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Assessing Factors Impacting College Students' Attitudes and Behavioral Intentions Toward Augmented Reality Technologies in Yibin, China

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Abstract

This study assessed the factors influencing the attitudes and behavioral intentions of college students in Yibin, China, regarding the use of augmented reality (AR) technology. The research focused on students aged 18 and above who showed interest in AR technology. This study leverages three significant theoretical models（TAM, UTAUT, IDT）to enhance and refine the conceptual framework. The conceptual framework included interactivity, innovation, perceived usefulness, sense of presence, perceived ease of use, attitude, and behavioral intention. A total of 450 students from four different majors participated in the survey. The data collection process was carried out in three phases: purposive sampling, stratified random sampling, and convenience sampling. To ensure the quality of the data, experts conducted an Item-Objective Congruence (IOC) assessment of the survey items prior to data collection, followed by a pilot test with 50 participants. Through confirmatory factor analysis (CFA), the factor structure's appropriateness and the model's test were verified, demonstrating a satisfactory fit, with the following model fit indices: CMIN/dF = 2.385, GFI = 0.874, AGFI = 0.847, CFI = 0.949, TLI = 0.942, and RMSEA = 0.056. These indices confirm the reliability and validity of our constructs. Notably, perceived usefulness was identified as the most influential factor on attitude, which in turn significantly impacts behavioral intention. As technology continues to evolve, augmented reality (AR) is demonstrating extensive potential across various domains, including education, business, and entertainment. Given their role as early adopters of new technologies, college students are instrumental in driving the adoption and practical application of AR technology.

Keywords: College Students, Augmented Reality (AR), Attitude, Behavioral Intention, TAM, UTAUT

Introduction

AR is an innovative technology that integrates digital information into our physical world in real time (Portalés et al., 2010). This technology creates an enhanced visual experience by adding visual graphics, sound effects, tactile feedback, and even smells to the real world, blending real life with virtual images or animations using the camera of a mobile device or specialized AR headsets and glasses (Samini et al., 2021). As a specialized sector within the broader extended reality (XR) domain, the AR market is projected to experience substantial growth in the foreseeable future (Johannesson & Karlsson, 2023). In 2023, AR hardware held a consumer market value of US$2.4 billion, a figure projected to surpass US$9 billion by 2027. (Statista, 2024).

Augmented reality (AR) enables the transformation of the physical environment by superimposing virtual content onto a real-time setting, creating an immersive visual experience for consumers through devices such as screens or projectors. The integration of AR in marketing has expanded significantly in recent years, offering novel methods for the real-world visualization of products, information, and experiences (Huang & Hsu Liu, 2014). A notable early commercial example of AR technology was the 2008 launch of an application by the car brand Mini, which utilized an innovative approach. The app enabled users to position their mobile phones over paper marked with specific labels, resulting in the display of a three-dimensional car model simulation on the phone's screen (Carmigniani et al., 2011). Users could control the model by moving the paper, providing an interactive and simulated view of the vehicle. This pioneering use of AR in marketing was soon followed by a proliferation of similar applications across the industry (Javornik, 2014).

In China, the industrial sector is gradually adopting AR and VR technologies for scenarios such as employee training and simulation projects, and these applications are increasing the demand for head-mounted display (HMD) products. The education sector has also begun to use HMD to provide a richer learning experience in the classroom, improving student interactivity and engagement through head-mounted devices. In addition, the use of HMD products in the medical industry is also increasing, especially in applications such as surgical operations and medical simulation, which provides a strong impetus for the growth of the Chinese market. Despite the growing implementation of AR in education and industry, limited research has examined the behavioral intentions of college students in mid-sized Chinese cities such as Yibin.

Drawing on previous research, this study explored in depth the determinants of attitudes and behavioral intentions of college students in Yibin City toward augmented reality (AR) technology. The survey thoroughly examined these students' views on AR and identified key factors that influence their behavioral intentions. Drawing on existing research, this study conducted a structural analysis to determine these students' attitudes and behavioral intentions toward AR technology. It used a quantitative approach to examine the interrelationships between seven key variables: interactivity, innovativeness, perceived usefulness, sense of presence, perceived ease of use, attitude, and behavioral intention.

