Let's Go On A Virtual Reality Trip!: The Effect on the Students' Literacy, Interest, and Satisfaction in Cultural Learning

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Abstract **– This research focused on the effect of a field trip-based virtual reality (VR) application on literacy, interest, and satisfaction of elementary school students. A quasi-experimental method was used with 370 participants from 6 areas in Jakarta. Data was collected using multiple-choice questions and questionnaires, while analysis used descriptive statistics and independent sample t-tests. The result indicated that Fieldtrip-based Virtual Reality (FVR) positively and significantly influenced cultural learning. First, FVR enhances students' literacy skills by providing an immersive experience. Moreover, its interactive features increase students' interest in cultural learning. Then, the unique and fun virtual environment increases satisfaction when learning is taking place. In conclusion, this study demonstrates the favorable influence of FVR on students' cultural learning, underscoring its potential as an effective educational tool for primary school students.**

Keywords **– Culture, learning media, literacy, virtual reality.**

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1. Introduction

The 5.0 era is changing how people communicate by making it easier to connect without borders. It allows individuals to connect with anyone, anywhere, and anytime instantly. This innovation opens the door for global collaboration and faster information exchange [1], [2]. Unfortunately, this convenience results in the rapid spread of cultural information from various countries entering Indonesia. The result is that other cultures have an impact on the current generation. The recent phenomenon also shows that the cultural knowledge of Indonesian students' is still low, and tends to idolize foreign cultures [3], [4]. Therefore, cultural literacy competencies must be instilled early in children so that local culture can survive and not disappear. However, a cultural learning process is generally monotonous and not innovative, resulting in reduced student interest and satisfaction with the learning culture.

Schools have a crucial role in foreseeing the erasure of local culture as formal educational institutions. With its role as the main pillar in shaping character and improving knowledge, schools must ensure that cultural learning is not just about delivering conventional materials that lack student interest. Currently, cultural learning in schools tends to be limited to material delivery, so it cannot foster cultural literacy, which should be an important part of students' education [5], [6]. To overcome these problems, schools must adopt innovative and interesting learning approaches for students. Utilizing cutting-edge technology, such as virtual reality or computer-based learning, is one way to achieve this [7]. Schools may give students a more engaging and dynamic learning experience by integrating this technology into cultural learning [8], [9]. Students can digitally "visit" historical sites or participate in traditional rites, for instance, using VR technology, which increases their interest in and comprehension of local culture.

Technology for virtual reality (VR) may produce lifelike experiences in virtual settings [10]. In education, virtual reality can deliver a more engaging and sincere learning experience. For example, in history subjects, students can use virtual reality to virtually visit historical places and feel the atmosphere of the past. Virtual reality has the advantage of overcoming geographical restrictions in teaching [11]. Through this technology, students can visit distant and exotic places without having to travel physically. In addition, virtual reality has great potential to enhance learning with a more immersive and real learning experience. Virtual reality in education can help students develop a better understanding, increase student engagement, and broaden their horizons without geographical limitations [12].

Numerous researches have been conducted on utilizing virtual reality in the classroom. Using new technology in virtual and augmented reality education boosts student engagement and interaction [13]. Virtual reality technology was reported to be used in teaching practice by Mao *et al*. [14], who also examined the impact of that activity. Furthermore, Zeynep Taçgın *et al*. [15] also reported that using virtual reality technology in learning can increase learners' confidence in practical skills. Virtual reality technology impacts one's style of learning, feeling of existence, cognitive workload, and affective and cognitive educational outcomes [16].

Overall, virtual reality has great potential to enhance learning, especially in cultural learning, by providing immersive, inclusive, and engaging learning experiences. However, using virtual reality in education should carefully plan, focus on learning objectives, consider safety and health aspects, and ensure inclusivity and proper evaluation [17]. With the right learning model, virtual reality can be a valuable tool in helping students develop knowledge, skills, and character.

