Effects of Dizziness, Authenticity, and Satisfaction on Students' Intention to Use VR in Vocational High School

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Abstract: The study aims to identify the influence of variables such as dizziness, activity-related authenticity, object-related authenticity, and satisfaction on students' behavioural intentions to continue using Virtual Reality (VR) technology in a learning context in vocational high school. The findings of the study demonstrate a substantial negative correlation between dizziness and satisfaction, indicating that an escalation in dizziness levels is concomitant with a decline in satisfaction and behavioural intention to persist in utilising VR. Furthermore, activity-related authenticity and object-related authenticity have been demonstrated to exert a significant positive influence on behavioural intention, thereby indicating that students are more inclined to continue utilising VR technology if they perceive the activities and objects within VR as more authentic. The study also found that student satisfaction is the strongest factor in increasing behavioural intention to continue using VR, with path coefficients indicating a significant positive influence. The findings of this study provide important insights into the factors influencing students' behavioural intentions to continue using VR in learning. Consequently, it is anticipated that this study will contribute to the development and application of VR technology in the domain of vocational high school. Moreover, it is expected to provide recommendations for technology developers and educators to design more effective and enjoyable learning experiences, taking into account the physical comfort and authenticity of the VR content used. This study advances VR learning research by providing large-sample evidence from Indonesian vocational high schools, a context that remains underrepresented. We test an integrated SEM model that simultaneously examines dizziness (a core cybersickness symptom), object- and activity-related authenticity, and satisfaction as predictors of students' intention to use VR. The findings offer context-specific, practice-oriented implications for designing VR activities in vocational high school.

Introduction

Digital technology has now become an integral part of people's lives. The development of digital technology has had a big impact, especially in the world of education (Cai et al. 2023; Mhlanga 2024; Wang et al. 2024). With the development of technology, our focus is no longer on whether technology will be used in education, but on understanding which technology is most appropriate and how best to use it in various educational contexts in schools (Higgins, Xiao, and Katsipataki 2012). The use of Technology-rich Learning Environments (TREs) such as Virtual Reality (VR) is one of the promising breakthroughs in the development of education (Kavanagh et al. 2017). The use of Virtual Reality (VR) in education is one of the most promising breakthroughs by creating immersive and interactive learning environments and creating more engaging and contextual learning experiences (Luo et al. 2021; Yu and Xu 2022). Virtual Reality (VR) has emerged as an important technology in the development of realistic simulations, which facilitates students' direct exposure to work practices in various educational domains (J. Chen et al. 2020), vocational high school is no exception.

The use of Virtual Reality (VR) technology as an important innovation in vocational learning models that can provide new insights and improve the quality of education in a way that adapts to technological developments. By leveraging VR, vocational high school institutions can not only teach theory but also provide opportunities for students to practice in realistic simulations (Alinier and Oriot 2022; Ravichandran and Mahapatra 2023). The provision of VR provides a more immersive and interactive experience allowing students to engage in practical simulations that reflect real-world working conditions.

With the great potential of Virtual reality (VR) that can provide an immersive experience inseparable from physical challenges that can affect students' comfort, users may experience symptoms of intoxication that have the potential to disrupt the user's VR experience. The symptoms experienced are usually not limited to eye fatigue, disorientation, and nausea which are also referred to as VR sickness or cyber sickness (Chang, Kim, and Yoo 2020). Dizziness or nausea that often occurs due to the use of VR technology for a long time. Several studies have shown that VR sickness can lead to decreased user attention (attention) in a virtual environment (Mimnaugh et al. 2023). The impact of this dizziness is important to pay attention to, as it can interfere with the comfort and effectiveness of the learning experience.

In addition, Virtual Reality (VR) which is growing rapidly is one of the important technologies and is being utilized. Creating an authentic and convincing experience is a crucial aspect, as it directly affects the level of user satisfaction with the content presented as well as with the VR technology itself (Nam, Dutt, and Baker 2023). Object-related authenticity and activity-related authenticity in a VR environment play a major role in creating a more convincing and immersive learning experience (Lowell and Tagare 2023). A more authentic experience can increase student satisfaction levels, which in turn can influence students' intentions to reuse VR technology in their learning process. With Virtual Reality (VR) Technology, students' intention to reuse VR technology refers to an individual's tendency to continue using and engaging with VR technology after their first experience. Research shows that the intent of this behavior is greatly influenced by various factors, including the user's

perception of the benefits obtained, the potential side effects felt, and the quality of the interaction they experience while using the technology (Ajzen 1991; Venkatesh and Davis 2000). Therefore, student satisfaction with the use of VR can be a decisive factor in increasing their intention to continue using this technology.

