Student Perceptions of the Use of MilleaLab-Based Virtual Reality as a Geography Learning Media (Geosphere Phenomenon Material)

Maria A. Purwaningtyas, Dewi Lestari, Oot Hotimah, Muhammad Zid
Geography Education, Faculty of Social Sciences, Universitas Negeri Jakarta, DKI Jakarta, Indonesia
E-mail: maria.andriyeni.purwaningtyas@mhs.unj.ac.id¹, oothotimah@unj.ac.id³, mzid@unj.ac.id⁴

Abstract
Learning media is required to develop continuously following the current era, and educators, as operators, are required to master learning media. The development and use of learning media, including visual, audio, and video, as well as the use of virtual reality (VR) in learning, continues to be researched and developed. This can increase the effectiveness, efficiency and motivation of learners in the use of VR media. MilleaLab-based VR can be used as a geography learning medium to support students in learning and understanding material in the virtual world. This research is a type of qualitative description research. Descriptive analysis is carried out by explaining students’ perceptions of the use of millealab-based virtual reality as a geography learning medium (geosphere phenomenon material).

Keywords: Student Perception, Virtual Reality, Geography Learning Media

Introduction
Education has become a very important thing for humans. According to Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System, education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious, spiritual strength, self-control, personality, intelligence, noble character and skills needed by themselves, society, nation and state. Education is the activity of developing knowledge and abilities through learning that has been designed, including formal and non-formal education. Education can also improve a person's quality of life (Yusof, 2007). This is because a person's way of life depends on the point of view of the things he sees and understands. With education, a person can see various points of view on a matter more wisely and skillfully in decision-making. Thus, education becomes a right for all humans, and the government seeks policies and develops curricula that make a better impact on students (Tsaaqib et al., 2022).

Education in the 21st century requires students to have a number of complex knowledge accompanied by various skills, both higher-order thinking skills, skills in the world of work, skills in using information, media and technology in accordance with the innovative learning
framework of the 21st century launched by Partnership for 21st Century Learning (2011) (Muhali, 2019). The achievement of students' skills depends on the efforts made so that the Human Resources (HR) produced are able to compete in the national and international job market. If the human resources produced are not able to compete, then Indonesian human resources will be left behind by the human resources of other countries, which can be a threat to countries that are not taken into account.

In this 21st century, educators must be ready to face the 4.0 era. Readiness in the 4.0 era is shown by the ability of educators to use ICT in learning. This need is based on the consideration that learning using real or concrete media will increase the interest of students in learning so that it can make it easier for students to understand the material taught (Goddess, 2020). In addition, the development of information and communication technology, especially on the internet, can be maximized in the teaching and learning process as a learning medium at various levels, ranging from elementary school to college (Suwastika, 2018). However, in reality, the learning media used sometimes does not match the interests of students and does not support students in understanding the learning material, so it has an impact on the cognitive abilities of students who are low (Wulandari et al., 2022). Thus, learning media is required to always develop following the current era and educators as operators are required to master learning media (Tsaaqib et al., 2022). Technology-based learning media is believed to be used to make it easier for students to understand the material of a subject, meaning that it affects the understanding of student material faster. Various studies show that the selection of the right technology-based learning media can increase the interest, motivation and learning outcomes of students. In addition, the use of technology-based learning media can provide space for educators to be more innovative and creative in providing teaching for students (Setyawan et al., 2023). This can have consequences for educators to always learn to use technology-based learning media in learning activities.

The development and use of learning media, including visual, audio, and video, as well as the use of virtual reality (VR) in learning, continues to be researched and developed. It aims to increase the effectiveness, efficiency and motivation of learners in the use of VR media. VR is a technology that allows users to interact with the environment in a virtual world simulated by a computer so that users can feel in the environment (Ultimate, 2020). With the use of VR, students will be directly involved in the learning process in the classroom by using a glasses-shaped tool called VR Glass.

Previous studies have shown that VR media teaching strategies can create active-interactive classes, teaching efficiency can be achieved, measurable material achievement levels, and the use of VR media can support material that is required for visualization, practice and limited resources (Sunarni & Budiarto, 2014). Other studies have shown that biology learning media using WebVR can work well and research respondents stated that WebVR is very easy to use, increases interest in the material presented, is more interesting and can be useful in learning (Hidayati, 2018). In addition, based on a literature review, it was found that science learning assisted by Virtual Reality can effectively improve the cognitive abilities of junior high school students in the 21st century (Wulandari et al., 2022). Therefore, researchers want to know the perception of learners regarding the usage of Virtual Reality with the theme raised "Student Perception of Use Virtual Reality Based on MilleaLab as a learning medium for geography (geosphere phenomenon material)".