A field trip is a strategy that entails inviting students to a specific place to obtain a specific object outside of the classroom or other learning environment to study, observe, and investigate something [18]. This model has advantages because students can interact directly with objects to make the knowledge obtained real, alive, meaningful, and comprehensive. Unfortunately, this model has the disadvantage that it requires a lot of money and time [19]. Therefore, combining virtual reality technology with the field trip learning model will positively impact students, especially cultural learning.

It is clear from the explanation above that field trip models and virtual reality technologies both have many educational advantages.

Therefore, the objective of this study is to find out how field trip-based virtual reality (VR) applications affect the literacy, interest, and satisfaction of primary school students. Applications for virtual reality offer students engaging learning opportunities in cultural learning. The outcomes of this investigation could offer useful baseline information for understanding how students in elementary school use virtual reality applications.

2. Methodology

The purpose of this study is to find out how a virtual reality (FVR) based field trip application affects elementary school students' literacy, interest and satisfaction. In this context, the methodology applied will help understand the approach used to collect data, analyze the results, and measure the impact of using FVR on students' literacy level, interest and satisfaction in cultural learning. The following are details regarding the methodology used in this study.

2.1. Research Design

This research was conducted using the quasi-experimental method. A quasi-experimental method is an approach that can provide information about the effect of a variable on a particular group without eliminating the confounding factors as a whole [20], [21]. In this research, two classes of students with comparable conditions were selected as the research subjects. The first class was designated as the experimental group, where students were treated with learning using virtual reality-based Fieldtrip media (FVR). Meanwhile, the second class was selected as the control group, where students were taught the Video Learning Media (VLM) that had been used previously. The research design is shown in Table 1.

Table 1. Research design

Category	Pre-test	Treatment	Post-test
Experiment Class	O_1	FVR	O_2
Control Class	O_3	VLM	O_4

2.2. Participants

Twelve primary schools in the Jakarta region—located in Jakarta (East, West, Central, South, and North region) and Kepulauan Seribu—were used for this study. 370 students in all took part in this study. Table 2 displays the demographics of the research participants.

Table 2. The demography of the participants

Categories	Number of students	Percentage
Gender		
• Male	167	45.14 %
• Female	203	54.86 %
Location		
• East Jakarta	61	16.49 %
• Central Jakarta	64	16.22 %
• West Jakarta	62	16.76 %
• Pulau Seribu	63	18.09 %
• North Jakarta	60	16.22 %
• South Jakarta	60	16.22 %
Region		
• Rural	123	33.24 %
• Urban	247	66.76 %

2.3. Instrument Data

In this research, the data collection process used two instruments: multiple-choice questions and questionnaires. Multiple-choice questions assessed and evaluated students' cultural literacy skills, investigating their understanding of various aspects and cultural knowledge. This instrument was given to the students before and after the treatment.

In addition, a questionnaire was employed to ascertain students' satisfaction and interest in culture when using the FVR app as part of the learning process. The questionnaire indicators were modified from the research of Abdullah *et al*. [22]. The purpose of the questionnaire was to obtain important information about students' perspectives and experiences with FVR integration in cultural education. By examining their feedback and opinions, this study aims to understand the effectiveness and appeal of the FVR app in enhancing the cultural learning experience for students.

The combination of data collection instruments offers a holistic approach to examining the cognitive and affective aspects of students' engagement with FVR in cultural education. The data collected through these instruments form the basis of the research analysis and conclusions, enabling a comprehensive assessment of the impact of FVR applications on students' cultural literacy and attitudes toward cultural learning.

2.4. Data Analysis

Utilizing descriptive statistics, the questionnaire's data were examined. Descriptive statistics is a method to summarize, describe, and analyze data numerically or graphically [23]. On the other hand, data obtained from multiple-choice tests were analyzed using the independent sample t-test.

This approach to statistical analysis is used to identify whether the means of two independent groups differ significantly from one another [23]. However, before conducting the t-test, both classes were subjected to an initial equality test to assess the assumption of equality between the two. This initial equivalence test ensures that both groups come from normally distributed and homogeneous populations.