Although the use of VR technology in vocational high school has received significant attention in recent years (Yu and Xu 2022) research has focused on the influence of factors such as dizziness (dizziness or nausea), object-related authenticity, activity-related authenticity, and satisfaction with behavioral intentions (students' behavioral intentions are still limited. Most previous studies have focused more on the implementation of VR in the context of general education and less explored the dynamics of vocational learning using more specific VR technologies. Furthermore, research on the impact of dizziness in VR-based learning environments has not been widely discussed, although this factor has the potential to affect the comfort and effectiveness of students' learning experiences. This study aims to fill this gap by investigating how the factors of dizziness, object-related authenticity, activity-related authenticity, and satisfaction affect students' behavioral intentions in VR-based vocational learning.

The main objective of this study is to identify how dizziness and variable variables such as activity-related authenticity, object-related authenticity, and satisfaction are related. affect behavioral intention to continue using VR in learning. It is hoped that the research can explore how the VR environment both in terms of objects and activities affects students' intention to continue using VR technology in learning. This study is expected to contribute to deepening understanding of the dynamics of the use of VR in vocational high school, as well as providing recommendations for educators and technology developers to improve students' learning experiences in a technology-rich environment.
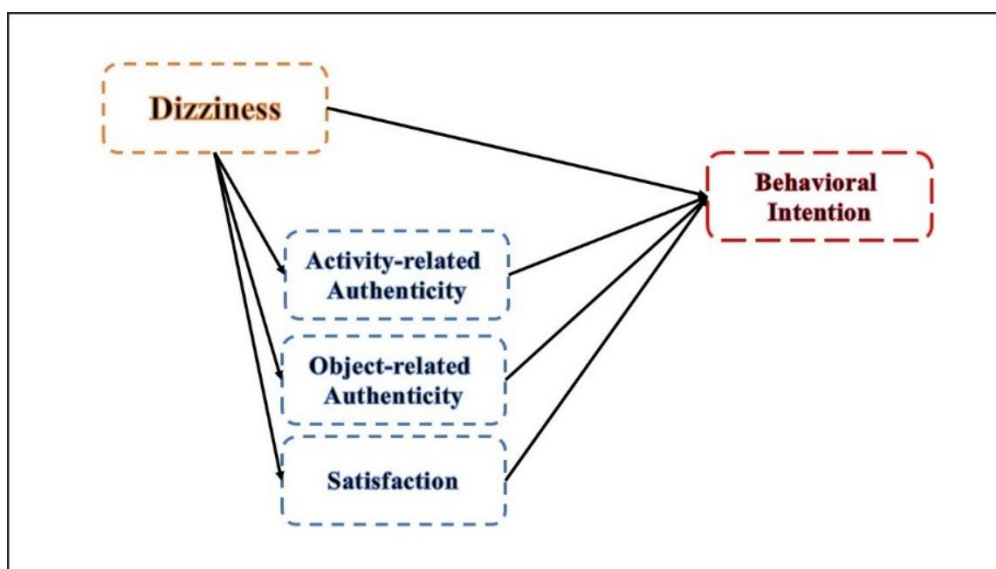

Figure 1. Theoretical framework

Based on the theoretical framework, the hypothesis in this study is summarized as follows:

Hypothesis 1 (H1):
Dizziness affects Behavioral Intention.
Hypothesis 2 (H2):
Dizziness affects Activity-related Authenticity.
Hypothesis 3 (H3):
Dizziness affects Object-related Authenticity.
Hypothesis 4 (H4):
Dizziness affects Satisfaction.
Hypothesis 5 (H5):
Activity-related Authenticity berpengaruh terhadap Behavioral Intention.
Hypothesis 6 (H6):
Object-related Authenticity affects Behavioral Intention.
Hypothesis 7 (H7):
Satisfaction affects Behavioral Intention.

This study contributes to the literature in three ways. First, it documents VR adoption mechanisms in vocational secondary education in Indonesia, a setting that is largely overlooked compared with higher education. Second, we propose and test an integrated structural model that jointly includes dizziness (as a core cybersickness symptom), two forms of authenticity (object- and activity-related), and satisfaction to explain students' intention to use VR. Third, we translate the model into actionable implications for lesson design in vocational classrooms, thereby bridging empirical evidence and instructional practice.