Literature Review

Interactivity

Studies suggest that interactivity significantly impacts consumer behavior, particularly in enhancing immersion, trust, and enjoyment (Gao et al., 2009; Hoffman & Novak, 2009). In the realm of e-commerce, Javornik (2016) defines interactivity as consumers' ability to virtually explore and interact with products in realistic settings, creating immersive experiences that drive positive emotions and actions. Park and Yoo (2020) found that a technology's interactivity affects users' perceptions of it and their tech-mediated shopping experiences, noting individual differences in these perceptions. AR technology emphasizes interaction by superimposing digital elements onto the user's view of the real world, thereby enhancing the physical environment. Research has found that in the new online marketing model, 3D images and videos of real products have a great impact on buyers' psychology (Li & Meshkova, 2013).Therefore, this study proposes a hypothesis:

Hypothesis 1: Interactivity has significant impact on attitude.

Innovativeness

In the domain of consumer behavior, innovativeness is characterized by the degree of enthusiasm with which consumers are inclined to experiment with novel products and services (Agarwal & Prasad, 1998). The receptivity of consumers to AR interactive technology is influenced by its innovativeness (Kim & Forsythe, 2008). Liu (2010) demonstrated that consumers possessing higher levels of innovativeness exhibit a greater propensity to embrace and actively investigate novel technologies, which consequently fosters a favorable stance toward innovation. Zarmpou et al. (2012) corroborated these findings, establishing that an individual's degree of innovativeness significantly influences their acceptance of augmented reality (AR) technology. Agarwal and Prasad (1998) defined customer innovativeness as a construct to analyze the impact of an individual's perception of the innovativeness of others on their own inclination to adopt new technologies. Their research indicated that early adopters, in particular, are more likely to be receptive to state-of-the-art technological advancements. Hence, a hypothesis is set:

Hypothesis 2: Innovativeness has significant impact on attitude.

Perceived Usefulness

Davis et al. (1989) introduced the concept of perceived usefulness as an individual's conviction that employing a specific application will enhance job effectiveness, which in turn influences their choice to adopt or forgo the technology. The Technology Acceptance Model (TAM) posits that an individual's perception of a technology's ease of use and its utility are pivotal factors in shaping their attitude toward it. As the perceived advantages of the technology increase, so too does the individual's positive attitude (Dwivedi et al., 2019). Wilson et al. (2021) further demonstrated that perceived usefulness not only drives customer satisfaction but also fosters loyalty, especially in the context of computer technology adoption. Additionally, the visual appeal and interactive features of technological systems can enhance user engagement

and improve the efficiency of information processing during product searches, thereby increasing the perceived usefulness of the technology (van Noort et al., 2012). The sustained use of technology is primarily influenced by two dimensions of perceived usefulness: process quality and result quality. The influence of these factors on the ongoing utilization of technology varies according to the consumer's degree of engagement with technological innovation, as highlighted by Saavedra et al. (2023). Based on these findings, the following hypothesis is proposed:

Hypothesis 3: Perceived usefulness has significant impact on attitude.

Perceived Ease of Use

Perceived ease of use refers to the extent to which users perceive the interaction with a system as being effortless and straightforward. This perception is largely shaped by factors such as interface design quality, interaction modality, and the extent of guidance needed to navigate the system's functionalities (Pantano et al., 2017). The combined effects of perceived ease of use and perceived usefulness shape users' attitudes toward a system, thereby dictating the extent of their engagement and propensity for continued use (Marangunić & Granić, 2015). These two factors have been identified as the primary determinants of users' adoption of new technologies (Chen et al., 2013). For example, Ahn et al. (2007) demonstrated in their study of online retail acceptance that perceived ease of use positively influences playability—a key factor affecting users' attitudes and behavioral intentions. Based on these insights, the following hypothesis is proposed:

Hypothesis 4: Perceived ease of use has significant impact on attitude.

