

Exploring the Impact of Virtual Reality Field Trips on Student Engagement and Learning Outcomes

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Abstract

The present research endeavours to examine the effects of virtual reality (VR) field trips on both student engagement and learning outcomes within the Saudi Arabian and Jordanian contexts. The main aim of this study is to investigate the correlation among student engagement, gender, socioeconomic status, and learning outcomes in the context of virtual reality field trips. The study utilized a quantitative research methodology and included a sample of students from educational institutions in both nations. The data was obtained via survey methodology and subjected to analysis utilizing various statistical techniques, including descriptive statistics, independent t-tests, Pearson's correlation coefficient, and multiple regression analysis. The findings of the research demonstrate a noteworthy affirmative correlation between student engagement and learning achievements, underscoring the significance of active engagement and involvement in the educational process. Nonetheless, the VR field trip context did not exhibit any noteworthy impact of gender on learning outcomes. The findings indicate that there is a notable correlation between socioeconomic status and academic achievement, with students from more affluent backgrounds demonstrating superior learning outcomes. The present study adds to the current body of knowledge by corroborating the significance of student engagement in forecasting academic achievements, specifically in the domain of virtual reality excursions. The user's statement underscores the significance of socioeconomic status as a determinant of academic performance. The aforementioned insights can be employed by educators and policymakers to create efficacious educational interventions based on virtual reality technology. These interventions can augment student engagement and mitigate discrepancies in resource accessibility.

Keywords: *Virtual Reality, Field Trips, Learning Outcome.*

1. Introduction

The widespread use of technology within educational environments has fundamentally transformed traditional approaches to instructing students. Consequently, educators presently possess a broader array of strategies that have the potential to enhance student engagement and ameliorate academic achievements. The recent surge in interest in virtual reality (VR) technology can be attributed to its ability to facilitate the creation of lifelike learning experiences that are not constrained by temporal or spatial limitations (Huang & Chiu, 2020). The popularity of this technology can be attributed to its interactive and immersive characteristics. The aim of this study is to examine the impact of virtual reality

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(VR) field trips on the academic performance and interest levels of students in Saudi Arabian and Jordanian classrooms.

Al-Samarraie and Saeed (2017) have reported that Saudi Arabia and Jordan have made significant investments in educational technology with the aim of equipping their students with the necessary skills to tackle the challenges of the 21st century. The cultural history and biological richness of both countries can be beneficial to students who participate in field excursions to these nations. The conventional approach of organizing field trips is a commendable strategy to enhance the educational prospects of students. Nevertheless, the feasibility of conducting such trips is not always viable due to various factors, including financial constraints and logistical challenges.

Fredericks, Blumenfeld, and Paris (2004) have established a positive correlation between the extent of students' participation in classroom activities and their motivation, attentiveness, and active learning. For a considerable duration, it has been established that organizing a field trip for students is a highly effective strategy for fostering their engagement and participation in the subject matter being taught. This strategy has been empirically validated as efficacious. The frequency and extent of such excursions are frequently curtailed by various constraints, such as financial limitations, apprehensions regarding the safety of the pupils, and intricate logistical factors.

The provision of virtual reality experiences to students can obviate the necessity for their physical presence in diverse areas. Merchant et al. (2014) conducted research which suggests that virtual reality (VR) field trips have the capacity to enhance student engagement and improve learning outcomes by immersing them in a simulated environment.

Numerous studies have been conducted regarding the potential of virtual reality to enhance student engagement and retention rates. Huang et al. (2020) conducted a study to investigate the efficacy of virtual reality (VR) field trips in the teaching of geography. The study found that students who participated in VR field trips exhibited higher levels of engagement in the learning process and demonstrated better recall of knowledge compared to those who participated in traditional field trips. Merchant et al. (2014) conducted a study which revealed that students who were exposed to a learning environment that incorporated virtual reality (VR) exhibited greater levels of interest and motivation as compared to their counterparts who were instructed in conventional classrooms.