3. Findings

FVR application is a virtual reality-based solution that allows students to participate in an immersive cultural learning experience. FVR invites students virtually to travel to cultural sites that become learning objects, as shown in Figure 1. This application provides a real experience for students without leaving the classroom. Students can virtually "visit" historical places, cultural monuments, or even traditional events. They can interact with the virtual environment, explore every corner, and get detailed information about the culture being studied. This learning experience can increase student engagement, build a deeper interest in the culture, and encourage them to learn and participate actively.

Figure 1. The illustration of the FVR application

3.1. Students' Interest

In this study, a descriptive analysis was done to find out how interested elementary school students were.

Table 3. Item analysis of students' interest in FVR

Number of items	Items
4	Interest in cultural learning
4	Interest in using FVR application

For each questionnaire on the student's level of interest in cultural learning in elementary school, the data were reviewed. The analysis's results are shown in Table 4 as mean scores.

Table 4. Mean interpretative table

Mean Score	Interpretative level
0.00 – 1.00	Very Low
1.01 – 2.00	Low
2.01 – 3.00	Average
3.01 – 4.00	High
4.01 – 5.00	Very High

a. Students' Interest in Cultural Learning

Table 5 presents the students' interest overall mean scores in cultural learning. This questionnaire data was given to all classes and collected before the sample was given the treatment to find out the level of students' interest in cultural learning. The results show that students' interest in cultural learning is average, as evidenced by the overall mean score of M = 2.25.

Table 5. The result of the questionnaire about students' interest in cultural learning

No	Statement	Mean	Mean Score	Standard Deviation
1	I like to learn about the culture	1.94	Low	0.52
2	I have fun learning cultural matter	1.75	Low	0.31
3	I want to explore the culture	2.21	Average	0.75
4	I can study culture for an extended period	1.86	Low	0.94
Total Mean Value		1.94	Low	

b. Students' Interest in Using FVR Application

Table 6 presents the students' interest overall mean score in using the FVR app as part of the cultural learning process. This questionnaire was only administered to the experimental class. As indicated by the mean value of M = 4.02, the findings show that students are highly interested in utilizing the FVR app in learning. The sizable mean score of 4.02 indicates that most students strongly favor and view using FVR applications during cultural learning. This research emphasizes the ability of FVR technology to attract and engage students, enhancing the interactive, immersive, and fun nature of the learning experience.

Table 6. The results of the questionnaire about students' interest in using the FVR application

No	Statement	Mean	Mean Score	Standard Deviation
1	After using the FVR application, I like to learn about the culture	4.45	Very High	0.74
2	During the learning process using the FVR application, I feel happy to learn about the culture.	4.26	Very High	0.65
3	After using the FVR application, I do not feel bored learning culture	4,21	Very High	0.92
4	I can study culture for an extended period	3,14	High	0.22
Total Mean Value		4.02	Very High	

3.2. Students Satisfaction

Through this research we conducted a thorough descriptive analysis to measure and comprehend the satisfaction levels of elementary school students. A statistical technique used was descriptive analysis, which thoroughly describes the data gathered and sheds light on how students view and interact with FVR applications [24], [25].

Table 7. Item analysis of students' satisfaction with the FVR application

Number of items	Items
5	Students' satisfaction with the FVR application
4	Students' ability to get information through the FVR application
4	Students' learning ability through the FVR application
3	Student attitude through FVR application-based learning

The data were reviewed for each questionnaire on the student's satisfaction level. The mean scores are displayed in Table 8 following analysis.

Table 8. Mean interpretative table

Mean Score	Interpretative level
0.00 – 1.00	Very Low
1.01 – 2.00	Low
2.01 – 3.00	Average
3.01 – 4.00	High
4.01 – 5.00	Very High

a. Students Satisfaction in the FVR Application

This questionnaire was only given to the experimental class with the FVR application treatment. Table 9 shows the findings on the students' general satisfaction with the FVR application, with a mean score of M=4.37. The high mean score of 4.37 illustrates students' enthusiasm for using the FVR application in the cultural learning process and their favorable reception. This data demonstrates that most students have a positive opinion of utilizing the application as a teaching tool, which indicates a significant opportunity to raise student engagement and interest in the subject material.