Attitude

Attitude mirrors an individual's emotional disposition towards a product or phenomenon, predicated on a subjective evaluation of the product's efficacy in fulfilling its intended function (Armitage & Conner, 2001). Attitude encapsulates the user's appraisal of the system, whereas behavioral intention denotes the user's propensity to engage with the system (Pantano et al., 2017). Consumer attitudes concerning VR are founded on subjective assessments of the overall VR experience. Attitudes toward VR are derived from the conceptualization of attitude toward advertising as “a propensity to respond with favor or disfavor to stimuli” in the context of VR (Lutz, 1985). Attitudes stem from genuine concerns regarding a technology, informed by accessible data, or they may emerge from misconceptions rooted in flawed reasoning or misinterpretations fueled by incorrect information (Lucas et al., 2021). Patrons who hold a positive view of a product or service are depicted as being keen to embrace and persist in utilizing it (Cheng et al., 2019). Demonstrations of AR products amplify the sense of enjoyment, which in turn fosters affirmative attitudes towards a brand (Smink et al., 2019). Engagement with AR technology can influence a user's attitude, persuasiveness, and motivation, primarily due to the user's practical and experiential values (Fogg, 2002). Subsequently, a hypothesis is suggested:

Hypothesis 5: Attitude has significant impact on behavioral intention.

Sense of presence

The experience of presence implies that consumers are wholly engrossed in VR stimuli, oblivious to their immediate surroundings, and with a sense that time is fleeting (Schaufeli et al., 2002). Presence is characterized as the extent to which a medium vividly portrays objects, events, and individuals in a manner that appears, sounds, and feels authentic (Lombard & Ditton, 1997). Although AR confines itself to the sensation of engaging with simulated entities as if they were genuine social agents, it fosters a sense of co-existence with others, often entailing the shared experience of virtual objects and physical locales (Poretski et al., 2019). From a theoretical standpoint, the sense of presence, which denotes the perception of being in a particular locale, is gaining prominence in marketing studies due to its association with immersive technologies (de Ruyter et al., 2020). J.-H. Kim et al. (2021) have observed that within the context of augmented reality (AR), as the technological and physical environments become less perceptible, users experience a heightened sense of presence, creating the illusion of immersion in the virtual setting. Rauschnabel et al. (2022) further propose that advancements in AR technology will enhance this sense of local presence, leading to more immersive and interactive experiences. Thereby, this study hypothesizes that:

Hypothesis 6: Sense of presence has significant impact on behavioral intention.

Behavioral Intention

Behavioral intention is conceptualized as the motivational force behind deliberate actions and is closely linked to the execution of those behaviors (Jang & Feng, 2007). Ajzen (1980) conceptualized behavioral intention as the propensity of an individual to perform or refrain from performing a specific behavior in the near term. It signifies a consumer's predisposition to interact with a product or service in a specific manner. Within the realm of consumer behavior studies, behavioral intention is often synonymous with consumer attitude loyalty (Altunel & Koçak, 2017). Behavioral intention is also characterized as a consumer's inclination to patronize an application, revisit it regularly, and extend recommendations to peers (J.-H. Kim et al., 2023). In the context of augmented reality (AR) environments, behavioral intention is perceived as the capacity of AR to conjure vivid mental imagery, which in turn positively influences consumers' attitudes and their propensity to engage with the product (Jayaswal & Parida, 2023). Ali et al. (2013) have demonstrated that favorable behavioral intentions can manifest in various positive consumer actions, such as positive word-of-mouth, increased spending with service providers, willingness to pay a premium, and maintaining loyalty to a brand.

Conceptual Framework

The development of an appropriate conceptual framework is essential, achieved through an analysis of the theoretical frameworks from prior studies. Such a framework not only underpins the theoretical aspects of the research but also aids in defining the study's objectives, boundaries, and methodologies. In this research, the conceptual framework has been formulated by building upon established theories and prior theoretical models, specifically designed to uncover the factors influencing college students' attitudes and behavioral intentions

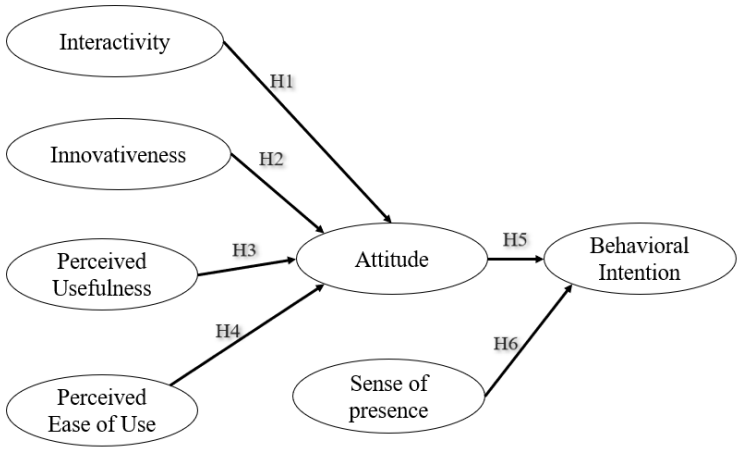
towards augmented reality (AR) technology. This study leverages three significant theoretical models（TAM、UTAUT、IDT）to enhance and refine the conceptual framework.