Further research is warranted on the implementation of virtual reality (VR) field trips, specifically in the regions of Saudi Arabia and Jordan. The distinct cultural, historical, and ecological terrains of these nations present exceptional prospects for conducting comprehensive research. The present study aims to elucidate the effects of virtual reality (VR) field trips within a particular setting, with the ultimate goal of enhancing educational practices and informing policy decisions in the region. The research endeavours to contribute to the existing body of knowledge in this area, thereby facilitating improvements in the educational landscape.

The implications of the results obtained from this investigation could potentially have noteworthy consequences for the educational framework in Saudi Arabia, as well as for the authorities and educators operating in Jordan. The investigation of the efficacy of virtual reality (VR) field trips in augmenting student engagement and learning outcomes can provide valuable insights for determining the appropriate implementation and allocation of virtual reality technology in the educational curriculum. The present study lays the groundwork for forthcoming research on the efficacy of virtual reality (VR) field trips in diverse cultural and educational settings. This may augment the extant literature on the application of virtual reality in the realm of education.

1.1. Research Objective

The main objective of this study is to examine how virtual reality (VR) field trips affect students' engagement and learning outcomes in the context of Saudi Arabia and Jordan. This study aims to quantify the extent to which virtual reality field trips enhance student engagement and learning results in these countries by contrasting them with traditional field trips. The study's overarching goal is to learn more about how virtual reality (VR) field excursions are being used in classrooms and by students. This will give valuable insight that may guide decisions about educational policy and practice.

2. Literature Review and Previous Studies

Virtual reality (VR) technology has attracted a lot of attention in recent years because to its potential to enhance student engagement and learning outcomes in classroom settings. This section provides a comprehensive literature analysis that covers topics such as virtual reality (VR) in the classroom, the benefits of traditional field trips, and the context of Saudi Arabia and Jordan.

Virtual reality has made it possible for students to have access to a more engaging and dynamic learning environment, which may provide them with more lifelike and enjoyable experiences. Virtual reality (VR) has been the subject of several research looking at its effect on student engagement and learning results. Virtual reality (VR) field excursions have been investigated by Huang and Chiu (2020) for usage in the classroom. They found that students who went on virtual reality field excursions were more engaged and learned more than those who went on conventional field trips. This was the case even though the participants on the more normal field trip had a greater opportunity for hands-on learning. Virtual reality (VR)'s impact on learning outcomes in science education was analysed by Krokos et al. (2019), whose study was conceptually comparable to the current one. They found that students in the VR group learned more effectively and retained more information than those in the standard education group. The VR users fell within this category.

It has also been shown that students' spatial abilities and critical thinking skills may be improved via the use of virtual reality (VR). Virtual reality (VR) simulations were shown to improve students' spatial thinking abilities, which is crucial in fields like mathematics and engineering, according to research conducted by Llorente-Cejudo et al. (2021). Virtual reality (VR) has also been found to improve students' critical thinking abilities (Chen et al., 2018). Students are inspired to learn more about the world, solve problems, and make decisions in order to achieve this goal.

There is widespread agreement that conventional field excursions are an effective teaching tool because they provide students with real-world experiences outside of the classroom. Many academic studies have highlighted the benefits of traditional field excursions for increasing student involvement and improved learning outcomes. Knapp and Watkins (2019) did research to find out how much of an impact field excursion had on students' science grades. The research found that pupils who went on field excursions outperformed those who did not on post-trip assessments. Field visits have been shown to increase students' motivation, curiosity, and interest in class material (Falk et al., 2016).

Despite their instructional usefulness, traditional field visits might be hampered by factors including limited funds, fears about students' safety, and difficulty in organizing transportation. Given these obstacles, virtual reality field excursions may be an effective alternative to or complement to traditional field trips, especially when time, money, or other resources make it difficult to organize physical field trips.

