



# The Effectiveness of Virtual Tour Museums on Student Engagement in Social Studies Learning in Elementary Schools

Freddy Widya Ariesta<sup>1\*</sup>, Bunyamin Maftuh<sup>2</sup>, Sapriya<sup>3</sup>, Ernawulan Syaodih<sup>4</sup> 

<sup>1,2,3,4</sup> Primary Education Department, School of Postgraduates Studies, Universitas Pendidikan Indonesia, Bandung, Indonesia

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## ABSTRAK

*Dalam era transformasi digital saat ini, integrasi teknologi ke dalam bidang pendidikan melalui metode pengajaran menjadi sebuah keharusan. Penelitian ini bertujuan untuk mengukur efektivitas media virtual tour museum terhadap peningkatan keterlibatan siswa pada pembelajaran IPS di Sekolah Dasar. Desain Penelitian menggunakan quasi eksperimen dengan pre-test dan post-test control-group design. Sampel Penelitian ini terdiri dari 64 siswa kelas V pada 2 Sekolah Dasar di Jakarta Barat. Dimensi dan indikator yang digunakan dalam kuesioner bersumber dari The Student Engagement in School Questionnaire (SESQ). Data yang digunakan dalam penelitian ini, bersumber dari kuesioner, wawancara, dan dokumentasi. Uji N-gain Score dipilih untuk menganalisis data, membandingkan skor rata-rata antara kelompok eksperimen dan kontrol. Hasil temuan menunjukkan adanya disparitas rata-rata hasil keterlibatan antara siswa yang memanfaatkan media virtual museum tour dan siswa yang menggunakan buku materi tradisional. Kelas eksperimen memperoleh skor n-gain sebesar 0,683 yang menunjukkan terjadinya peningkatan keterlibatan siswa dengan kategori tinggi, sedangkan kelas kontrol memperoleh skor n-gain sebesar 0,193 yang menunjukkan peningkatan keterlibatan siswa dalam kategori rendah. Dengan demikian, penggunaan media virtual tour museum terbukti dapat memberikan kontribusi yang signifikan dalam meningkatkan keterlibatan siswa, mendorong apresiasi terhadap budaya, dan memperkuat rasa nasionalisme siswa di Sekolah Dasar.*

## ABSTRACT

During the era of digital transformation, the integration of technology into the field of education through teaching methods has become a necessity. This study aims to measure the effectiveness of museum virtual tour media on increasing student involvement in social studies learning in elementary schools. Research design uses quasi-experiment with pre-test and post-test control-group design. The research sample consisted of 64 students in the fifth grade. The dimensions and indicators used in the questionnaire are sourced from The Student Engagement in School Questionnaire (SESQ). The data used in this research comes from questionnaires, interviews, and documentation. The N-gain Score test was chosen to analyse the data, comparing the average scores between the experimental and control groups. The findings show that there is a disparity in the average engagement results between students who use virtual museum tour media and students who use traditional textbooks. The experimental class obtained an n-gain score of 0.683 which indicated an increase in student involvement in the high category, while the control class obtained an n-gain score of 0.193 which indicated an increase in student involvement in the low category. Thus, the use of virtual museum tour media is proven to be able to make a significant contribution in increasing student involvement, encouraging cultural appreciation, and strengthening students' sense of nationalism in elementary schools.

## 1. INTRODUCTION

The era of globalization has resulted in notable societal changes in Indonesia, characterized by the increased availability of information from global origins because of swift technical progress (Nugraha et al., 2017). The current epoch is distinguished by the prevalence of competitive behaviours, mindsets, and lifestyles that are propelled by breakthroughs in the fields of science and technology (Tilaar, 2019). Globalization offers a multitude of prospects, although it also presents certain obstacles, such as the emergence of radical entities that have the potential to undermine the unity and sovereignty of Indonesia

(Baharun & Nur Aini, 2020). To adequately equip the younger generation for the continuous phenomenon of globalization, it is imperative to prioritize character education. This educational approach is crucial as it cultivates a robust moral framework, fortifies resilience against external forces, and fosters the capacity to effectively compete with industrialized nations (Jumrana et al., 2020).

