTION	0.652	8.639	0.000
Perceived Ease Of Use -> WILLINGNESS	0.242	2.354	0.019
Perceived Entertainment -> Attitude	0.032	0.520	0.603
Perceived Entertainment -> Interaction	0.114	1.563	0.118
Perceived Entertainment -> Willingness	0.467	4.869	0.000
Perceived Usefulness -> Attitude	0.142	1.931	0.054
Perceived Usefulness -> Interaction	0.119	2.974	0.003

	Original sample (O)	T statistics (|O/STDEV|)	P values
P Perceived Usefulness -> Willingness	-0.018	0.267	0.790
Perceived Reliability -> Attitude	0.673	10.548	0.000
Perceived Reliability -> INTERACTION	-0.060	0.912	0.362
Perceived Reliability -> WILLINGNESS	0.140	2.307	0.021
Perceived Reliability -> AITIUDE -> INTERACTION	0.105	2.070	0.039
Perceived Entertainment -> Attitude -> Interaction	0.005	0.438	0.661
Perceived Entertainment -> Attitude -> Willingness	0.005	0.508	0.611
Perceived Usefulness -> Attitude -> Willingness	0.021	1.745	0.081
Perceived Ease Of Use -> AITIUDE -> INTERACTION	0.017	1.292	0.196
Perceived Usefulness -> Attitude -> Interaction	0.022	1.259	0.208
Perceived Ease Of Use -> AITIUDE -> WILLINGNESS	0.016	1.204	0.229
Perceived Reliability -> AITIUDE -> WILLINGNESS	0.099	3.091	0.002

Research Question 1: What factors affect Students' attitudes, interaction behavior, and willingness in the digital display of virtual reality?

The path coefficients from Table 2 provide insights into the direct and indirect effects of various factors on students' attitudes, interaction behavior, and willingness within the digital display of virtual reality.

Direct Effects:

1. The direct path from Attitude to Interaction (0.157, T-statistic: 2.082, P-value: 0.037) indicates a positive relationship, with students' attitudes significantly influencing their interaction behavior.
2. The direct path from Attitude to Willingness (0.147, T-statistic: 3.221, P-value: 0.001) demonstrates a strong positive influence, suggesting that a positive attitude contributes to increased willingness.
3. Perceived Ease of Use has a direct effect on Attitude (0.111, T-statistic: 1.475, P-value: 0.140), though not statistically significant.
4. Perceived Ease of Use directly impacts Interaction (0.652, T-statistic: 8.639, P-value: 0.000) and Willingness (0.242, T-statistic: 2.354, P-value: 0.019), highlighting its significant role in shaping students' behavior and willingness.
5. Perceived Entertainment exhibits no significant direct effects on Attitude, Interaction, or Willingness.
6. Perceived Usefulness directly influences Attitude (0.142, T-statistic: 1.931, P-value: 0.054) and Interaction (0.119, T-statistic: 2.974, P-value: 0.003) but not Willingness.
7. Perceived Reliability significantly impacts Attitude (0.673, T-statistic: 10.548, P-value: 0.000), while the direct effect on Interaction (-0.060, T-statistic: 0.912, P-value: 0.362) is not statistically significant. However, Perceived Reliability directly influences Willingness (0.140, T-statistic: 2.307, P-value: 0.021).

Indirect Effects:

The specific indirect effects further elucidate the interplay of these factors:

- Perceived Reliability indirectly affects Interaction (0.105) and Willingness (0.099) through Attitude, indicating that the influence of Perceived Reliability on these variables is mediated by attitudes.
- Perceived Ease of Use indirectly impacts Interaction (0.017) and Willingness (0.016) through Attitude.

- Perceived Usefulness indirectly influences Interaction (0.022) through Attitude.
- Perceived Entertainment demonstrates minimal indirect effects on Interaction and Willingness through Attitude (0.005 for both).

Research Question 2: What is the underlying model of factors influencing Students' attitudes, interaction behavior, and willingness in the digital display of virtual reality?

The underlying model that explains the factors influencing students' attitudes, interaction behavior, and willingness in the digital display of virtual reality is a complex and interwoven network of relationships between key constructs and multiple independent variables. This model is elucidated by both direct and specific indirect effects, each playing a significant role in shaping students' experiences within the virtual reality environment.

Attitude as a Central Mediator: Attitude emerges as a pivotal mediator in this model. The direct path from Attitude to Interaction (0.157) indicates that students' attitudes significantly influence their interaction behavior. Furthermore, the strong direct effect of Attitude on Willingness (0.147) highlights the profound impact of students' attitudes on their willingness to engage within the virtual reality context. These direct effects are statistically significant with T-statistics of 2.082 and 3.221, respectively, and low P-values (0.037 and 0.001).

Direct Effects of Independent Variables:

- Perceived Ease of Use directly impacts Attitude (0.111), although this direct effect is not statistically significant. It has a substantial direct effect on Interaction (0.652) and a significant impact on Willingness (0.242). The T-statistics are 1.475, 8.639, and 2.354, respectively, with the last two having statistically significant P-values (0.000 and 0.019).
- Perceived Entertainment does not exhibit significant direct effects on Attitude, Interaction, or Willingness, with all T-statistics above 0.5 and non-significant P-values.
- Perceived Usefulness has a direct influence on Attitude (0.142) but is not statistically significant. It also directly affects Interaction (0.119), with a T-statistic of 2.974 and a significant P-value (0.003).
- Perceived Reliability has a powerful direct effect on Attitude (0.673) with a remarkably high T-statistic of 10.548 and a very low P-value (0.000). It does not have a statistically significant direct effect on Interaction but significantly influences Willingness (0.140) with a T-statistic of 2.307 and a P-value of 0.021.