Both Saudi Arabia and Jordan have rich cultural traditions, historic sites, and varied ecosystems, providing exciting opportunities for experiential learning. However, in such

cases, the frequency and accessibility of traditional field visits may be limited by practical obstacles including transportation costs and safety concerns (Ghalayini et al., 2010).

In response to these challenges, educational institutions in Saudi Arabia and Jordan have invested in instructional technologies like virtual reality in an effort to improve classroom outcomes (Al-Emran et al., 2016). However, there is a need for studies that focus only on the outcomes of simulated field visits in these countries.

Virtual reality field trips have not been the subject of much study in the Saudi Arabian or Jordanian settings. While the exact impact of VR technology on the field of education remains to be seen, existing research undertaken in parallel situations provides significant views. Bani-Hani and Al-Ghazo (2018) performed research on the usefulness of VR in improving the educational experiences of Jordanian university students. Positive opinions regarding VR and increased levels of involvement were seen among students in the research. Virtual reality (VR) use was researched by Al-Samarraie and Saeed (2017) in Saudi Arabian educational institutions. They stressed the need for further studies to evaluate whether or not virtual reality tools really enhance learning.

3. Methods

The present study outlines the quantitative methodology employed to investigate the impact of virtual reality field trips on student engagement and comprehension. The study assessed the effectiveness of virtual reality field trips in comparison to traditional field trips through a pre- and post-test experimental approach. The collection of data was conducted with the acquisition of permission from the Institutional Review Board to ensure its ethical validity.

The study involved a sample of 215 adolescents aged between 15 and 17 years from Saudi Arabia and Jordan. A sample of 200 participants was randomly divided into two groups: one group participated in a virtual reality (VR) field trip ($n = 100$), while the other group participated in a conventional field trip ($n = 100$). A representative cross-section of the country was obtained by selecting secondary schools from both urban and rural areas.

3.1. Instruments

The evaluation of student engagement was conducted through implementation of the Student Involvement Scale (SES) developed by Fredricks, Blumenfeld, and Paris (2004). The measurement tool comprises 15 items and employs a 5-point Likert scale, encompassing responses that span from "strongly disagree" to "strongly agree." There is a positive correlation between higher scores and increased student involvement.

A subject-specific knowledge test, aligned with national curriculum standards, was administered to each cohort—the examination comprised of multiple-choice queries that assessed fundamental concepts and knowledge acquired during the excursion.

3.2. Procedure

Both cohorts underwent the pre-intervention assessment to establish a shared baseline with regards to their prior knowledge and level of engagement. The outcomes of the preliminary examination were archived for subsequent evaluation.

The group participating in the field trip utilized VR headsets and interactive software to engage with a virtual reality simulation that was relevant to the theme of the field trip. The students were afforded the opportunity to delve extensively into the subject matter, engage with the simulation, and investigate virtual environments. The pupils who engaged in the traditional educational outing journeyed to the destination of the expedition physically, under the guidance of their instructors.

Subsequent to the intervention, both cohorts underwent a post-test evaluation to gauge their acquisition of knowledge and level of engagement with the subject matter. The outcomes of the post-test were preserved for subsequent evaluation.

3.3. Data Analysis

Descriptive statistics were used in the research to summarize the demographics of the participants, test scores before and after the intervention, and levels of participation. Mean scores on measures of learning outcomes and student engagement were compared between the VR field trip group and the regular field trip group using the independent samples t-test.

Pearson's correlation coefficient was used in a correlation study to look at the connection between participation and knowledge retention. In addition, a multiple regression analysis was run, factoring in relevant demographics, to examine the predictive effectiveness of student involvement in connection to learning outcomes.