The prevalence of online education has witnessed a notable rise, particularly in the context of globalization. Nevertheless, the level of student involvement in virtual classrooms is still below the desired standard (Kamińska et al., 2020; Nguyen et al., 2018). The integration of emotions and senses into the learning process is a critical aspect of student involvement (Adedoyin & Soykan, 2023; Kavanagh et al., 2017). The notion has undergone evolution and now encompasses several dimensions, including behavioural, cognitive, and emotional involvement (Fredricks et al., 2016; Fredricks & McColskey, 2012). There is a significant correlation between heightened student involvement and enhanced learning outcomes (Khan et al., 2017), indicating that increased engagement might potentially optimize the effectiveness of the learning process (Risdiyanto, 2019). The transition to online learning has several problems, such as the need to carefully choose suitable methodologies and media, potential communication difficulties, and constraints related to available resources and facilities (Giatman et al., 2020). The establishment of good communication is crucial to mitigate the risk of distant learning becoming boring and ineffectual, particularly for younger students (Pramana et al., 2020; Putria et al., 2020).

The fast progression of information technology within the context of globalization calls for a reassessment of the education system. It is crucial to provide students with the necessary abilities to effectively manage the complexities of the modern global society (Van Lieshout et al., 2018). The current era, known as the 21st century, is characterized by a strong emphasis on the acquisition and distribution of information. This shift in focus has resulted in a transformation from a predominantly agricultural culture to one that places a central importance on knowledge (Bardakci et al., 2022; Khukalenko et al., 2022). The utilization of virtual reality (VR) technology presents a promising avenue for augmenting education through the creation of immersive learning experiences (Ozili & Arun, 2023).

The utilization of virtual reality (VR) enables humans to engage with computer-generated simulated settings, hence fostering a subjective experience of being present within such virtual places (Tilovberdiyevich, 2023). The virtualization of educational materials in numerous formats has become a natural consequence of improvements in information and communication technology (Makransky & Lilleholt, 2018; Oigara, 2018). Within the realm of media virtual reality, students are actively involved in educational encounters, surpassing the mere receiving of material and instead engaging in activities such as observation, analysis, performance, and demonstration (Nguyen et al., 2018). The immersive characteristics of virtual reality (VR) bear a striking resemblance to the tangible environment, hence augmenting the educational encounter (Makransky & Lilleholt, 2018; Perriguet, 2023).

To promote active learning within online educational settings, it is imperative for educators to offer avenues for collaboration, debates, case studies, and direct engagement in various activities (Boyles, 2017; Hu-Au & Lee, 2017). The utilization of media interactive learning facilitates the establishment of a reciprocal conversation, hence fostering active engagement in the process of learning (Lei et al., 2018). Virtual reality (VR) technology has the capability to recreate actual or conceptual surroundings in three-dimensional areas, resulting in an enhanced degree of engagement that promotes attentiveness and active involvement (Kavanagh et al., 2017; Tilovberdiyevich, 2023). In the present context, learning is a cognitive process characterized by its dynamic nature, wherein individuals engage in the active reconstruction of meaning to acquire information, comprehension, and skills. The utilization of virtual reality (VR) technology in the field of education has yet to be fully explored (Maroungkas et al., 2023).

Given the dynamic nature of the educational environment and the emerging possibilities offered by virtual reality (VR) technology, this study investigates the efficacy of Virtual Tour Museums in augmenting student engagement within the context of social studies instruction at the primary school level. This study aims to fill a notable research void, since there exists a scarcity of scholarly investigations pertaining to the utilization of virtual reality (VR) technology within the context of primary education in Indonesia. The significance of this research is emphasized by the continuous process of globalization and the imperative to provide the younger generation with the necessary skills and knowledge to succeed in a swiftly evolving global landscape. The proposed research entails many key components, including an extensive evaluation of relevant literature, the development and execution of a Virtual Tour Museums program within primary schools, the collection of data pertaining to student engagement and learning outcomes, and the subsequent analysis of these findings to derive meaningful conclusions.

The main aims of this study are to examine the present condition of student participation in social studies education in primary schools in Indonesia, considering the influence of globalization and online learning. This study aims to investigate the potential of Virtual Tour Museums as an instructional tool to augment student engagement in the context of social studies education. This study aims to evaluate the

influence of Virtual Tour Museums on student learning outcomes and their capacity to negotiate the complexities associated with globalization. This paper aims to present suggestions and guidelines for the successful integration of Virtual Tour Museums into the primary school curriculum, with the objective of enhancing student engagement and facilitating effective learning outcomes.