Theoretical Foundation

Geography

Geography is a subject found at the Senior High School (SMA) level. Geography is the study of the earth's geosphere, which consists of layers such as the atmosphere, hydrosphere, biosphere, lithosphere and antistrosphere (SK et al., 2022).

Geosphere Phenomena: Earthquakes
1. The lithosphere, or earth's crust, is a layer of rocky soil. This layer consists of catamorphic and metamorphic. The arrangement of chemical elements found in the layers of the earth's crust is described based on analysis of mining goods (minerals) and rocks. Minerals are components of soil layers or rocks that make up the earth's crust.

2. Learning Resources (definition, categories of learning resources, types of learning resources leading to Learning Media)

   Learning is an activity that occurs to everyone without knowing the age limit and lasts a lifetime. Learning is an effort made by a person through interaction with the environment to change his behaviour (Rifai, 2017). Thus, the results of learning activities are in the form of behaviour changes in a better and more positive direction in learners.

   Learning activities can be carried out with the guidance of teaching staff or with their own efforts. Learning activities carried out with teaching staff can lead to interaction in the learning process. The quality of student interaction with learning resources is very influential on learning outcomes (Supriadi, 2015). Learning resources are various sources in the form of data, people, methods, media and places of learning used by students to facilitate learning (Samsinar, 2019). According to Rusman (2008), learning resources are divided into two categories, namely as follows (Zid & Hotimah, 2023).

   1. Learning sources by design are all resources that have been specifically developed as components of instructional systems to provide directed and formal learning facilities.

   2. Learning sources by utilization are learning resources that are not specifically designed for learning purposes, but their existence can be found, applied and utilized for learning purposes.

   Based on the above, there is an understanding that through the use and utilization of learning resources, both the categories of learning resources designed and the learning resources utilized, learning can be carried out optimally, effectively and efficiently.

Learning Media

   Learning media can be used as a means to channel messages and information on subject matter so that students can begin a learning process in order to achieve goals (Mawardi, 2018). Learning media is divided into three media: audio media, video media, and multimedia (Chaeruman, 2015). Audio media is all listening media for learning that is packaged in various storage media formats such as audio cassette, CD-ROM, MP3 and other storage media. Video media is all listening media (audiovisual) for learning that is packaged in various storage media formats.

   Meanwhile, multimedia is all learning media in which it combines various elements of media formats (text, graphics, audio, video, animation and simulation) synergistically in one whole with the help of facilities packaged in various computer-based storage media or distributed via the internet Online. The characteristics of computer-based learning media are as follows (Cahdriyana & Richardo, 2016).

   1. Learning objectives are clear.
   One of the menus displayed in computer-based learning media is the competency menu, which displays several objectives of media use. This is intended so that students know what competencies can be mastered.

   2. Material in accordance with the competencies to be achieved
   The material in computer-based media must conform to the curriculum and guide students to have the expected competencies.

   3. The concepts of the presented material are correct
   The delivery of material outlined in the form of animation or interactive simulations on computer-based learning media does not deviate from existing concepts.

   4. Explanation of the material in accordance with the thinking ability of students
The form of simulation through experiments is one way for students to be moved to learn more about the material being studied.

5. **Clear learning path**
Curriculum analysis carried out in the early stages of preparing computer-based media is intended so that the material delivered has good and correct systematics. Thus, students can find out the order of mastery of the material through the initial display of systematically arranged media.

6. **There are clear instructions.**
Computer-based media has general instructions for media use located on its initial display that can lead users to browse through each explanation of the material presented.

7. **Images, animations, text and colors are presented harmoniously, harmoniously and proportionally**
Computer-based media has achieved good visual design because of the selection of the right type and font size, the use of consistent typeface, proper spacing, the display of images presented clearly and not breaking concentration, the right combination of colors, and the consistent layout of elements in slides.

8. **Interactive**
The presentation of material in learning media requires users to conduct various experiments through the simulations presented.

9. **Easy navigation**
Each button in the learning media is designed and placed in such a way that users can easily understand it.

10. **The language used is easily understood by students**
The use of standard language does not cause double interpretation, and communication makes language in computer-based media easily understood by students.

**Virtual Reality**
Virtual reality is one of the media that can bring students to interact directly with the world of material (Fitriya et al., 2022). So, virtual reality is included in non-print learning resources that can display images, videos and objects in 3D. This is because Virtual Reality is a collection of combined hardware used to create simulations of the environment (Neelakantam & Pant, 2017). The environment used is a replica of the real environment with three-dimensional images and sound arrangements.

**Methodology**
This research is a type of qualitative description research. Descriptive analysis is carried out by explaining learners' perceptions of using of Virtual Reality millealab As a medium for learning geography (material on geosphere phenomena). The study was conducted using virtual reality media in geography subjects with geosphere phenomena, such as volcanoes. Respondents in this study amounted to 78 students consisting of class X5 as many as 28 students, class X6 as many as 26 students and class X7 as many as 24 students. Data collection instruments using questionnaires Online through Google Form. Data analysis is carried out descriptively by explaining the distribution of frequency, percentage and average of answers that have been given by respondents.

