

The use of google earth as the learning media in geosciences education

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Abstract. In studying geosciences, students sometimes face some problems because occasionally they are not able to visualize the earth in their minds. This difficulty is increasingly moreover, if it concerns the distance and height of the topography of the earth, as well as the earth and its relationship to all aspects of life. In this study, the use of google earth as the learning media has been examined to help students understanding in learning geosciences. Students were given guidelines of google earth usage and then students were asked to create a mini project in terms of using of google earth. After that students were given a questioner that is questioned about understanding of the learned material with the help of google earth. The results show that almost all students are fully aware of what they are doing. They also gave an average score of 3.8 (scale 4) in terms of the google earth utilities in learning geosciences. It can be concluded that google earth is able to provide a deeper understanding to the students in studying the concept of physics of earth.

Keywords: *Google Erath, Geosciences, Learning Media.*

1 Introduction

In the learning process of earth sciences, students sometimes have difficulty in understanding some of the physical concept of the earth, such as the sea floor spreading concepts, how the mountain developed, subduction of oceanic plates beneath the continental plate and so many others. The problem is even increased when students are required to do a work on a mini project such as an analysis of hydroelectric generating sites in relation to the water resources collection zone and the resulting impacts on the electric power. In making this mini project, without the existence of a media that illustrates the existence of the earth in the process of making this mini project, of course students will have difficulty to do it. Thus the students need to be given a media that can visualize the earth in the learning process and also on the process of making the mini project.

Besides the real experiment in the learning process (Islami, 2017; Gusmida et al., 2017; Gusmida et al., 2016) and the method of learning model

(Tranminingsih et al., 2017; Fathurrahmah et al., 2017; Saragih et al., 2017; Apriani et al., 2017), the media is also helping in increasing the understanding of students (Edwana et al., 2017; Maisyaroh et al., 2017). To bring the earth media in the learning process, not apart from the requirements of the media presented, the media can explore a distance between two locations (Islami 2017), the height of a location, the experiencing on a real visualization and can be visualized from any angle. The media means in this context is Google Earth

Google Earth is easy to use and presents, in a visual geospatial context, a great deal of information that applies to topics that are addressed in geoscience courses and many other educational settings. By offering the ability to place this information in combination on a three-dimensional model of the Earth, it can facilitate understanding of the Earth system and the many subject areas that comprise it, ranging from natural sciences to social sciences, history, art, engineering and any other topic that has a geographic component. Information that can be displayed on Google Earth includes aerial and satellite imagery, the numerous layers offered by Google's database, and a huge amount of third-party data made available by the Google Earth Community and on other web sites.

With Google Earth, students can browse casually on their own or engage in structured inquiry-based explorations individually or in teams. Since Google Earth is available to download for free for all the major operating systems, students can use it in school as well as for homework or fun. They can easily create their own data and save the information in KMZ data files, or as saved images for incorporation into oral presentations or reports. This data can be rendered on maps in combination with any other data made available to the students.

In addition to its educational utility, Google Earth is a great research tool. The imagery itself contains a great deal of information about the natural landscape and human infrastructure on the Earth's surface. The constantly growing Street View layer adds dimensionality to this imagery by offering a dense array of 360° panoramic photographs for many cities, towns, and other places around the world. The terrain and 3D Buildings layers also contribute information to the three-dimensional Google Earth experience. The other Google Earth layers offer a wealth of additional geographic information. Many web sites, including the Google Earth Community, offer data designed specifically for use in Google Earth. There are also much data, including imagery and vector data that can be adapted for use in Google Earth even though it was not created for that purpose.

In this research, the use of google earth in the learning geosciences is examined by looking the result of some projects assigned to the student.

Through this research, the understanding of student in the certain topics are expected improved after using the google earth in the learning process.