In summary, the objective of this study is to fill the existing research void about the utilization of Virtual Tour Museums in the context of primary education in Indonesia. Considering the continuous phenomenon of globalization and the rapid progression of technology, it is imperative to provide the younger cohort with the essential competencies and information. The utilization of virtual reality technology holds significant potential for augmenting student engagement and improving learning outcomes within the realm of social studies. This study aims to provide significant insights on the efficacy of Virtual Tour Museums in elementary school and offer recommendations for their integration into the curriculum through a thorough examination and analysis.

## 2. METHOD

The research methodology comprises various essential steps, namely research design, selection of research subjects, utilization of data collection instruments, and subsequent data analysis. The study employed a quasi-experimental research design with a pre-test and post-test control-group design but without randomization. The researcher opted for a quasi-experimental design for this study, as it allowed for conducting the research without the need for random selection. This approach was chosen to ensure that the study did not disrupt the regular school learning activities (Sugiyono, 2017). Upon establishing the experimental and control groups, the researchers proceeded to administer treatment to the experimental group. This involved utilizing a virtual museum tour media as an instructional tool to impart knowledge on the topic of Indonesian independence history to fifth-grade students in an elementary school setting. In the experimental group, students engaged in educational exercises utilizing social studies textbooks designed for elementary school students in the fifth grade. Subsequently, the researcher collected pre-test and post-test data by means of a questionnaire and proceeded to analyse the data to evaluate the efficacy of the learning process. The researcher employed a nonprobability sampling technique to determine the research sample. Nonprobability sampling is a sampling technique wherein researchers select participants based on their availability, appropriateness, and representation of certain observed characteristics (Hamdi & Bahruddin, 2015).

The study sample comprised 64 students enrolled in grade 5 at two elementary schools located in the city of West Jakarta. The researchers employed a questionnaire as a data collection tool to investigate the efficacy of virtual museum media in enhancing student engagement in social studies education at the elementary school level. This study employs a questionnaire instrument to collect data from students before and after the test. This questionnaire comprises nine statements that will be rated on a Likert scale ranging from 1 (Strongly Agree) to 4 (Strongly Disagree). The dimensions and indicators utilized in this questionnaire were derived from The Student Engagement in School Questionnaire (SESQ) as presented in Table 1.

**Table 1.** Dimensions and Indicators the Student Engagement in School Questionnaire (SESQ)

No	Dimensions	Indicator
1.	Emotional	Interest Pleasure
2.	Behavior	Sense of ownership Participation No annoying behavior Attention
3.	Cognitive	Invest in learning Like challenges Trying to exceed expectations

(Hart et al., 2011)

The researcher employed a data triangulation approach, wherein questionnaires, in-depth interviews, and documentation were concurrently utilized as data sources. Triangulation refers to the process of validating and corroborating information by utilizing many techniques and sources of data collecting (Hamdi & Bahruddin, 2015; Sugiyono, 2017). The employed methodology for data analysis encompasses both quantitative and qualitative approaches. Quantitative analysis encompasses several statistical tests, such as normality testing, homogeneity testing, independent sample testing, and the Mann-

Whitney test, which are employed to do hypothesis testing. The chosen method for qualitative analysis in this study is the N-gain Score test, which is employed to determine the normalized average score (N-Gain) between the experimental group and the control group. Table 2 shows the interpretation of the N-Gain score.

**Table 2.** Interpretation Average Score of N-Gain

Score	Category
$\geq 0.7$	High
$0.3 \leq <g> < 0.7$	Medium
$<g> < 0.3$	Low

The present study employed a data analysis approach to examine and evaluate the efficacy of student engagement in the learning process through the utilization of virtual museum media (Hamdi & Bahruddin, 2015; Sugiyono, 2010).

### 3. RESULT AND DISCUSSION

#### Result

The researcher conducted a comparative analysis of the post-test outcomes between the experimental group and the control group. This analysis was performed using a questionnaire comprising nine variables that measure student participation. The measurement of the indicator is conducted using a Likert scale ranging from 1 (representing Strongly Disagree) to 4 (representing Strongly Agree). Table 3 presents the outcomes of the statistical descriptive analysis conducted on the pre-test and post-test data of both the experimental group and the control group.