**Results and Discussion**
This research was carried out to determine students' perceptions of the use of millealab-based virtual reality as a learning medium for Geography (Geosphere Phenomena material). The data was collected by giving questionnaires to a sample of 78 students consisting of class X5 as many as 28 students, class X6 as many as 26 students and class X7 as many as 24 students. The perception indicators analyzed are ease of initial operation of the application, application content, ease of use of the application and satisfaction of user experience.
Ease of Application Initial Operation

Table 1. Questionnaire Results with Indicators: Ease of Initial Operation of the Application Adaptation of (Timothy et al., 2022)

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Totally Agree</th>
<th>Agree</th>
<th>Nervous/Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>Ease of Application Initial Operation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Students are able to download MilleaLab on personal mobile phones.</td>
<td>36</td>
<td>24</td>
<td>3</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Students are able to access VR using personal mobile phones.</td>
<td>32</td>
<td>21</td>
<td>2</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>3.</td>
<td>Students are able to access VR by borrowing other students' mobile phones.</td>
<td>36</td>
<td>37</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Students are able to run VR that has been provided by the teacher.</td>
<td>40</td>
<td>33</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>144</td>
<td>115</td>
<td>12</td>
<td>28</td>
<td>13</td>
</tr>
</tbody>
</table>

Based on Table 1, many students gave Strongly Agree (SS) opinions of 144 students on the criteria for ease of initial operation of the application. Students can easily download and access MilleaLab-based VR on their students' personal mobile phones or there are several students who access VR by borrowing other students' mobile phones. This is because students who have mobile phones with the iOS operating system do not support many illeaLab applications.

App Content

Table 2. Questionnaire Results with Indicators: Application Content Adaptation of (Timothy et al., 2022)

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Totally Agree</th>
<th>Agree</th>
<th>Nervous/Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.</td>
<td>App Content</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Students are able to understand the Volcano material that has been provided by the teacher.</td>
<td>20</td>
<td>34</td>
<td>20</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Students are able to absorb information about Volcano material displayed in VR longer.</td>
<td>18</td>
<td>34</td>
<td>18</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7.</td>
<td>Students are able to absorb information about Volcano material displayed in VR longer.</td>
<td>21</td>
<td>42</td>
<td>13</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Sum</td>
<td></td>
<td>59</td>
<td>110</td>
<td>51</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

Based on Table 2, many students gave an Agree (S) opinion of 110 students on the application content criteria. Students are able to understand Volcano material and learners are
able to absorb material information displayed in virtual reality. The use of VR applications can make it easier for students to understand the material supported by a display that describes the material being taught.

**Ease of Use of the App**

VR applications easily. (VR) media-based creation and learning platform launched in 2019 to make it easier for students to access the virtual world.

**Table 3. Questionnaire Results with Indicators: Ease of Use Application Adaptation of (Timothy et al., 2022)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Totally Agree</th>
<th>Agree</th>
<th>Nervous/Netral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Students are able to run VR applications easily.</td>
<td>30</td>
<td>30</td>
<td>12</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>9.</td>
<td>Students are able to run the display of images, videos and three-dimensional objects easily.</td>
<td>23</td>
<td>31</td>
<td>17</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Based on table 3, many students gave a Strongly Agree (SS) opinion of 30 and Agree (S) of 30 with an indicator stating that students are able to run VR applications easily. In addition, students also gave an Agree opinion (S) of 30 students with indicators stating that students are able to run applications based on 3D media and Virtual Reality (VR) in the display of images, videos and three-dimensional objects easily.

**User Experience Satisfaction**

Virtual Reality (VR), learners can have a different learning experience that is a virtual world. Through the MilleaLab application, students can learn by seeing virtually about the structure of the volcano.

**Table 4. Questionnaire Results with Indicators: User Experience Satisfaction Adaptation of (Timothy et al., 2022)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>Totally Agree</th>
<th>Agree</th>
<th>Nervous/Netral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>The application used is interesting and interactive.</td>
<td>22</td>
<td>38</td>
<td>12</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Features on the application can add insight into Volcanoes.</td>
<td>23</td>
<td>41</td>
<td>12</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

Based on table 4, students gave an Agree opinion (S) of 38 students with an indicator stating that the application used was interesting and interactive. In addition, the features used on the application can add insight into the Volcano that was declared Agree(S) by 41 learners.
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Table 5. Interval Determination

<table>
<thead>
<tr>
<th>N</th>
<th>858</th>
</tr>
</thead>
<tbody>
<tr>
<td>X Max</td>
<td>390</td>
</tr>
<tr>
<td>X Min</td>
<td>78</td>
</tr>
<tr>
<td>X Max - X Min</td>
<td>312</td>
</tr>
<tr>
<td>Interval</td>
<td>62.4</td>
</tr>
<tr>
<td>Interval Rounding</td>
<td>62</td>
</tr>
</tbody>
</table>