Table 9. The result of the questionnaire about student satisfaction with the FVR application

No	Statement	Mean	Mean Score	Standard Deviation
1	I love FVR application	4.76	Very High	0.84
2	I want to use the FVR application for the end	4.31	Very High	0.73
3	I want to use the FVR application with my friend	4.22	Very High	0.89
4	I want to use the FVR application again	4.52	Very High	0.76
5	I enjoy learning about culture after using the FVR application	4.03	Very High	0.66
Total Mean Value		4.37	Very High	

b. Students' Ability to Get Information Through the FVR Application

This questionnaire was only given to the experimental class with the FVR application treatment. Table 10 shows that the average student's capacity to access information from the FVR application is very high, with an average score of M = 3.91. The number of students' data has shown a high ability to use the FVR application to access and acquire information during cultural learning, according to the mean score. This report highlights how well the FVR application helps students find helpful and pertinent information, promoting a more focused and autonomous learning experience.

Table 10. The results of the questionnaire about students' ability to get information through the FVR application

No	Statement	Mean	Mean Score	Standard Deviation
1	I understand the description of this FVR application.	4.41	Very High	0.67
2	I understand more about culture after using the FVR application.	3.92	High	0.34
3	I can interpret culture after using the FVR application	3.72	High	0.48
4	I feel like a cultural expert after using the FVR app	3.57	High	0.52
Total Mean Value		3.91	High	

c. Students' Learning Ability Through the FVR Application

Only the experimental class receiving the FVR application treatment received this questionnaire. Based on Table 11, the FVR application's overall average for aiding students in learning culture demonstrates a high level (M = 4.17). According to this investigation, the FVR application can aid students in learning more efficiently.

Table 11. The result of the questionnaire on students' learning ability through the FVR application

No	Statement	Mean	Mean Score	Standard Deviation
1	I can retell the matter of what I know in the FVR application	3.97	High	0.83
2	I enjoyed learning about culture after using the FVR application	4.52	Very High	0.39
3	I can learn about my culture independently after using the FVR application	4.14	Very High	0.67
4	I understand different types of cultures after using the FVR app	4.03	Very High	0.71
Total Mean Value		4.17	Very High	

d. Student Attitude Through FVR Application-Based Learning

This questionnaire was only given to the experimental class with the FVR application treatment. Table 12 shows that the overall mean for the FVR app's effect on students' attitudes is very high, with a mean score of M = 4.14. This average score indicates that FVR app-based cultural learning can shape positive attitudes.

Table 12. The results of the questionnaire about student attitude through the FVR application

No	Statement	Mean	Mean Score	Standard Deviation
1	I am not tired of using FVR application	4.31	Very High	0.77
2	I like using FVR application	3.85	High	0.98
3	I can do a culture dance after using FVR application	4.27	Very High	0.64
Total Mean Value		4.14	Very High	

3.3. Students Cultural Literacy

a. Normality Test

Using the information in Table 13, the significance value in the Shapiro-Wilk column was obtained at 0.128 and 0.112, greater than 0.05, meaning that the data in the experiment and control classes are normally distributed.

Table 13. Normality test

Test of Normality	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Experiment Class	.387	267	.076	.926	267	.128
Control Class	.454	267	.099	.861	267	.112

b. Homogeneity Test

Based on the data in Table 14, the homogeneity test's significance value is 0.413, which is larger than 0.05, indicating that the data in the experimental and control classes are homogeneous.

Table 14. Homogeneity test

Levene Statistic	df1	df2	Sig.
.693	1	267	.413

c. Hypothesis Test

Based on the data in Table 15, the significance value obtained through the t-test is 0.000, less than 0.05. The calculated t value obtained is 13,854, which is smaller than the t table, which is 1,971. So it can be concluded that the hypothesis is accepted. It can be said that there are differences in student cultural literacy skills between the experiment and control class.