**Table 3.** Data Analysis of Experiment Group

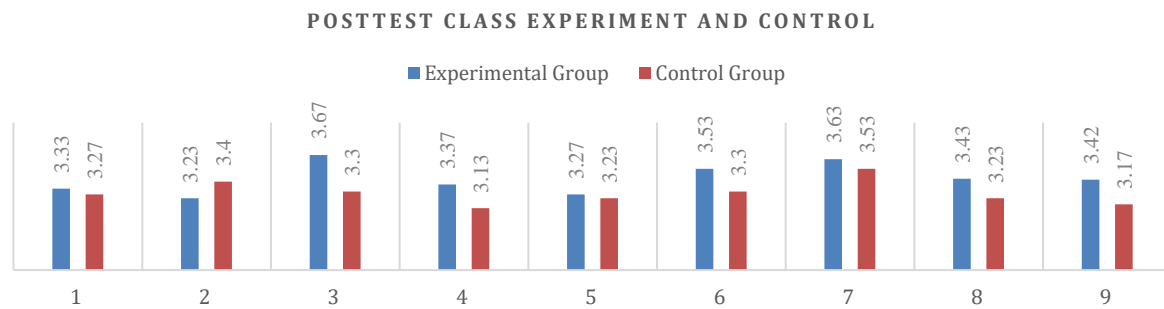
Statistics	Pretest	Post-test
N	32	32
Mean	25.87	32.33
Median	26.50	30.33
Std. Deviation	3.589	3.231
Minimum	18	23
Maximum	33	36

Based on the findings shown in Table 3, it is evident that there is a statistically significant rise in the mean scores of student engagement after their use of virtual media from the history museum during social studies instruction in primary educational settings. The data pre-test and post-test control group are depicted in Table 4.

**Table 4.** Data Analysis Control Group

Statistics	Pretest	Post-test
N	32	32
Mean	28.03	29.57
Median	30.00	30.00
Std. Deviation	2.930	3.775
Minimum	22	18
Maximum	36	36

Based on the data shown in Table 4, it can be inferred that there is a decline in the mean scores of student engagement after the implementation of traditional media books in social studies instruction at the primary school level. The calculation of post-test recapitulation is typically expressed as a percentage by researchers. The post-test findings in Figure 1 depict the graphical representation of the overall student engagement in both the experimental group and the control group.



**Figure 1.** Post-test Graph of Student Involvement in Experiment and Control Class

Figure 1 provides a comprehensive overview of the indicators pertaining to student engagement in both the experimental and control groups. Charts 1 to 3 depict the many levels of emotional engagement, which encompass signs such as curiosity, enthusiasm, and a sense of ownership. Charts 4 to 6 present the quantitative measurements of behavioural engagement, encompassing indications related to active involvement, the lack of disruptive behaviours, and focused attention. Charts 7 to 9 depict the many aspects of cognitive engagement, specifically focusing on signs such as investing in learning, embracing difficulties, and striving to surpass established expectations.

The efficacy of student engagement in learning through the utilization of virtual media museums was assessed by a questionnaire including nine indicators and corresponding statements. The purpose of this questionnaire is to assess the level of student engagement in the social studies learning process through the utilization of virtual museum media. In reference to the outcomes of the efficacy assessment conducted utilizing the N-Gain examination, the corresponding data is shown in Table 5.

**Table 5.** Results of the N-Gain Test

	Experiment	Control
Max. Score	36	36
Pretest	25.87	28.03
Post-test	32.33	29.57
N-Gain	0.683	0.193
Category	High	Low

The analysis of Table 5 reveals that the experimental group, which engaged in learning using virtual museum media, achieved an interesting n-gain score of 0.683, achieving the high requirements. The control group engaged students in a traditional learning approach, utilizing books as the primary instructional medium. This resulted in an n-gain score of 0.193, indicating a relatively modest level of improvement based on the predetermined criteria.

**Discussion**

The utilization of technology, particularly through virtual museum tours, enables students to engage in a more comprehensive, authentic, and engaging educational encounter. This diverges from the utilization of textbooks, which typically exhibit a passive and boring nature. Virtual museums provide students the opportunity to engage in virtual exploration of historical locales, examine historical relics, and interact with many cultural perspectives, all inside the controlled environment of their classrooms. The utilization of this methodology promotes an elevated degree of genuineness within the educational procedure (Al-Ansi et al., 2023; Huang et al., 2023; Wu et al., 2023).