Strongly Agree

Table 6. Percentage determination in assessment criteria Agree

<table>
<thead>
<tr>
<th>Class</th>
<th>Class Interval</th>
<th>Percentage Deadline</th>
<th>Percentage (%)</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>78 – 140</td>
<td>36</td>
<td>11 – 36</td>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>2</td>
<td>141 – 202</td>
<td>52</td>
<td>37 – 52</td>
<td>Disagree</td>
</tr>
<tr>
<td>3</td>
<td>203 – 264</td>
<td>68</td>
<td>53 – 68</td>
<td>Nervous</td>
</tr>
<tr>
<td>4</td>
<td>265 – 326</td>
<td>84</td>
<td>69 – 84</td>
<td>Agree</td>
</tr>
<tr>
<td>5</td>
<td>327 – 390</td>
<td>100</td>
<td>85 – 100</td>
<td>Totally Agree</td>
</tr>
</tbody>
</table>

Table 7. Determination of the average percentage category based on the assessment of the indicator

<table>
<thead>
<tr>
<th>Code</th>
<th>Score Each Code</th>
<th>Total Score of Each Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4 5 6 7 8 9 10 11</td>
<td></td>
</tr>
<tr>
<td>STS</td>
<td>1 5 7 1 0 1 2 1 0 1 0</td>
<td></td>
</tr>
<tr>
<td>TS</td>
<td>2 20 32 2 2 6 12 2 12 12 4</td>
<td></td>
</tr>
<tr>
<td>RR</td>
<td>3 9 6 9 12 60 54 39 36 51 36</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>4 96 84 148 132 136 136 168 120 124 152 164</td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>5 180 160 180 200 100 90 105 150 115 110 115</td>
<td></td>
</tr>
</tbody>
</table>

Number of Scores 310 289 340 346 303 294 315 318 303 309 319
Max Score 390 390 390 390 390 390 390 390 390 390 390
Percentage 79 74 87 89 78 75 81 82 78 79 82
Category S S SS SS S S S S S S

Average Percentage 80

Based on table 7, the average percentage of the overall score based on student perception assessment indicators is 80 with the category Agree. Thus, it can be concluded that students' perceptions of the use of MilleaLab-based virtual reality as a learning medium for Geography with Geosphere Phenomena: Volcanoes material are agreed. Students get ease in the initial
operation and use of the application, ease of accessing and learning the material taught in the MilleaLab application in 3D and virtual reality and students get a virtual experience to enjoy the display presented and add insight into the volcano.

So, students can interact with the environment in a virtual world simulated by computers and students can feel in the environment. This is also in line with previous research stating that the use of Virtual Reality can provide excellent benefits for students to provide new knowledge about technological developments, provide encouragement and motivation to students to learn various sciences and be more familiar with technology and its application in everyday life (Permana et al., 2022).

Conclusion

In the 21st century, educators must be ready to face the 4.0 era. Readiness in the 4.0 era is shown by the ability of educators to use ICT in learning. This need is based on the consideration that learning using real or concrete media will increase the interest of students in learning and can make it easier for students to understand the material taught. Thus, learning media is required to always develop following the current era and educators as operators are required to master learning media. The use of technology-based learning media can provide space for educators to be more innovative and creative in providing teaching for students. This can have consequences for educators to always learn to use technology-based learning media in learning activities. The development and use of learning media visually, audio and video to the use of Virtual Reality (VR) in learning continues to be researched and developed. It aims to increase the effectiveness, efficiency and motivation of learners in the use of VR media. With the use of VR, students will be directly involved in the learning process in the classroom by using a glasses-shaped tool called VR Glass. Based on the research and discussion that has been described, the average percentage of the overall score based on student perception assessment indicators is 80 with the category Agree. Thus, it can be concluded that students agree and acknowledge the use of virtual reality based on MilleaLab as a learning medium for Geography with Geosphere Phenomena: Volcanoes. Students can interact with the environment in a virtual world simulated by computers and students can feel in that environment.

Bibliography


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Education: E-Science, 3(2). https://doi.org/https://doi.org/10.36312/e-saintika.v3i2.126
Ultimate, D. S. (2020). The Effectiveness of Virtual Reality and Augmented Reality Media on the Learning Outcomes of Grade IV Science Students at SDN MLATIHARJO 01 SEMARANG. Semarang State University.
https://doi.org/https://doi.org/10.35134/jmi.v29i1.90
https://doi.org/https://doi.org/10.32585/edudikara.v2i2.41
https://doi.org/https://doi.org/10.26877/jipmat.v7i1.9950