Research Method

This quantitative study used a cross-sectional questionnaire survey. We implemented a two-stage sampling procedure. Stage 1: five Vocational High Schools (SMK) located in different districts of South Sulawesi were selected by simple random sampling from the provincial list of SMKs eligible for VR use. Stage 2: within each selected school, we recruited intact classes that were using VR during the data-collection period. In total, 438 students participated. To reduce potential location bias, we used a standardized instrument and field protocol across schools and verified the robustness of results by controlling for school fixed effects; the substantive conclusions were unchanged. Respondent demographics are presented in Table 1.

Table 1. Research Demographic Variables

Variable Demographics	Sum	Percentage
Gender		
Male	192	43.80 %
Female	246	56.20 %
Class		
Class X	48	11.00 %
Class XI	329	75.10 %
Class XI	62	13.90 %
Industrial Internship Program		

Not yet an Apprentice	32	7.32%
Internship	326	74.43%
Already Apprentice	80	18.26 %

From the available data, the majority of research participants were women (56.20%), while men accounted for 43.80%. The most participants came from class XI (75.10%), followed by class XII (13.90%) and class X (11%). In terms of internship status, most of the participants were interning (74.43%), while 18.26% had completed their internship and 7.32% had not yet completed an internship. This data shows that most of the participants are women, come from class XI, and are already involved in the internship program.

The research procedure is carried out by introducing students to the use of *virtual reality* through a special VR Video Box device that shows videos that make it seem as if students are really in a simulated environment as a learning design with technology to provide an immersive learning experience. After the learning process using the technology, students were asked to fill out an electronic questionnaire containing statements related to dizziness, object-related authenticity, activity-related authenticity, satisfaction, and behavioral intention towards the use of VR technology. The data was analyzed using *the Structural Equation Modeling* (SEM) approach with the help of SmartPLS 3.0 software. In this study, a structural model was tested to test the relationship between variables based on path coefficient, t-statistical value, and p-value. The significance level used is 0.05 (5%).

Figure 2. Activity Documentation

The instrument used is in the form of questionnaires that were developed and adjusted from previous studies with the context of learning in vocational schools. Each indicator was measured using a 10-point Likert scale, ranging from (1) strongly disagree to (10) strongly agree.

Table 2. Instrument of Question of Each Variable

Variabel	Question Items	Source
Dizziness	Dizziness when using Virtual Reality. Feeling headaches during/after using Virtual Reality. Feeling nauseous after using Virtual Reality.	(Chang, Kim, and Yoo 2020)
Object-Related Authenticity	Virtual Reality makes videos look like real. A Virtual Reality object is the same as the original object. Virtual Reality can make me know the features of the objects in the video.	(Nam, Dutt, and Baker 2023)

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Virtual Reality creates real objects virtually.

Activity-Related Authenticity	Virtual Reality immersed me in a virtual atmosphere. Virtual Reality allows me to break away from my real life. Virtual Reality makes me feel like I'm really experiencing the conditions in Virtual Reality.	(Nam, Dutt, and Baker 2023)
Satisfaction	I feel satisfied using Virtual Reality during the learning process. I feel good about using Virtual Reality during the learning process.	(Nam, Dutt, and Baker 2023)
Behavioral Intention	I have a great desire to use Virtual Reality to learn. I want to use Virtual Reality technology often in learning activities. I will use Virtual Reality to learn	(Al-Adwan and Al-Debei 2024)

Result

The structural model was evaluated using path coefficients, t-statistics, standard deviations, and p-values to determine the significance of hypothesized relationships.

Table 3. Validitas & Reliabilitas Outer Loadings of the scale used (SEM)

Construct	k (item)	Loading Range	AVE	CR (rho_c)	Cronbach's α	√AVE
Activity-Related Authenticity	3	0.895–0.904	0.809	0.927	0.927	0.900
Behavioral Intentions	3	0.929–0.937	0.869	0.952	0.952	0.932
Dizziness	3	0.632–0.906	0.676	0.859	0.849	0.822
Object-Related Authenticity	4	0.894–0.916	0.817	0.947	0.947	0.904
Satisfaction	2	0.942–0.946	0.891	0.942	0.942	0.944

Measurement model analysis demonstrated good convergent validity and internal consistency across all constructs. Indicators had high outer loadings (most ≥ .89) and were all significant ($p < .001$). AVE values ranged from .676–.891 (≥ .50), and composite reliability (ρc) and Cronbach's α ranged from .859–.952 (≥ .70), indicating strong construct reliability. These results support the interpretation of discriminant validity when the √AVE of a construct exceeds its highest correlation with another construct.