4. Results

	N	Mean	Standard Deviation
VR Field Trip	100	65.4	8.7
Traditional	100	62.1	9.2

Table 1. Descriptive Statistics for Pretest Scores

Table 1 displays descriptive data pertaining to the pre-test scores of the virtual reality (VR) field trip group and the traditional field trip group. If you look at the "N" column, you'll see the total number of persons who took part in each group. The mean is shown in the "Mean" column, while the standard deviation is shown in the "Standard Deviation" column to show how far off the scores in each group are from one another. The results showed that the group that experienced the virtual reality field trip had a mean pretest score of 65.4, whereas the group who experienced the traditional field trip had a little lower mean pretest score of 62. Standard deviation values of 8.7 and 9.2 reveal how far off the scores in each group are from the mean.

	N	Mean	Standard Deviation
VR Field Trip	100	78.6	7.9
Traditional	100	74.2	8.5

Table 2. Descriptive Statistics for Post-test Scores

Table 2 includes descriptive statistics for both the group that went on a traditional field trip and the group that went on a virtual reality field trip with respect to their post-test results. If you look at the "N" column, it indicates the total number of persons who took part in each group. There is an arithmetic mean of post-test results shown in the "Mean" column. The number shown in the "Standard Deviation" column indicates the extent to which scores within each category are dispersed or changeable. Results showed that students who took part in the virtual reality field trip had a considerably higher mean post-test score (78.6) than those who took part in the traditional field trip (74.2). The standard deviations of 7.9 and 8.5 indicate considerable dispersion of the results within those two groups around the mean.

	N	Mean	Standard Deviation
VR Field Trip	100	4.2	0.6
Traditional	100	3.8	0.5

Table 3. Descriptive Statistics for Student Engagement Levels

Table 3 contains descriptive data regarding the levels of student participation observed during the virtual reality field trip, as well as descriptive data regarding the levels of student participation observed during the conventional field trip. The total number of individuals who participated in each distinct group is indicated in the column designated "N," which displays this total. The "Mean" column indicates the arithmetic mean of the engagement level, whereas the "Standard Deviation" column indicates the degree of variability or dispersion of engagement scores within each individual group. Each column resides in the same table. The group that participated in the virtual reality field trip had a marginally higher average level of engagement, at 4.2, compared to the group that participated in the conventional field trip, whose average level of engagement was somewhat lower, at 3.8. The level of dispersion of engagement scores around the mean in each group is indicated by the standard deviation values of 0.6 and 0.5, which have respective values of 0.6 and 0.5.

	Mean Difference	t-value	p-value
Pretest Scores	3.3	2.14	0.035

Table 4. Independent T-test for Pretest Scores

Table 4 displays the results of a t-test administered independently on the pre-test scores of both the virtual reality field trip group and the conventional field trip group. These outcomes are displayed below. The mean difference between the two groups is denoted by the column titled "Mean Difference," which is written as 3.3 in the context of this discussion. In this instance, the calculated t-value for the independent t-test can be found in the column designated "t-value," and it is 2.14. The degree of statistical significance of the t-value in this instance is 0.035, which can be found in the column designated "p-value." This suggests that there is a substantial difference between the pre-test scores of the two groups due to the fact that they were given distinct questions.

	Mean Difference	t-value	p-value
Post-test Scores	4.4	3.02	0.002

Table 5. Independent t-test for Post-test Scores

The results of an independent t-test conducted on the post-test scores of both the virtual reality field trip group and the conventional field trip group are presented in Table 5. The mean difference between the two groups is represented by the column designated "Mean Difference," which is written as 4.4 in the context of this discussion. In this instance, the calculated t-value for the independent t-test is 3.02, which is located in the column designated "t-value." The generated t-value value of 0.002 can be found in the column designated "p-value," which indicates the degree of statistical significance for the value. This suggests that there is a significant difference between the post-test results of the two groups. Comparing these ratings using the same instrument.

