Through Virtual Field Trip Technology Intervention, Can Museums Be a Source of Historical Learning?

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Abstract. The only method to develop historical significance is through artifacts from the past. The museum is one place where you can research history and discover various relics from the past. Technology developments and social mobility restrictions have made it necessary for museums to exist in a virtual form that may be explored like a real field trip. Through the use of technology known as Virtual Field Trips (VFT), this study seeks to analyze the impact and effectiveness of museums as a source of historical knowledge. A quasi-experimental approach with a single group pretest-posttest design was employed for the research. A sample of 120 students from the class XI SMA Negeri 1 Padang City, out of a total population of 346, was chosen for the study using the proportional stratified random selection method. The data analysis method employed the t-test independent sample t-test to assess the impact of the museum and the N-Gain test to assess its effectiveness. The study's findings show that the museum, as a source of knowledge of history, through the use of VFT technology, has a significant impact on class XI students at SMA Padang City's historical understanding, which is supported by a significance value (Sig.) of $0.000 > 0.05$. The N-Gain test revealed a 46% increase in the learning results for students. So, it was determined that the museum was effectively employed by high school students as a source of historical knowledge with the help of Virtual Field Trip technology.

Keywords: Museum · history learning · Virtual Field Trip technology

1 Introduction

The goal of teaching history in schools is to provide students with a thorough grasp of historical events as well as the critical and analytical thinking skills they will need in the future [1]–[3]. Only the evidence left behind can be used to understand previous occurrences. Written documents, historical artifacts and sites, tape recordings, persons who were there at a past event, and living historical witnesses can all serve as forms of historical evidence. The museum is one of the best venues to keep and gather historical artifacts and evidence. A museum is a place where artifacts from the past and cultural heritage are gathered, cared for, displayed, and preserved [4].

We may learn about historical events in museums by looking through collections of artifacts and other written records. It is a historical field trip activity to visit the museum. In the opinion of many, the most successful way to teach historical events is through this historical field trip [5]. Students can directly examine and observe historical artifacts or relics during historical field trips. Comparatively speaking, this has a greater effect on students' comprehension of history than if they were simply presented with abstract learning materials in class [6].

Research has shown that the conventional, traditional methods of instruction discourage students from being motivated and engaged in learning [6, 7]. This is distinct from when students are encouraged to participate in learning activities outside of the classroom, such as visiting a museum. During visits to museums, students display higher levels of enthusiasm and motivation while participating in group projects and other interactive activities [8]. Students get the opportunity to interact with relics, places, stories, and other historical recreations when they leave the classroom to visit museums or historical sites [9]. It is difficult to recreate this activity in a classroom setting. Therefore, when students encounter historical relics at museums, they will be more motivated to exercise critical thought about original sources and expand on historical interpretation [10, 11].

Museums can greatly aid pupils in understanding historical events [12]. The utilization of museums as a source for historical education can be beneficial, particularly for teaching local history, as schools lack the necessary teaching materials. Museum visits may enhance students' knowledge of the subject matter, create a more sensory learning environment, and develop their capacity for historical thought [13].

However, due to social mobility limitations brought on by the COVID-19 pandemic, which has spread globally, historical tourist activities like museum visits are no longer possible. This is due to the government's restrictions on extracurricular activities. SMA Negeri 1 Padang City experienced the same issue as well. It was discovered after speaking with various history teachers regarding historical field excursions that pupils had never been to a museum during the COVID-19 pandemic. This is due to the absence of authorization from the West Sumatra Education Office for extracurricular activities. Researchers suggest using digital technology to conduct virtual museum tours as a way to get around these issues.

When it comes to the COVID-19 pandemic, virtual visits (also known as virtual field trips) are being explored as an alternative to historical field trips. In several studies, virtual visits have been found to significantly affect students' motivation, interest, learning results, and historical comprehension. Because the VFT has a number of benefits, including the ability to depict the actual situation in 360°, the ability to access historical sources that are distant from the student's environment, the ability to provide an active and independent learning experience for students, and the ability to save on both time and cash, it was chosen as a substitute for a museum visit. Based on the abovementioned issues, the goal of this study is to use Virtual Field Trip technology to offer an alternate approach to historical education in museums. This study's specific goal is to examine the impact and potency of the museum as a learning resource using the Virtual Field Trip intervention.

Table 1. Criteria N-Gain score

Interval	Criteria
$g \geq 0.7$	High
$0.3 \leq g \geq 0.7$	Middle
$g < 0.3$	Low

2   Method

A single group pretest-posttest design with a quasi-experimental research method was adopted. This method was adopted with the research purpose in mind, which was to examine how the museum may affect students' historical understanding through the use of technology known as Virtual Field Trips. 120 students from class XI SMA Negeri 1 Padang were chosen for the study sample using the proportionate stratified random procedure from a total of 346 students in class XI.