2. Methodology

This research was conducted in Physics Education Study Program, University of Riau in March to June 2017. This study was involving students who take the Advanced Earth Physics course. In this course, one of the tasks given to students is related to this research material. In the first four weeks, students were given lecture about these concepts, then after that students were given explanation and demonstration of the use of google earth. After students know the use of google earth, students are required to work on mini projects that deal directly with the lecture material in the first four weeks. The tasks are:

1. Observing the coordinate system of the earth and check the coordinates of several cities. In this task, students were asked to explore earth navigation system consisting of Latitude and Longitude. Students are also asked to find a position of 0^0 longitude that is located in the city of Greenwich.
2. Checking the distance of two cities by knowing the coordinates of each location manually and comparing with the distance calculated by google earth.
3. Visualizing the earth rotation and the solar lighting system from time to time so that the students understand about the change of the different night or day entries differently each time periodically. Through this task students are expected to understand why dawning and rising sun always change periodically
4. Viewing elevation of certain locations. This task is part of understanding the project mini tasks that will be assigned to students later on.
5. Documenting the subduction profile by looking at the elevation of a line that cuts off the Sumatra Island. By doing this task, students will understand the shape of the cross-section of the earth, subduction, sea floor spreading and so on.
6. Proposing a location of hydropower dam by analysing the possibility of water input, puddle area and the amount of electric energy generated

After the assignment is collected, students were asked to fill in some questioners related to their level of understanding and aptitude towards google earth. The question were following: Google earth can be understood easily; Google earth can help to determine the distance of two location properly; Google earth can determine the direction from a location to others properly; Google earth can be used to determine the certain area; Google earth can be used to determine an elevation of a point; Google earth can be used to determine the plate boundary; Google earth can be used to determine the possibility of rock types.

3. Results and Discussion

Task 1. Observing coordinates system. Figure 1. shows a snapshot of google earth with the grid lines of latitude and longitude. This figure and other figures of the google earth snapshot are obtained directly from the student task. In this figure, the line shows the latitude and longitude coordinate of the earth system.



Figure 1. Visualization of earth coordinate system and position of Greenwich.

Task 2. Checking a distance. In this task, the students were required to measure some location to others location. Figure 2. Shows the distance from Pekanbaru to Jakarta in the straight line. When the student calculated it using mathematic method, the different just less than 1%. It means calculation of the student can be said true.

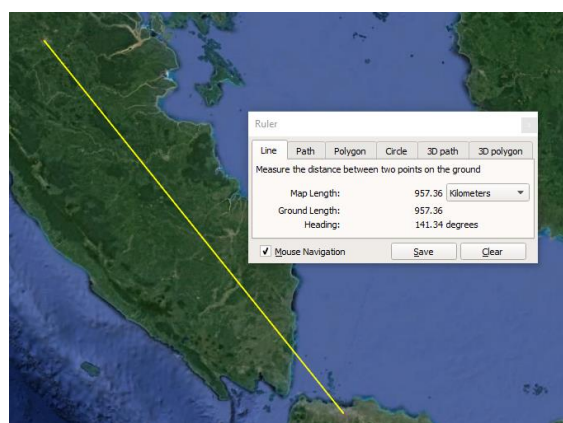


Figure 2. Showing the distance between Pekanbaru and Jakarta

Task 3. Visualizing the earth rotation. In this task, besides to visualize the earth rotation, student are also required to include the sunlight in the visualization. Through the position of sunlight, student will easily understand to capture why the time of sunset and sunrise is different time to

time periodically. After doing this task, student more confident to explain why the phenomenon occur.

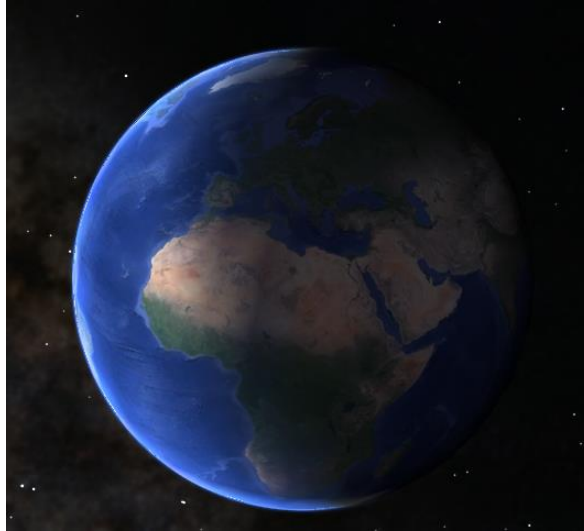


Figure 3. Exploration of earth rotation.