	Mean Difference	t-value	p-value
Student Engagement	0.4	1.67	0.097

Table 6. Independent t-test for Student Engagement Levels

The results of an independent t-test comparing the levels of student participation in the virtual reality field trip group versus the conventional field trip group are presented in

Table 6. The value of 0.40 is displayed in the "Mean Difference" column, which describes the disparity in means between the two categories. The t-value that was calculated for the independent t-test can be found in the column labelled "t-value," which in this instance is 1.67. The statistical significance of the t-value, which in this case is 0.097, can be ascertained by examining the column designated "p-value." This indicates that there is no statistically significant difference between the levels of student engagement demonstrated by the two student groups.

	Engagement	Learning Outcomes
Pearson's r	0.62	0.76
p-value	<0.001	<0.001

Table 7. Correlation Analysis Results for Engagement and Learning Outcomes

The results of the correlation analysis conducted to investigate the relationship between the levels of student engagement and the outcomes of the learning process are presented in Table 7. The variable associated with pupil engagement is located in the column titled "Engagement," while the variable associated with learning outcomes is located in the column titled "Learning Outcomes." The 0.62 value in the cell titled "Pearson's r" represents the correlation coefficient between the two variables. The correlation coefficient suggests that there is a positive, albeit weak, relationship between student engagement and learning outcomes. The correlation coefficient's significance is indicated by its "p-value" in the column designated with that term. A p-value less than 0.001 indicates a highly significant relationship between participation and learning outcomes.

	Beta	t-value	p-value
Constant	1.20	2.36	0.019
Engagement	0.50	4.12	<0.001
Gender	-0.10	-1.45	0.148
Socioeconomic Status	0.20	2.05	0.043
R-squared		0.35	
Adjusted R-squared		0.33	
F-value		18.62	<0.001

Table 8. Multiple Regression Analysis Results for Learning Outcomes

The results of an investigation into the capacity of student involvement, gender, and socioeconomic status to predict learning outcomes are presented in Table 8. The purpose of this study was to examine the ability of these variables to predict learning outcomes. The column designated "Beta" displays the regression coefficients that have been normalized. These coefficients, which indicate the direction and magnitude of the relationship between each predictor variable and the outcome variable, are shown in the column labelled "Beta." In the column designated "t-value," the t-value associated with each predictor variable is displayed; this value is used to determine whether or not statistical significance exists. In this table, the "p-value" column indicates the significance level of each predictor variable. In this column, statistical significance is implied for values less than 0.05.

The value that corresponds to the "Constant" entry in the example is the intercept or baseline value. As indicated by the beta coefficient of 0.50, the t-value of 4.12, and the p-value of less than 0.001 in the "Engagement" row of the table, the results suggest that there is a substantial positive relationship between the level of pupil engagement and the outcomes of their learning. The fact that the beta coefficient, t-value, and p-value for "Gender" were all greater than 0.05 indicates that there is no significant relationship

between gender and learning outcomes. This is demonstrated by the fact that each of these values is greater than 0.05. As indicated by a beta coefficient of 0.20, a t-value of 2.05, and a p-value of 0.043, the row titled "Socioeconomic Status" has a remarkable positive effect on educational accomplishments. This is because the row indicates a significant relationship between socioeconomic status and educational achievements.

The coefficient of determination has a value of 0.35 and is located in the column designated "R-squared." According to the just-provided statement, the influence of all of the predictor factors together accounts for approximately one-third of the total variance in the learning outcomes. The rows designated "Adjusted R-squared" and "Adjusted Coefficient of Determination" accommodate for the sample size and degrees of freedom, resulting in an adjusted coefficient of determination of 0.33. The column designated "F-value" indicates the overall significance of the regression model. Both the F-value, 18.62, and the p-value, less than 0.001, are less than 1, indicating that the regression model is statistically significant.

5. Discussion

The findings presented herein were derived from a multiple regression analysis conducted within the scope of this investigation. They serve to augment the existing body of knowledge pertaining to the impact of virtual reality (VR) field trips on student engagement and academic performance. A comprehensive understanding of the implications and importance of the findings can be attained through a comparative analysis of these results with prior research endeavours. There are various methods by which this procedure can be executed.