These models collectively facilitate the examination of key constructs including behavioral intention, perceived ease of use, perceived usefulness, innovativeness, and attitude. The study draws upon three foundational research frameworks: the first, by Dogra et al. (2023), employs the TAM to investigate the interconnections among technology anxiety, innovativeness, interactivity, virtuality, attitude toward AR, behavioral intention toward AR, and other relevant variables. The second, by Castillo S and Bigne (2021), examines the relationships among perceived ease of use, aesthetics, navigation, perceived usefulness, self-efficacy, technology readiness, and attitude. The third, by Kim et al. (2023b), encompasses variables such as vividness, interactivity, presence, attitude toward technology, and behavioral intention.

Furthermore, this study's conceptual framework is dedicated to exploring the interplay among six critical variable groups to pinpoint the primary determinants of college students' attitudes and behavioral intentions toward AR technology. The framework is visually represented in Figure 1.

Figure 1

Conceptual Framework



Source: Constructed by the Author

Research Methodology

Research Design

This study measures the attitudes and behavioral intentions of college students in Yibin, China, towards AR technology. The methodologies of this study include the general study design, participants and sampling strategy, research instrument and its content validity, internal consistency reliability, data collection strategies, and statistical analysis procedures. In this

study, item-objective congruence (IOC) testing and preliminary analysis are presented.

The primary research instrument is a questionnaire designed to investigate the variables that influence college students' attitudes and behavioral intentions toward AR technology in Yibin, China. The questionnaire is divided into three main sections: screening questions, demographic data, and factors affecting users' attitudes and behavioral intentions. The screening questions help identify the target population, while the demographic data provide context for the respondents' backgrounds. The final section delves into the specific factors that may influence users' attitudes and behavioral intentions regarding AR technology.

Research Population and Sample

The study focuses on university students in Yibin, China, who express interest in AR technology. These students are aged 18 and above, major in science-related fields, and have prior experience with AR devices. The exact number of AR users in Yibin is unknown, a multi-phase approach was implemented to gather data from participants, encompassing three stages: purposive sampling to ensure diversity, stratified random sampling to ensure proportional representation, and convenience sampling for accessibility. This method helps identify the relevant audience for the study, ensuring that the participants are familiar with and interested in AR technology.

Taherdoost (2017) highlighted that sample size is a critical factor in empirical research aimed at generalizing findings to a larger population. To ensure the representativeness of a random sample and minimize potential biases or sampling errors, an adequately sized sample is essential. This study employs Structural Equation Modeling (SEM), a quantitative statistical method that examines the relationships among both observed and latent variables, thereby providing a comprehensive analytical framework for understanding complex interrelationships. With a significance level set at 0.05, the minimum necessary sample size for conducting Structural Equation Modeling (SEM) was calculated to be 425. To bolster the data's reliability and strengthen the analysis, the sample size was expanded to include 450 participants. This methodological approach ensures that the data are sufficiently robust and the resulting analytical outcomes are reliable.

Data Analysis

IOC is an effective content validity assessment tool because it provides relevant information about whether the project has achieved its intended objectives. This approach focuses on developing and improving research instruments through expert judgment. Prior to data collection, experts evaluated the IOC of the questionnaire items and a pilot test with 50 participants was conducted. The IOC assessment score scored by three experts exceeded 0.6, thus confirming the content validity of the questionnaire. In addition, the pilot test results showed that the reliability of the questionnaire measured by Cronbach's alpha coefficient exceeded the acceptable threshold of 0.7.

For data analysis, this study employed SPSS 22.0 and AMOS 26.0 software. The principal objective of Conducting Confirmatory Factor Analysis (CFA) is to determine the adequacy of the proposed model, which permits a structured assessment of critical validity

aspects of constructs, encompassing model fit, reliability, and both convergent and discriminant validity. Within the scope of this study, the application of CFA coupled with SEM facilitated a thorough evaluation of the theoretical model and a nuanced exploration of the hypothesized associations among different variables. The integration of this comprehensive analytical approach established a robust platform for extracting valid inferences from the collected data.