The requirements and goals of the study are used to choose the research sample. According to Barker et al. (2016), a sample that is too small cannot correctly disclose the effect of the research, but a sample that is too large would need more money and effort. On the basis of this, the sample was chosen in accordance with the aims and goals of the research. A student history learning test sheet is used as a research instrument. To evaluate students' knowledge of learning history, research data was gathered through literature study activities, interviews, and examinations. The test was administered twice: the pretest was administered prior to the treatment, and the posttest was administered following the administration of the treatment, which involved using the Museum based virtual field trip.

Pretest data were analyzed using an independent sample t-test, and the results revealed a significance value (Sig) of 0.314 (greater than 0.05), implying that there was no significant difference in the experimental and control classes' initial historical understanding prior to treatment application. The independent sample t-test at a significant level of 5% was used to analyze museum data as a source of historical learning through the intervention of Virtual Field Trip technology to assess whether or not there was an impact of delivering treatment. However, normality tests were run on the collected historical thinking skills data before the t-test. In the meantime, the N-Gain test is run to gauge the impact of the effect. Richard Hake developed the N-Gain criterion, which is as shown in Table 1 [14].

Statistical analysis of research data was carried out using IBM SPSS version 25 software.

3   Results

Researchers discovered an improvement in students' historical learning based on statistical analysis. The post-test mean score (82.24) is greater than the pre-test, indicating this (64.37). Additionally, the t-test results show that the t-score is 28,671 and the P

Table 2. Descriptive statistics

Descriptive Statistics						
	N	**Range**	**Min**	**Max**	**Mean**	**SD**
Pretest	120	24	54	78	64.37	7.461
Posttest	120	32	56	88	82.24	4.426
Valid N (listwise)	120					

Table 3. Normality results

One-Sample Kolmogorov-Smirnov Test		Pretest	Posttest
N		120	120
Normal Parameters[a,b]	Mean	64.37	82.24
	Std. Deviation	7.461	4.426
Most Extreme Differences	Absolute	.313	.318
	Positive	.313	.167
	Negative	−.118	−.318
Test Statistic		.313	.318
Asymp. Sig. (2-tailed)		.224	.201
a. Test distribution is Normal.			

value is $0.000 < 0.05$, indicating that there is a difference between the pre-test and post-test classes' average values. This demonstrates how incorporating virtual field trips into museum learning may help students have a better historical perspective on historical occurrences. The Table 2 shows the findings of the study's statistical analysis.

Table 2 shows descriptive data on the outcomes of tests on historical comprehension performed on class XI students at SMA Negeri 1 Padang City using museums as learning resources. According to the statistical findings, the pretest's average score was 64.37, while the posttest's average score was 82.24. The results of the statistical test revealed that the scores between the pretest and posttest varied. The posttest's average value is greater than the pretest's average value. This demonstrates that there are disparities between students' historical comprehension before and after receiving instruction from museums that employ Virtual Field Trip technology.

Additionally, a t-test test using an independent sample was conducted to see whether a museum with a virtual field trip as a source of learning has an impact on students' comprehension of history. It is required to assess the requirements for the study data, including the normalcy test, before examining the effect using the t test. The normality test was carried out through the Kolonogorov-Smirnov test with the test results presented in Table 3.

Table 4. t-test result

t-test for Equality of Means

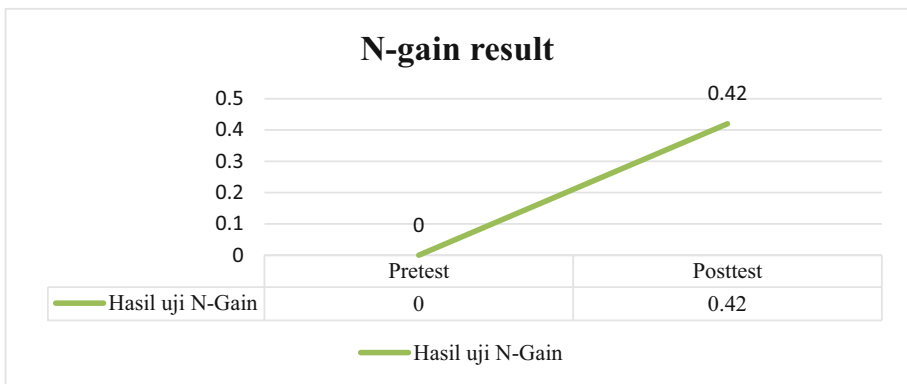|		t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Learning outcome	Equal variances assumed	28.671	118	.000	7.933	.466
	Equal variances not assumed	28.671	57.860	.000	7.933	.466

Fig. 1. N-gain result

Table 3 shows that the pretest test's normalcy value is 0.224 and the posttest's is 0.201. The values for pre- and post-normality are both greater than 0.05, indicating that the data is normally distributed. Do a t-test using an Independent Sample t-test in order to determine the impact of implementing a museum-based Virtual Field Trip technological intervention on students' historical comprehension. Table 4 lists the findings of the t test.