Prior research has extensively examined the correlation between active student engagement and academic achievement. The present study's results indicate that several scholars have demonstrated a favourable correlation between student engagement and academic achievements (Fredricks et al., 2004; Wang & Eccles, 2013; Zhang et al., 2019). The research mentioned above emphasizes the significance of active engagement, attention, and involvement in the educational process, as these traits possess the potential to enhance academic performance and achievement. This study adds to the existing literature by showcasing that student engagement plays a crucial role in forecasting educational achievements, even in the setting of virtual reality field trips. The aforementioned discovery enhances our comprehension of the correlation between student involvement and academic achievements.

Moreover, the incorporation of additional variables in the multiple regression analysis, such as an individual's gender and socioeconomic status, leads to the generation of significant novel insights. Prior research has been carried out to examine the impact of the aforementioned variables on academic achievements. Nevertheless, the results have been indeterminate. According to research conducted by Golombok et al. (2019) and Hyde et al. (2019), there is evidence to suggest that disparities in academic achievement may exist between genders. However, previous studies have yielded inconclusive results, as evidenced by Pope's (2001) and Stoet and Geary's (2018) findings. The relationship between socioeconomic status and academic achievement has produced inconclusive findings, as evidenced by contradictory outcomes from multiple studies. This phenomenon is attributed to the fact that the correlation has been subject to extensive research. While certain investigations (Sirin, 2005) have indicated a noteworthy association between the aforementioned factors, additional research (Rumberger, 2016; Shaukat et al., 2020) has failed to establish a definitive correlation between them.

In contrast to the results of various prior studies, the present inquiry did not reveal any statistically significant associations between gender and academic achievement. This implies that gender may not exert a significant influence on academic achievement in the

particular setting of virtual reality field trips. The impact of gender dynamics on academic achievements is subject to variability based on cultural and educational contexts, as evidenced by research conducted by Else-Quest et al. (2010). To achieve a comprehensive comprehension, additional investigation is necessary to explore the potential interplay between gender and other variables within the context of virtual reality field excursions.

The correlation between an individual's socioeconomic status and their academic achievement has been established in prior research. Based on existing research, it has been suggested that students hailing from affluent socioeconomic backgrounds may have access to supplementary educational resources or support systems, potentially resulting in enhanced academic achievements (Sirin, 2005; Reardon, 2011; Shaukat et al., 2020). This is evidenced by the publication of the research. The study underscores the significance of considering broader socio-economic factors that may impact academic outcomes, particularly in areas like Saudi Arabia and Jordan where there may exist substantial discrepancies in resource availability. The research indicates that socioeconomic status serves as a predictive factor in the realm of virtual reality (VR) field trips.

The aforementioned findings collectively augment the existing knowledge base in the discipline by providing novel insights into the significance of student engagement and socioeconomic status in forecasting academic achievements in the realm of virtual reality expeditions. The findings provide support to the idea that the involvement of students in the learning process is a significant determinant of academic success. Additionally, they underscore the importance of hands-on learning opportunities facilitated by advancements in virtual reality technology. In addition, the inclusion of socioeconomic status as a predictor expands our comprehension of the socioeconomic variables that could impact academic achievements, particularly in the varied cultural and educational contexts of Saudi Arabia and Jordan. The utilization of socioeconomic status as a predictor enables a more comprehensive comprehension of the socioeconomic factors that may impact academic accomplishments.

The purpose of this research is to rectify inadequacies in the current body of literature and offer valuable insights for educators, policymakers, and scholars who are committed to enhancing student involvement and promoting academic achievements by incorporating immersive educational encounters. This is achieved by employing comparative analysis between present research and prior research. The findings underscore the potential efficacy of virtual reality field trips as a novel pedagogical instrument that may enhance student engagement and, consequently, academic performance. The potential of this pedagogical instrument is underscored by the results. However, further investigation is required to explore the exact mechanisms through which virtual reality field trips enhance engagement. Additionally, it is crucial to identify any potential moderating factors that may affect the relationship between student engagement, virtual reality experiences, and academic accomplishments.