Demographics of Participants

This study used the Likert five-point scale to answer the questionnaire. Among the respondents, males accounted for 58% and females accounted for 42%. In terms of age distribution, the 20-22 age group accounted for the largest proportion (36.4%), followed by 18-19 years old (18%), 22-24 years old (31.8%), and the rest accounted for 13.8%. In terms of majors, mechanical and electronic engineering accounted for 31%, vehicle engineering for 30%, mechanical design, manufacturing and automation for 27%, and industrial design for 12%. Table 1 summarizes the demographic data of all 450 respondents.

Table 1

Demographic Information

Demographic and Behavior Data (N=450)		Frequency	Percentage
Gender	Male	261	58%
	Female	189	42%
Age	18-19 years old	81	18%
	20-22 years old	164	36.4%
	22-24 years old	143	31.8%
	24-26 years old	62	13.8%
Major	Industrial design	54	12%
	Vehicle engineering	135	30%
	Mechanical and electronic engineering	138	31%
	Mechanical design, manufacturing and automation	123	27%

Source: Constructed by the Author

Results and Discussion

This study used confirmatory factor analysis to evaluate the discriminant validity of the constructs. Table 2 shows that the Cronbach's alpha coefficients of all constructs are higher than the 0.7 standard proposed by Dikko (2016), indicating that the constructs have good reliability. The factor loadings of each construct are very high, ranging from 0.769 to 0.930, indicating that there is a significant correlation between the constructs and the survey items. In addition, the reliability coefficients of all indicators are higher than 0.7, and the average variance extracted is higher than 0.5, which meets the discriminant validity standards proposed by Fornell and Larcker (1981).

Table 2

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

Variables	Source of Questionnaire	No. of Item	Factors Loading	CR	AVE
Interactivity (INT)	Dogra et al. (2023)	5	0.819-0.877	0.920	0.698
Innovativeness (IN)	Kim and Forsythe (2008)	5	0.769-0.930	0.930	0.729
Perceived Usefulness (PU)	Castillo S and Bigne (2021)	4	0.844-0.895	0.932	0.773
Perceived Ease of Use (PEOU)	Marangunić and Granić (2015)	4	0.843-0.884	0.920	0.743
Sense of presence (SP)	Kim et al. (2023)	3	0.812-0.860	0.882	0.713
Attitude (ATT)	Lucas et al. (2021)	4	0.807-0.873	0.903	0.699
Behavioral Intention (BI)	Suhartanto (2019)	5	0.804-0.868	0.921	0.699

Fornell and Larcker (1981) proposed a method for evaluating the discriminant validity of constructs by comparing the square root of the average variance extracted (AVE) for each construct with its correlations to other constructs. This approach has since become a widely accepted criterion for assessing whether distinct constructs are empirically separable. In the context of this study, Table 3 provides a comprehensive overview of the discriminant validity assessment by presenting both the square roots of the AVEs and the correlation matrix for the variables under investigation. The diagonal entries in this table are particularly noteworthy, as they represent the square roots of the AVE for each respective variable, serving as a crucial benchmark for determining whether discriminant validity is achieved.

Specifically, the square roots of the AVE for each variable are as follows: interactivity (INT) at 0.835, innovativeness (IN) at 0.854, perceived usefulness (PU) at 0.879, perceived ease of use (PEOU) at 0.862, sense of presence (SP) at 0.844, attitude (ATT) at 0.836, and behavioral intention (BI) also at 0.836. These values are critical in the discriminant validity assessment, as they must exceed the inter-correlations between the respective variable and all other variables in the study. Upon examination of the correlation matrix, it is evident that the square roots of the AVEs for each variable are not only larger than their respective inter-variable correlation coefficients but also significantly so. This finding indicates that each construct captures a unique dimension of variance that is distinct from the other constructs in the model.

In conclusion, the results clearly demonstrate that the square roots of the AVEs for each variable are substantially larger than their respective inter-variable correlation coefficients. This finding confirms that the scale exhibits strong discriminant validity, thereby validating the distinctiveness of each construct within the research framework.