As shown in Table 4, several pathways were found to be statistically significant, indicating meaningful relationships between variables in the proposed model.

Table 4. Results of Data Analysis

Relationships Between Variables	Path Coefficients	T-Statistik	Standard Deviation	P-Value	Information
Dizziness -> Behavioral Intention	-0,118	2,674	0,044	0,008	Signifikan (-)
Dizziness -> Activity-related Authenticity	-0,070	1,509	0,046	0,131	Not Significant

Relationships Between Variables	Path Coefficients	T-Statistik	Standard Deviation	P-Value	Information
Dizziness -> Object-related Authenticity	-0,041	0,880	0,046	0,379	Not Significant
Dizziness -> Satisfaction	-0,131	2,952	0,044	0,003	Signifikan (-)
Activity-related Authenticity -> Behavioral Intention	0,183	2,712	0,068	0,007	Signifikan (+)
Object-related authenticity -> Behavioral Intention	0,172	2,422	0,071	0,015	Signifikan (+)
Satisfaction -> Behavioral Intention	0,548	9,065	0,060	0,000	Signifikan (+)

Dizziness was found to have a significant negative effect on behavioral intention (β = –0.118, p = .008), indicating that higher levels of dizziness experienced by participants were associated with lower intention to engage in the behavior. Similarly, dizziness also exerted a significant negative influence on satisfaction (β = –0.131, p = .003). However, its effects on both activity-related authenticity (β = –0.070, p = .131) and object-related authenticity (β = –0.041, p = .379) were not statistically significant.

In contrast, both authenticity constructs demonstrated significant positive effects on behavioral intention. Specifically, activity-related authenticity positively influenced behavioral intention (β = 0.183, p = .007), as did object-related authenticity (β = 0.172, p = .015), suggesting that participants' perceptions of authenticity in their experiences enhanced their intentions to continue or recommend the activity.

Finally, satisfaction emerged as the strongest predictor of behavioral intention (β = 0.548, p < .001), indicating that higher satisfaction significantly increased participants' behavioral intentions.

Collectively, these findings support the critical role of satisfaction and perceived authenticity in shaping behavioral intentions, while highlighting the potentially disruptive role of dizziness in immersive or interactive experiences.

Discussion

This study offers important insights into the psychological and experiential mechanisms that shape behavioral intention within immersive or experiential contexts. The findings of this study show that there is a substantial negative correlation between the level of dizziness experienced by users and their behavioral intentions in the use of Virtual Reality (VR) technology. The results obtained from the statistical analysis of this study revealed a negative correlation between the level of dizziness experienced and the tendency of individuals to return to using VR in the future. These findings are consistent with previous research that highlighted the negative effects of physical discomfort on the adoption of VR-based technologies. In line with research (Chang, Kim, and Yoo 2020) discomfort such as dizziness and nausea or known as cybersickness. This has been shown to directly affect users' perceptions of the convenience and effectiveness of VR technology. This, in turn, has the capacity to influence behavioral intentions with respect to the sustainable use of technology. In their study, users who experienced cybersickness showed significant decreases in satisfaction and behavioral intent, despite acknowledging the immersive advantages of virtual environments.

These findings lend support to the idea that physiological factors play an important role in technology adoption models, as articulated in the Technology Adoption Model (Venkatesh and Davis 2000) and Theory Planned Behavior (Ajzen 1991).

Furthermore, the research conducted by (Rebenitsch and Owen 2016) reveals a strong correlation between the duration of VR exposure and the onset of symptoms of cybersickness, which in turn reduces the user's desire to continue engaging in virtual experiences. The findings of this study emphasize the importance of prioritizing user convenience in the development and implementation of VR technology. In the absence of mitigation of symptoms such as dizziness, users tend to develop negative attitudes that have an impact on behavioral intentions. Therefore, virtual reality (VR) software developers should consider user-friendly interface designs that take into account physiological factors and provide visual comfort settings with the aim of minimizing negative effects.