According to Table 5, the significant value of the t test is 0.000 or less than 0.05. The use of the museum as a source of historical knowledge through the use of Virtual Field Trip technology has a substantial impact on students' historical comprehension. The N gain test is then run in order to determine how much influence is provided. Figure 1 displays the outcomes of the N-Gain test.

Based on Fig. 1, it is known that students' grasp of history increased by 46% after receiving instruction using virtual museums as a source of historical knowledge. Therefore, it can be concluded that the museum is a valuable historical learning resource for students to obtain a better understanding of the past when combined with Virtual Field Trip technology.

4 Discussion

The results of the study demonstrate that the museum based on Virtual Field Trip (VFT) technology as a source of historical knowledge has a substantial impact on the students at SMA Negeri 1 Padang City. That there is a difference in the level of students' historical understanding between before and after the use of virtual museums as a source of learning history. This is supported by the significance value of the t test of $0.000 < 0.05$ and the average score of the posttest test being higher than the average score of the pretest test. The N-gain number demonstrates that students' historical knowledge grew by 46% in the medium category after utilizing a museum that uses Virtual Field Trip technology as a history learning resource. The results of this study are consistent with those of other studies [6, 15]–[18] that show how much simpler it is for students and teachers to learn historical events thanks to the accessibility of virtual museums. According to Yilmaz et al. [19], virtual museums can be a useful learning tool for enhancing students' understanding of historical processes.

Students may easily learn all there is to know about the museum's collection through the virtual museum. Virtual museums are interactive, instructive, and collaborative. People can engage with the artifacts of a virtual world to enhance their own understanding, their cognitive processes, and to stimulate creativity and the creation of new inventions [20]. Users of the Virtual Museum can download all educational resources, including collections, catalogs, publications, brochures, and books. Students may actively participate in the learning process and gain a deeper historical knowledge of past events by using museums as learning resources with the use of Virtual Field Trip technology.

Learning in virtual environments that incorporate museums has a good impact on students' progress because it boosts learning motivation, develops cognitive skills, fosters analytical and critical thinking, enhances observational abilities, and fosters independence and self-management [21]–[24]. This is due to the fact that students will examine the materials asynchronously, requiring them to actively seek for, locate, and identify each collection in the museum. The use of virtual museums as educational tools can break down barriers to access to physical museums and provide places for social inclusion (such as travel costs, spatial distance, and impaired mobility). Through a variety of amenities made available by technology, virtual museums provide a new way to visit that does away with the typical difficulties posed by traditional museum and historical field tours [25, 26]. Virtual museums are more cost-effective than traditional museums because, as long as there are no issues with the web browser or the internet, they don't need to be maintained. With no concern for physical space constraints, it is simple to add collections or objects to a virtual museum.

The learning of history will become more engaging for pupils via the use of technology interventions, boosting their involvement in the process. It is a good idea to create virtual museums that may be used as learning resources to assist online learning. Technology-based museums may be used as learning tools to assist students in analyzing, assimilating, contextualizing, and synthesizing their information [27]. This fosters new levels of thinking and increases students' drive to study by giving them a better understanding of the past.

Thus, virtual museums are viewed as educational tools that provide access to knowledge gathered in art galleries, museums, and objects, supporting both situational learning

and authentic learning [20]. Students may access virtual museums online in this way using their technological devices, such as laptops or mobile phones. Based on the discussion above, it can be said that the museum, when combined with Virtual Field Trip (VFT) technology, is an excellent way for students to learn about history and deepen their understanding of the past.

5 Conclusion

The results of the study indicate that using Virtual Field Trip (VFT) technology in combination with a museum has a substantial impact on students at SMA Negeri 1 Padang City's comprehension of history. Students' historical comprehension increased by 46% after using the virtual museum as a learning tool. Based on these findings, it can be said that using Virtual Fields Trip (VFT) technology in conjunction with a museum is an excellent way to teach history to students and increase their understanding of the past. In order to increase students' historical comprehension and higher-order thinking skills, the researcher advises history teachers to use virtual museums as a source and medium for teaching history. In addition to research findings that affect how students learn history, this study is still restricted to SMA Negeri 1 in Padang City, and it is hoped that future studies will use a broader sample size in order to provide more accurate and complete results.

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