Table 3

Square roots of AVEs and correlation matrix

Variables	INT	IN	PU	PEOU	SP	ATT	BI
INT	0.835						
IN	0.137	0.854					
PU	0.318	0.028	0.879				
PEOU	0.214	0.141	0.175	0.862			
SP	0.296	0.142	0.202	0.168	0.844		
ATT	0.346	0.197	0.37	0.29	0.293	0.836	
BI	0.302	0.34	0.154	0.152	0.32	0.26	0.836

Note: The diagonally listed value is the AVE square roots of the variable

Table 4 summarizes the goodness-of-fit indices of the measurement model used in this study. These indices play a crucial role in assessing how well the proposed measurement model fits the collected empirical data. In this study, the CMIN/dF value was 2.385, which is below the generally accepted threshold of 5.00. This result indicates that the model does not deviate much from the data, indicating a reasonable fit.

In addition, the goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI) further indicate the adequacy of the model. The GFI value was 0.874, while the AGFI value was 0.847. These results indicate that the model fits the data well, considering the absolute fit and the complexity of the model. In this study, the NFI value was 0.916, the CFI value was 0.949, and the TLI value was 0.942. These values all exceeded the acceptable standard of 0.80, indicating that the proposed measurement model fits the data better than the baseline model. The RMSEA value in this study was 0.056, which is well below the threshold of 0.08. In summary, the initial measurement model showed robust fit indices on multiple criteria. The consistency of these indicators with the confirmatory factor analysis (CFA) criteria further verified the reliability and validity of the measurement model.

Table 4

Goodness of Fit for Measurement Model

Fit Index	Source	Acceptable Criteria	Statistical Values
CMIN/dF	Awang (2012)	<5.00	2.385
GFI	Sica and Ghisi (2007)	≥0.85	0.874
AGFI	Sica and Ghisi (2007)	≥ 0.80	0.847
NFI	J.-H. Wu and Wang (2006)	≥ 0.80	0.916
CFI	Bentler (1990)	≥ 0.80	0.949
TLI	Sharma et al. (2005)	≥ 0.80	0.942
RMSEA	Pedroso et al. (2016)	< 0.08	0.056
Model Summary		**In harmony with empirical data**	

Source: Constructed by the Author

Structural Equation Modeling (SEM)

The researcher utilized AMOS statistical software to evaluate the structural model's goodness-of-fit. Table 5 displays the goodness-of-fit indices for the structural model before and after modification, which are essential for determining how well the model aligns with the empirical data.

Initially, the GFI was 0.848, below the acceptable threshold of 0.85, and the AGFI was 0.823, slightly below the required 0.80. However, after modification, the GFI rose to 0.868, surpassing 0.85, and the AGFI increased to 0.846, meeting the 0.80 criterion. The other indices also showed improvements: CMIN/dF decreased from 2.801 to 2.434, NFI increased from 0.897 to 0.911, CFI from 0.931 to 0.945, TLI from 0.925 to 0.940, and RMSEA decreased from 0.063 to 0.057, all aligning with their respective acceptable criteria. These enhancements indicate that the structural model was refined to better capture the relationships among the constructs, thereby improving its validity and reliability.

Table 5

Goodness of Fit for Structural Model

Fit Index	Acceptable Criteria	Statistical Values	
		Before Adjustment	After Modification
CMIN/dF	<5.00	2.801	2.434
GFI	≥0.85	0.848	0.868
AGFI	≥ 0.80	0.823	0.846
NFI	≥ 0.80	0.897	0.911
CFI	≥ 0.80	0.931	0.945
TLI	≥ 0.80	0.925	0.940
RMSEA	< 0.08	0.063	0.057
Model Summary		**Not in harmony with empirical data**	**In harmony with empirical data**

Hypothesis Outcomes

As shown in Table 6 and Figure 2, the study empirically tested six hypotheses, all of which were supported. The path coefficients indicate that INT has a significant positive effect on ATT (β=0.240), and IN also positively affects ATT (β=0.132). Additionally, PU has the most significant positive impact on ATT (β=0.309), while PEOU positively affects attitude as well (β=0.213). Notably, SP has a significant positive effect on BI (β=0.291). These findings reveal the important roles of interactivity, innovativeness, perceived usefulness, perceived ease of use, and presence in shaping attitude and behavioral intention, providing strong support for relevant theories and practices.