Table 15. Paired Sample T-test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre-test – Post-test	35.500	11.459	2.562	28.00	40.00	13.854	267	.000

4. Discussion

Research findings relevant to the main objectives of this study will be outlined. The discussion explores the impact of using virtual reality in a cultural learning context on students' literacy, interest, and satisfaction levels.

4.1. Students' Interest Level Towards Cultural Learning

Cultural education is essential for students from a young age to ensure that their culture is preserved and passed on to future generations. However, cultural learning in Indonesia is currently facing a decline in interest. The condition can be seen from the questionnaire results in Table 5, showing that the average student interest in cultural learning is in the low category (M = 1.94). The questionnaire to students on the statements "I like to learn about the culture", "I have fun learning cultural matter", and "I can study culture for an extended period" classify it in the low category. The lack of student enthusiasm in learning about culture results from monotonous classroom instruction. Some teachers use lecture and presentation methods in teaching culture, causing students to be uninterested in culture, even if only briefly. This is in line with the results of research whose authors reported that students' interest in learning local culture is still low [26], [27], [28].

On the other hand, the questionnaire results for the statement "I want to explore the culture" showed positive results where an average score was obtained. This result can represent that students want to explore a culture.

However, this attention wanes as a result of the boring learning process. Additionally, students' motivation in learning about culture is diminished due to the difficulty of providing knowledge that is simple enough for them to understand. This is in line with research from Wang *et al*. [29], Vurdien and Puranen [30], Dalton *et al* [31], and Aladsani [32] who reported that students welcome experiential learning opportunities to explore culture.

Various external factors also contribute to Indonesian students' low interest in cultural learning. One of the main problems is the lack of cultural material in the education curriculum [33], [34]. In the current education system, learning focuses more on academic subjects, so cultural learning often receives less attention. In addition, the dominance of foreign cultures from globalization is also a serious challenge. Foreign cultures with strong appeal, such as those propagated through social media and the entertainment industry, are often more attractive to the younger generation than local cultures [35]. The condition causes them to lose their original cultural identity and traditions. The lack of an active role of families and communities in preserving local culture is also an obstacle to learning and understanding culture [36]. In the face of technological developments and modern lifestyles, interest and appreciation for traditional culture may decline as lives become increasingly busy and technology-focused.

4.2. Students' Interest Levels Towards FVR Application

Virtual reality is a technology that produces a digital environment that resembles the real environment and allows users to interact with the environment [37]. In this research, the FVR application facilitates students to visit historical sites virtually so that it can save costs and time. The data revealed a very high category (M = 4.02), indicating that students were enthusiastic about using the FVR program to learn about different cultures. The typical responses to the following three statements on the questionnaires: "I like to learn about culture after using the FVR application," The phrases "After using the FVR application, I don't feel bored learning about culture," and "During the learning process using the FVR application, I feel happy to learn about culture," show that all three assertions received very high marks. This positive result can occur because learning using virtual technology provides hands-on experience and explores cultural places in a digital environment, even though it is only in the classroom [38]. In addition, students can also actively participate in learning, interact with virtual environments, and explore cultural concepts so that students are happy and not bored in the learning process [39].

As opposed to that, the statement "I can study culture for an extended period" only gets a high score after using FVR media. This condition is due to the character of elementary school children who cannot study for too long, causing the score to be obtained only in the high category. The same issue is also stated by Liu *et al.* [40] who claim that there is a connection between inadequate student study time and students' attitudes toward learning activities as well as their subjective well-being.

4.3. Students Satisfaction With the FVR Application

The analysis results in Table 9 show that student satisfaction with using the FVR application is very high, with an average value of 4.37. This shows that students are satisfied and happy to use the FVR application in learning. This proves that VR technology's immersive and interactive learning experience positively affects students. Then, the average score of all statements given to students, namely "I love the FVR application", "I want to use the FVR application for the end", "I want to use the FVR application with my friend", "I want to use the FVR application again", "I enjoy learning about culture after using the FVR application" showed a score with a very high category. This proves that the learning experience presented by immersive and realistic VR technology to students positively impacts students. Then, elementary school students are curious about something they consider interesting, causing them not to get bored quickly in the learning process using FVR media. Providing interesting learning media can increase students' curiosity [41].