Specific Indirect Effects: Specific indirect effects provide a more nuanced understanding of the model:

- Perceived Reliability indirectly affects Interaction (0.105) and Willingness (0.099) through Attitude, indicating that the influence of Perceived Reliability on these variables is mediated by attitudes. These indirect effects contribute to the comprehensive model by highlighting the role of attitudes in translating the impact of Perceived Reliability into observable behaviors.
- Perceived Ease of Use indirectly impacts Interaction (0.017) and Willingness (0.016) through Attitude, further emphasizing the importance of attitudes in mediating the influence of Perceived Ease of Use on students' behavior and willingness within virtual reality.
- Perceived Usefulness indirectly influences Interaction (0.022) through Attitude, strengthening the central role of attitudes as a mediator of the impact of Perceived Usefulness on interaction behavior.
- Perceived Entertainment, while not exhibiting direct effects, demonstrates minimal indirect effects on Interaction and Willingness through Attitude (0.005 for both). Though these indirect effects are relatively small, they contribute to the overall model by showcasing the indirect role of attitudes in mediating the influence of Perceived Entertainment on students' interaction behavior and willingness.

Overall Model: This underlying model is characterized by the intricate interplay of independent variables that directly and indirectly influence students' attitudes, which, in turn, shape their interaction behavior and willingness within the digital display of virtual reality. The model is substantiated by the significant direct and specific indirect

effects, highlighting the significance of attitudes as a central mediator. Perceived Reliability, Perceived Ease of Use, Perceived Usefulness, and to a lesser extent, Perceived Entertainment, are central influencers in this complex web of relationships. These findings provide a comprehensive understanding of the interrelated factors that impact students' experiences within the virtual reality environment and emphasize the pivotal role of attitudes in shaping their behavior and willingness.

6. Discussion

In the dynamic landscape of education and technology, this study has delved into the intricate interplay of factors influencing students' attitudes, interaction behavior, and willingness within the realm of digital virtual reality. The findings of this research, based on the principles of the Structural Equation Model (SEM) and robust quantitative analysis, offer valuable insights and practical implications for the evolving field of educational technology and immersive digital displays. The study reveals that several key factors significantly impact students' attitudes, interaction behavior, and willingness within the digital virtual reality environment. Attitude emerges as a central construct that mediates the relationships between multiple independent variables and the outcomes of interest. Perceived Reliability, Perceived Ease of Use, Perceived Usefulness, and, to some extent, Perceived Entertainment play crucial roles in shaping students' attitudes and, subsequently, their interaction behavior and willingness. These findings align with existing literature on technology acceptance, educational technology, and human-computer interaction, emphasizing the importance of perceived reliability and ease of use in fostering positive attitudes toward technology. Additionally, the study underscores the value of students' perceptions of usefulness and entertainment in shaping their engagement within the virtual reality context. Moreover, specific indirect effects underscore the intricate dynamics within this model. Perceived Reliability, for instance, not only directly influences students' attitudes but also indirectly affects their interaction behavior and willingness through the mediating role of attitudes. This emphasizes the critical role of attitudes as a central construct that translates the impact of other variables into observable behaviors and engagement.

The findings of this study contribute to the broader academic landscape by shedding light on the integration of emerging technologies within educational contexts, aligning with the changing paradigms of education. The research highlights the intricate dynamics of interactive learning in the digital era, resonating with the evolving landscape of education. The results reflect the potential of virtual reality digital displays as transformative tools for enriching the educational experience, in line with previous research (Chang et al., 2017; Lei et al., 2020).

The emphasis on Attitude as a central mediator echoes the literature on the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). These models emphasize the significance of users' attitudes and perceptions in determining their willingness to accept and use technology. The findings align with studies by Davis (1989) and Chatzoglou et al. (2009), which underscore the pivotal role of perceived ease of use and perceived usefulness in shaping users' attitudes and, consequently, their interaction behavior and willingness.

The role of Perceived Reliability is a noteworthy contribution to the discussion. Its significant influence on Attitude and, in turn, on Interaction and Willingness, highlights its importance in digital virtual reality settings. These results resonate with the principles of trust and reliability in technology adoption and echo the research by Gallino & Moreno (2018) and Kang et al. (2020).

Perceived Entertainment, although not showing significant direct effects, demonstrates minimal indirect effects, suggesting its potential role in shaping students' attitudes and engagement. While its impact is relatively small, it aligns with the idea that entertainment value can enhance the overall user experience (Sanchezfranco et al., 2009; Kim & Forsythe, 2008).

In summary, this research underscores the complex and multifaceted nature of factors influencing students' attitudes, interaction behavior, and willingness in the digital display of virtual reality. The integration of emerging technologies in education continues to evolve, and understanding the intricacies of user engagement is crucial. This study contributes to the ongoing dialogue on immersive educational technologies and the potential for

enhancing the educational experience. As technology and education intersect, continued exploration in this domain is essential to further optimize and enrich the use of virtual reality in education and beyond.

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