Furthermore, the findings from the data analysis show that the dizziness experienced during the use of Virtual Reality (VR) does not have a substantial influence on activity-related authenticity or object-related authenticity. The findings of this study show that, although users experience symptoms of dizziness, their perception of the authenticity of activities and objects in the VR environment is not significantly affected. These findings suggest that users can still assess the authenticity of virtual environments, despite experiencing physical discomfort.
These findings are consistent with research (Ahn et al. 2017; Irshad 2022; Madshaven et al. 2021) which suggests that the presence and perception of authenticity in virtual experiences are more influenced by environmental design factors, interactivity, and visual representation quality than short-term physiological disorders such as dizziness. In short, the authenticity of a virtual experience does not depend on the physical comfort of the user, but rather on the capacity of the system to replicate reality in a convincing way.

However, this is different from the user satisfaction variable. The study found that dizziness had a significant negative relationship with VR use satisfaction. As a result, the greater the dizziness experienced by the user, the lower their satisfaction with the VR experience. These results show that, although the authenticity of activities and objects can still be perceived, physical comfort remains a major factor affecting overall satisfaction. These findings are corroborated by research by (Weech, Kenny, and Barnett-Cowan 2019) which states that symptoms of dizziness significantly reduce users' perceptions of satisfaction with VR, even when the technology manages to create immersive experiences. In another context, research by (Azmi et al. 2023) also shows that physical comfort is a key determinant of user satisfaction in various VR applications. It has been shown that, although dizziness does not directly impact the perception of the authenticity of the virtual environment, it does have an effect on the final evaluation of the user, namely satisfaction. Therefore, the development of future VR systems should prioritize strategies to reduce cyber sickness, such as reducing latency, adjusting the field of view, and improving the quality of graphics, so that the virtual experience is not only authentic but also convenient and satisfying.
Moreover, satisfaction emerged as the strongest predictor of behavioral intention, a finding consistent with the expectancy-disconfirmation paradigm (Oliver 1980). When individuals perceive that their experience exceeds expectations—despite potential physical discomfort—they report higher satisfaction, which serves as a proximate determinant of loyalty and re-engagement. This aligns with past tourism and leisure research, which consistently identifies satisfaction as a key antecedent of post-experience behavioral outcomes (C. F. Chen and Chen 2010; Yoon and Uysal 2005).

Taken together, these findings highlight the interplay between affective discomfort (dizziness), cognitive appraisals (authenticity), and emotional gratification (satisfaction) in shaping consumer behavior in immersive settings. While sensory disruption may suppress affective response, a strong perception of authenticity and post-experience satisfaction can buffer its negative effects, preserving users' behavioral intention. This integrative view suggests that future design and marketing of immersive experiences should balance technical optimization (to reduce dizziness) with strategic enhancement of authenticity and satisfaction touchpoints to maximize behavioral outcomes.

Conclusion

The objective of this study is to ascertain the influence of variables such as dizziness, authenticity related to activities, authenticity related to objects, and satisfaction on behavioural intention to continue using Virtual Reality (VR) technology in learning contexts. This study utilised path analysis to ascertain the impact of dizziness on satisfaction and behavioural intention in users of virtual reality (VR). The findings revealed a substantial negative relationship between dizziness and satisfaction, indicating that an increase in dizziness experienced by users is associated with a decrease in satisfaction and behavioural intention to continue using VR.

Furthermore, activity-related authenticity and object-related authenticity exhibited a significant positive influence on behavioural intention. This suggests that students are more likely to continue using VR technology if they perceive the activities and objects in VR to be more authentic. The study found that student satisfaction was the strongest factor in increasing behavioural intention, with a path coefficient indicating a significant positive influence.

The results of this study provide important insights into the factors that influence students' behavioural intentions to continue using VR in learning. Specifically, these findings indicate that while factors such as dizziness can hinder VR use, other factors such as authentic design and satisfying experiences can encourage students to engage more with this technology.

It is hoped that the results of this study will contribute to the development and application of VR technology in vocational high school. Consequently, technology developers and educators can utilise these findings to design more effective and enjoyable learning experiences for students, taking into account physical comfort and the authenticity of the VR content used. A series of pragmatic recommendations can be posited for implementation, including the gradual introduction of VR to students, with particular attention to technical aspects aimed at minimising dizziness. Furthermore, it is essential to ensure that VR content exhibits a high degree of authenticity, thereby enhancing user engagement and satisfaction.

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