Allowing students to immediately explore new concepts they have learnt is another aspect of virtual reality learning that makes pupils embrace it. Students can retain their level of satisfaction and enhance the knowledge and skills they have gained via using FVR programs by being given hands-on opportunities [11], [42].

4.4. Students' Ability to Get Information Through the FVR Application

Through its virtual features, the FVR app provides students with an immersive and realistic learning environment, allowing them to understand and explore cultural content in greater depth. The results in Table 10, which show that student's capacity to find information using the FVR app attained an average of M = 3.91, support this assertion. This result indicates that the FVR app effectively assisted students in acquiring relevant and useful knowledge related to cultural learning.

In the questionnaire results, a statement reached a very high category score: "I understand the description of this FVR application". This can be explained by the features of virtual reality technology that have been adapted to the characteristics of students in elementary schools. Learning materials that are dominantly in the form of images and videos that students can directly explore facilitate their learning process [43]. Using virtual reality technology can facilitate the implementation of information so that students more easily get material information [44], [45], [46].

However, on the other hand, statements such as "I understand more about culture after using the FVR application," "I can interpret culture after using the FVR application," and "I feel like a cultural expert after using the FVR app" only scored in the high category. This result can be clarified through the fact that the cultural learning process through the FVR app was conducted in a limited number of meetings. As a result, some learning materials may not be fully retained by students. This is due to the limited recall ability of elementary school students [47]. Although the FVR app provides an immersive learning experience, some aspects may not be fully captured in students' memories due to the limited time and number of learning meetings. Nonetheless, the high scores indicate that using the FVR app still positively impacts students' understanding of culture, even with these limitations.

4.5. Students' Learning Ability Through the FVR Application

The results from Table 11 reveal that the FVR application significantly improves students' ability to learn culture, as reflected in the overall average result on this item, which reached M = 4.17. In the context of the four statements asked, only "I can retell the things I know in the FVR application" scored high in the category. This result can be clarified through the fact that the ability to recall material, especially in elementary school students with limitations, is still in the developmental stage [47]. As a result, students may only be able to reassemble what they already know after using FVR. Nonetheless, the results in the high category indicate that using the FVR application has significantly contributed to students' ability to understand and respond to the cultural content taught.

However, on the other hand, statements such as "I enjoyed learning about culture after using the FVR application," "I can learn about my culture independently after using the FVR application," and "I understand different types of cultures after using the FVR app" received very high scores.

This experience underscores the ability of virtual reality technology to provide immersive and realistic learning experiences for students. Through VR technology, students can "feel" and "see" the learning material directly in a virtual environment, creating an engaging and compelling learning experience. This experiential learning approach also comforts students in dealing with the learning process and allows them to understand and respond to the material learned more easily.

The improvement in students' learning ability through virtual reality technology was also reported by Županec *et al*. [48], who stated that this improvement was due to VR technology's ability to accommodate students' different learning styles. Furthermore, the research of Cai *et al*. [49], Rasheed *et al*. [50], and Di Natale *et al*. [51] revealed that VR technology would greatly stimulate students' learning interest and increase their activity level, thus showing significant potential for implementing VR technology in learning.

4.6. Student Attitude Through FVR Application-Based Learning

The study results illustrated in Table 12 show that using the virtual reality trip (VRT) application significantly influences student attitudes in the cultural learning process. It is evident from the overall average score of the questionnaire in this section, which reached a very high category (M = 4.14), indicating a positive change in students' attitudes towards cultural learning when utilizing the FVR application. Of the three statements asked, two scored very high: "I am not tired of using the FVR application" and "I can do a culture dance after using the FVR application." VR technology's interactive, realistic, and entertaining features help prevent students from feeling tired when using the app. In addition, the active and dynamic interaction in the virtual environment stimulates students' curiosity, enhances the spirit of learning, and connects theoretical concepts with practical experience. As a result, students not only avoid boredom in learning but can also apply the knowledge they gain in real life.