Table 6

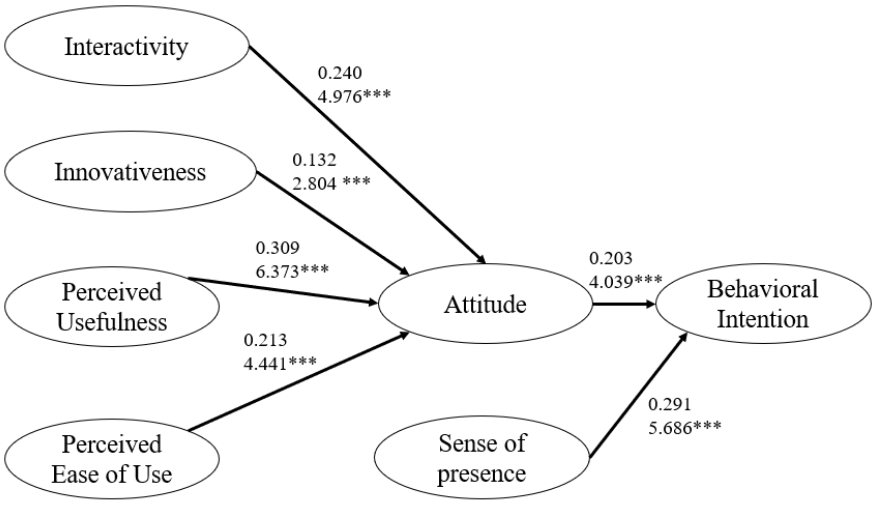
Hypothesis Testing Result of the Structural Model

Hypothesis	Paths	Standardized Path Coefficients (β)	T-value	Result
H1	INT→ATT	0.240	4.976***	Supported
H2	IN→ATT	0.132	2.804***	Supported
H3	PU→ATT	0.309	6.373***	Supported
H4	PEOU→ATT	0.213	4.441***	Supported
H5	ATT→BI	0.203	4.039***	Supported
H6	SP→BI	0.291	5.686***	Supported

Source: Constructed by the Author
Note: *=p-value<0.05

Figure 2

Result of the Structural Model



Note: Solid line reports the Standardized Coefficient with * as p<0.05.

Discussion

This study investigates the impact of various factors on consumers' attitudes and behavioral intentions towards Augmented Reality (AR) technology in the context of e-commerce. The results of our hypothesis testing provide significant insights into the dynamics of consumer behavior in AR environments.

H1 has shown significant impact of Interactivity on Attitude; this structural pathway results in the standard coefficient value of 0.240. This indicates that higher levels of interactivity lead to more positive brand attitudes. This result is consistent with previous research (Vashisht et al., 2020), which emphasizes the role of interactivity in enhancing user engagement and satisfaction. The positive effect of interactivity on attitude suggests that brands

should prioritize interactive features in their AR applications to enhance consumer satisfaction and loyalty.

H2 has presented significant impact of Innovation on Attitude, marked by a standard coefficient of 0.132. This aligns with Dogra et al. (2023) conclusion that consumer innovativeness is positively linked to attitudes towards AR-based e-commerce platforms. Innovative AR applications can provide unique and memorable experiences that go beyond traditional shopping methods, thereby enhancing consumers' overall attitudes towards the technology.

H3 reveals a significant impact of Perceived Usefulness on Attitude, with a standard coefficient of 0.309. As highlighted by Van Esch et al. (2019), anthropomorphism in AR can enhance consumers' perception of its usefulness in retail settings. When consumers perceive AR as a useful tool for product exploration, decision-making, and purchase, their attitudes towards the technology become more positive. This finding is further supported by Yim et al., (2017), who demonstrated that increased perceived usefulness of AR media leads to more favorable attitudes. Brands should focus on emphasizing the practical benefits of AR, to enhance consumers' perceived usefulness and, consequently, their attitudes.

H4 show that Perceived Ease of Use significantly influences consumers' Attitudes towards AR, with a standard coefficient of 0.213. This indicates that consumers are more likely to develop positive attitudes when they find AR applications easy to use. Perceived ease of use is a crucial factor in technology adoption, as it reduces the cognitive and emotional barriers associated with learning and using new technologies. Srivastava et al. (2021) also emphasized the importance of perceived ease of use in shaping attitudes towards AR.