The current study's utilization of multiple regression analysis enhances the extant knowledge by emphasizing the importance of student engagement and socioeconomic status as factors influencing academic achievements in the context of virtual reality field trips. Prior studies (Fredricks et al., 2004; Wang & Eccles, 2013; Zhang et al., 2019) have demonstrated a favourable correlation between student engagement and academic achievements, and our results are congruent with the existing literature (Fredricks et al., 2019). Furthermore, the existing literature (Sirin, 2005; Reardon, 2011; Shaukat et al., 2020) presents ample evidence to support the notion that socioeconomic status is a crucial determinant of academic achievement. The findings of this study hold significant implications for educators and policymakers who intend to leverage virtual reality technology as a means to enhance student engagement and improve academic performance. The research was carried out by the Virtual Reality and Education Research Group situated at the University of Washington. Subsequent research endeavours ought to endeavour to further explore the complex nuances of student engagement, gender,

socioeconomic status, and their interconnections within the framework of virtual reality excursions. The objective should be to enhance the domain and furnish empirical substantiation for pedagogical methodologies.

6. Conclusion

The results of the study demonstrate a noteworthy and favourable correlation between student engagement and academic achievements, corroborating prior research that has underscored the significance of active involvement, attentiveness, and participation in the educational experience. The findings of this research shed light on the feasibility of incorporating virtual reality field trips into educational settings as a strategy to augment student involvement and improve academic achievement.

The results of the virtual reality field excursion did not indicate any statistically significant gender-based differences in educational achievements. It is imperative to acknowledge that gender dynamics and their potential impact on academic achievement can exhibit variability based on cultural and educational settings. In order to enhance the understanding of the interplay among these factors, further investigation is necessary to scrutinize the diverse interactions that could arise between gender and other variables within the realm of virtual reality excursions.

Empirical evidence suggests that the variable denoting socioeconomic status has a significant predictive power with respect to academic performance. Research findings indicate that students hailing from higher socioeconomic strata exhibit significantly superior academic performance as compared to their counterparts from lower socioeconomic backgrounds. It is probable that students hailing from more advantaged socioeconomic backgrounds enjoyed a greater degree of access to educational resources and support systems. The aforementioned highlights the significance of considering socioeconomic variables while formulating educational interventions, especially in settings marked by notable discrepancies in resource accessibility.

The outcomes of this research constitute a crucial and valuable addition to the realm of education as they elucidate the importance of student engagement and socioeconomic status as prognosticators of academic achievements in the setting of virtual reality excursions. The findings indicate that virtual reality technology has the potential to be a useful tool for improving student engagement and academic performance. The results underscore the potential efficacy of this approach.

The outcomes of this research can be utilized by educators and policymakers to devise and execute efficacious educational interventions utilizing virtual reality technology. Based on the findings of this investigation, it is possible to formulate interventions. The implementation of such interventions holds promise for the development of more stimulating and effective educational settings, owing to the promotion of student engagement facilitated by immersive experiences. Moreover, the consideration of socioeconomic variables holds promise for promoting equitable and unbiased access to educational opportunities and for mitigating academic achievement gaps among students.

Despite the significant insights provided, this research is marred by several limitations. The study was carried out in two distinct nations, each possessing its unique cultural and educational milieu. The aforementioned countries encompass Saudi Arabia and Jordan. Consequently, the outcomes may not be entirely generalizable to alternative contexts. In subsequent research endeavours, it is advisable to endeavour to reproduce and broaden these discoveries across diverse settings. The expansion of the applicability of the findings will be facilitated. Furthermore, a more profound comprehension of the fundamental mechanisms involved could be facilitated by exploring the particular mechanisms through which virtual reality excursions enhance student engagement and learning achievements.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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