However, on the other hand, the statement "I like using the FVR app" only scored in the high category. The traits of elementary school students, who are prone to getting bored easily if learning is monotonous, can be used to explain this occurrence. Given this characteristic, the statement "I like using the FVR app" still received a positive assessment, indicating that using Virtual Reality Trip (FVR) technology has succeeded in maintaining students' interest and avoiding boredom that may arise in conventional learning.

By utilizing interactive features and a more engaging learning experience, the FVR app can create a more dynamic learning environment and focus on meeting students' more active and varied learning needs.

Attitudinal changes in the learning process were also reported by Yu-Sheng Su *et al*., who stated that virtual reality could effectively enhance students' sensory experiences and improve students' learning attitudes [52]. Virtual reality boosts learning efficacy and makes the process more engaging and motivating, which changes students' attitudes about learning [57]. Additionally, several other authors reported high student satisfaction and attitude toward virtual classes [53], [54], [55].

4.7. Students Cultural Literacy

The inferential statistics in Table 15 demonstrate that students in the group participating in the experiment had significantly higher results in terms of their cultural literacy than those in the control group. This finding proves that applying FVR improves students' cultural literacy. By utilizing virtual reality (VR) technology, cultural learning becomes more convincing as students can directly feel and experience the environment in an immersive and realistic manner. This creates a rich and relevant learning experience, strengthening students' understanding of culture and increasing their engagement in the learning process. This learning condition is especially important when cultural lessons are generally monotonous and uninteresting to students [56].

Numerous findings of this research demonstrated the benefit of VR in enhancing students' cultural literacy. First, there was a significant improvement in student involvement. With engaging and interactive virtual reality features, students engage in immersive and mesmerizing learning experiences. They can "feel" the culture first-hand and better understand the values and traditions of different cultures [52]. Subsequently, the level of comprehension and retention of information increases. With realistic and interactive learning experiences, students more easily visualize complex cultural concepts. This helps them understand and remember information [46].

Another indicator is the increase in students' interest and motivation to learn. VR technology creates a fun and exciting learning experience for students. They feel motivated to learn more about the culture because of the unique and interesting learning experience. Not only that, students' ability to interact and collaborate in a virtual environment is also an important indicator.

VR opens up opportunities for collaborative learning, where students can share ideas, thoughts, and knowledge about culture with their classmates [57].

5. Conclusion

Research on the effect of field trip-based virtual reality (FVR) applications on students' literacy, interest, and satisfaction in cultural learning has been successfully conducted. According to the findings, using the FVR application has a favourable and significant impact on students' cultural learning. First, using FVR media in cultural learning can increase students' interest. The questionnaire results confirm that students who were previously uninterested in cultural learning began to show interest after using FVR media. The interactive and engaging features of FVR create a fun and mesmerizing learning experience, making students more motivated to learn more about culture and develop higher curiosity.

In addition, students' satisfaction with cultural learning increases when using FVR media. The unique and exciting experience of learning culture in a virtual environment is one of the factors that cause students to feel satisfied with the use of FVR applications compared to video media. Furthermore, the field trip-based learning approach with information obtained directly through FVR media improves students' ability to learn and get information because students' curiosity increases when travelling in the virtual world. This differs from video-based learning (VLM), which only displays moving images and information in text or video, sometimes making learning monotonous. In addition, FVR media that invites students to learn about the culture in the virtual world directly makes learning enjoyable so that students' attitudes towards learning experience significant differences compared to video learning.

Using FVR in cultural learning has an essential impact on improving students' literacy by providing an immersive and realistic learning experience. This study shows a significant difference between the FVR and VLM classes, as shown from the Independent Sample t-test results. Students that learn through FVR media cause this difference because they are better able to comprehend and assimilate various cultural values and traditions through direct engagement in a virtual environment. The immersive and interactive learning experience presented by VR technology creates a meaningful and satisfying learning environment for students, ultimately increasing their motivation to learn about culture. As a result, students' literacy skills can be significantly improved.

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