The significant relationship between Attitude and Behavioral Intention (H5, standard coefficient of 0.203) confirms that positive attitudes towards AR technology translate into higher behavioral intentions. This finding is consistent with prior research on AR and VR settings (J.-H. Kim et al., 2021), which revealed a favorable correlation between attitudes and behavioral intentions. Consumers who have positive attitudes towards AR are more likely to engage in behaviors such as purchasing products, recommending the technology to others, and using it repeatedly. This highlights the importance of fostering positive attitudes through effective marketing strategies and user experiences to drive consumer behavior.

H6 hypothesized that Sense of Presence has a significant effect on Behavioral Intention with the results of 0.291. AR's ability to merge reality and virtuality allows consumers to virtually test products, creating a sense of presence that enhances their shopping experience. Lavoye et al. (2021) emphasized that the sense of presence during shopping can shape consumers' behavioral intentions. Additionally, Verhagen et al. (2014) highlighted that a sense of presence increases users' trust in product information authenticity. When consumers feel immersed in an AR environment, they are more likely to trust the information provided and have a more positive experience, which in turn influences their behavioral intentions.

Conclusion

This study focuses on college students in Yibin as the subject of investigation, employing the TAM and utilizing data from 450 valid questionnaires to assess attitudes and behavioral intentions towards augmented reality (AR) technology. By combining TAM, UTAUT, and IDT, this study offers a more comprehensive and nuanced understanding of the factors influencing AR adoption. This integrated framework enriches the existing literature by providing a broader theoretical lens that captures the multifaceted nature of technology acceptance. Specifically, the inclusion of innovation and interactivity from IDT, alongside the core constructs of TAM and UTAUT, allows for a more holistic assessment of the factors driving AR adoption among college students.

SEM was employed for data analysis, encompassing variables such as interactivity, innovativeness, perceived usefulness, sense of presence, and perceived ease of use. The study formulated six hypotheses to explore the influence of these variables on attitudes and behavioral intentions among college students. The findings indicate that interactivity, innovativeness, perceived usefulness, sense of presence, and perceived ease of use significantly and positively affect students' attitudes towards AR technology. Furthermore, students' attitudes significantly and positively influence their behavioral intentions.

The research outcomes contribute insights to diverse sectors. For AR technology developers, the findings offer concrete guidance for enhancing product design and user experience. Service providers can leverage the insights to better understand user needs and preferences, facilitating the development of more effective marketing strategies. Educational institutions can benefit from the study's results to advance the integration of AR technology in education and enhance teaching efficacy. Additionally, the study offers a reference for governmental bodies and policymakers to foster the broad application and healthy progression of AR technology.

Recommendations

Based on the findings of this quantitative study, the researcher offered suggestions for the application and optimization of augmented reality (AR) technology. According to this study, perceived usefulness significantly impacts college students' attitudes towards AR technology. AR applications should be designed to be user-friendly and provide practical benefits to enhance students' perceived usefulness and thus improve their attitudes. This can assist in addressing the technical concerns of users and help them understand how AR technology can enhance their learning and interactive experiences.

AR technology providers should focus on improving the interactivity of their products to make them more engaging and intuitive for users. Well-structured and easy-to-use interfaces should be developed to enhance the user experience. In addition, the content provided by AR applications should be organized logically and be relevant to users' needs to enhance its perceived value.

AR technology developers should always evaluate aspects that affect the ease of use and perceived usefulness of their products. All customer service personnel should receive training so they can provide prompt and effective support. Recognizing users' demands and swiftly providing applicable services following their needs is essential.

Ultimately, providers of AR technology can significantly enhance college students' behavioral intentions to use AR in educational and future professional contexts by emphasizing interactivity, perceived usefulness, and ease of use.

Limitations and Further Study

A limitation of the present study is its specific focus on college students in Yibin, China. Therefore, future studies should take into account the potential impact of differences in culture and social context when extending the findings and models of this study to other regions and populations. Future research could explore other factors impacting college students' attitudes and behavioral intentions towards AR technology, such as social influence and cultural background. Additionally, future studies could employ mixed-methods approaches to control for other variables that confound causal relationships. For instance, researchers may consider defining specific quality factors and observing the behavioral intention of the dependent variable. Qualitative research could be incorporated to gain a deeper understanding of students' attitudes and behavioral intentions regarding AR technology.

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