In the contemporary epoch of digital transformation, the incorporation of technology inside educational settings has transitioned from being discretionary to becoming imperative. The utilization of technology has offered viable alternatives to enhance the educational experiences of students (Allcoat & von Mühlenen, 2018; Gao et al., 2020). Empirical evidence from research studies demonstrates that the incorporation of virtual museum tour media into social studies courses at the primary school level yields a noteworthy and favourable effect on student engagement. During the period known as the fifth industrial revolution, advancements in technology-driven media within the field of education are being employed to support the process of learning. These advancements have the potential to enhance students' engagement and motivation, hence facilitating a deeper comprehension of educational content (Ariani, 2019; Kassab et

al., 2023; Khan et al., 2017). Effective learning materials are characterized by their alignment with core competencies and basic competencies outlined in the curriculum. Additionally, these materials employ language that is tailored to students' cognitive development stages, facilitating comprehension (Fidan & Tuncel, 2019; Scheiter et al., 2019). Media that utilizes Virtual Reality (VR) has the capability to provide representations of immersive learning content, hence enhancing the precision of visualization (Al-Ansi et al., 2023; Burdea & Coiffet, 2003). The clarity of information in the learning process is enhanced via the integration of both virtual and real-world elements. The incorporation of interactive elements inside the virtual museum provides students with the ability to engage with the educational content, so enhancing the appeal and enjoyment of the learning experience. This contact undeniably enhances student engagement. Previous research has indicated a favourable correlation between high levels of student participation and various educational outcomes, including enhanced comprehension of subject matter, improved long-term retention of information, and heightened interest and drive for learning.

Based on the findings of this study, there is a notable contrast between students who utilize virtual museum tour media and those who continue to rely on conventional techniques, such as textbooks. Based on the calculated n-gain scores of 0.683 and 0.193, it is evident that there exists a substantial disparity in student involvement between the two groups. The experimental class, which incorporated virtual museum tour media, had a significantly higher n-gain score compared to the control class. Additionally, the student engagement level in the experimental class was classified as high. The utilization of real-life illustrations in social studies education has been shown to be a successful approach in fostering comprehension and achieving concept mastery (Kassab et al., 2023; Noetel et al., 2023; Yang et al., 2023). The use of this approach enhances student engagement and facilitates comprehension of the offered content. The virtual tour media of the museum encompasses a significant portion of historical content pertaining to the subject of independence. This study further presents empirical support for the proposition that virtual museum tours have the potential to foster students' awareness of cultural heritage and reinforce their feeling of national identity.

The active engagement of students in the educational process, namely through virtual museum tours, facilitates a more profound comprehension of a nation's cultural and historical legacy. In this manner, pupils can comprehend the knowledge not just from an academic standpoint, but also engage with it on an emotional level. When student learning becomes engaging and relevant, students are more likely to be intrinsically driven to acquire knowledge due to their recognition of the practicality and applicability of the subject matter in their daily lives (Allcoat & von Mühlenen, 2018; Lan & Hew, 2020). The findings presented in this study are consistent with other research indicating the efficacy of virtual reality-based media as a tool for facilitating student learning (Al-Ansi et al., 2023; Kamińska et al., 2019; Tilovberdiyevich, 2023). In addition to this, extant literature has similarly posited that media has the potential to enhance students' capacity for critical thinking (Billinghurst et al., 2015; Reilly & Dede, 2019). In the realm of science, empirical evidence has demonstrated the efficacy of virtual reality-based media in facilitating enhanced learning outcomes for students. Furthermore, it is crucial to bear in mind that the efficacy of using technology in education is not contingent entirely upon the technological tools themselves. The role of the teacher has significant importance in the integration of technology into the educational process (Baharun & Nur Aini, 2020; Risdianto, 2019). It is imperative for educators to possess the capacity to successfully instruct pupils in the utilization of technology, make informed decisions about material selection, and develop learning activities that are both pertinent and engaging. In summary, the judicious utilization of technology, such as virtual museum tour media, has the potential to serve as a very efficacious instrument for enhancing student engagement, fostering a heightened sense of national identity, and augmenting the overall quality of student learning encounters. As educators, it is imperative that we consistently seek opportunities to use technology within the classroom setting, with the aim of enhancing the educational experiences of our students in a more profound manner.

#### 4. CONCLUSION

In this research, the use of virtual museums was proven to significantly increase student engagement in social studies learning at the elementary school level. The experimental group that integrated the virtual museum into the curriculum showed a significant increase in post-test scores and had a high n-gain, indicating the effectiveness of the virtual museum medium in increasing student engagement. The implications of this research include the potential to motivate students to understand national history, develop an appreciation for culture, and strengthen a sense of nationalism. In addition, the role of teachers and educational institutions in increasing student engagement is also very important, with the integration of learning technology enabling the provision of interesting material. Overall, this research underscores the

importance of utilizing virtual museums as an effective tool to increase student engagement in social studies learning in an increasingly innovative and technology-oriented educational future.

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