Task 4. Viewing elevation of certain locations

Some locations have been selected in order to do this task. Student were given the favourite location including the Merapi Mount in Sumatera Barat, the depth of Malaka Strait and many other. Figure 4 shows the elevation of Merapi Mount in Sumatera Barat, the bigger pointer is indicating position where the elevation obtained, whilst the smaller pointer shows the value of elevation.

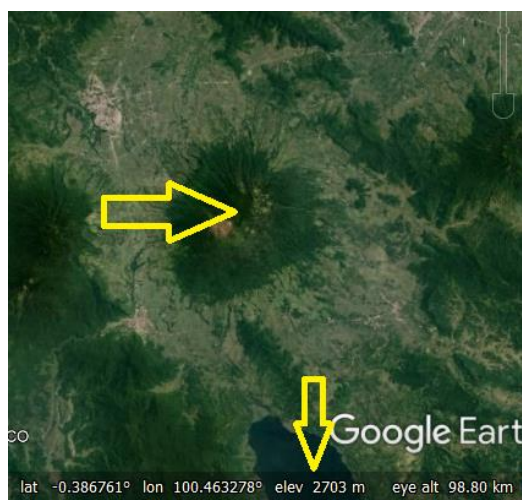


Figure 4. Checking elevation of Merapi Mount in Sumatera Barat

Task 5. Making a cross section.

Making a cross section is a very important part in this course. Sometime student do not understand when a lecturer mention about the cross section in the subduction zone. Cross section can image the thing from the side so that everything will be visualized properly as it is viewed from the side. Figure 5 shows the cross section of topography Sumatra Island through the Mentawai Island.

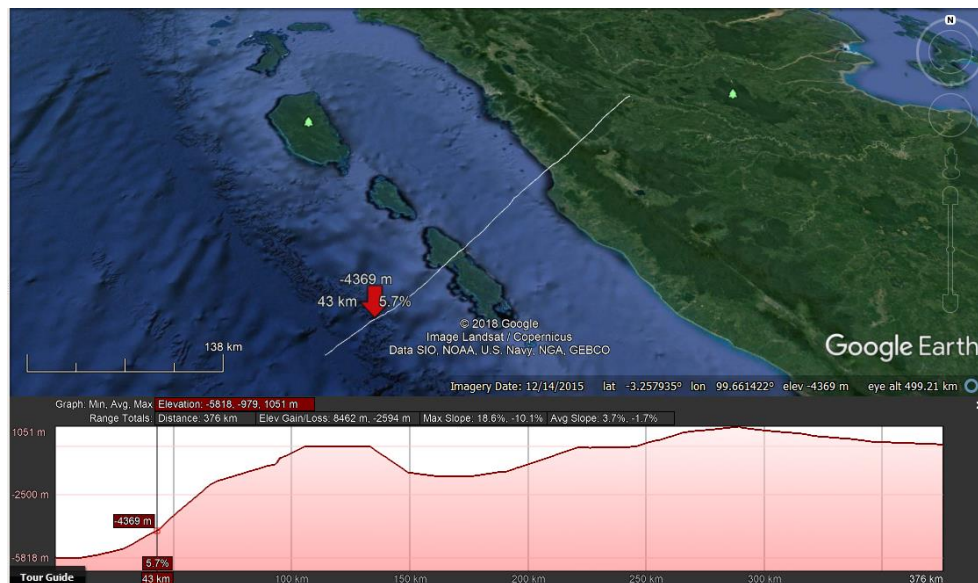


Figure 5. Topography cross section of western part Sumatra Island.

Task 6. Mini project

In this task, student are required to apply all the previous tasks and combine with their knowledge that have been thought in the previous lectures. The result of the task is very satisfied, which 78% students can do it perfectly.

At the submission time of task 6, student are also submitting the questioner that asking about their mastering of topic through the google earth usage. Student should give a mark for each questions with 4 scale, which 1 is strongly not agree, 2 is not agree, 3 is agree and 4 is very agree. After calculating all the answers, it is produced an average of 3.8 derived from total of 62 students. This value is also matched when it is compared to the result of mini project where mostly students can do it perfectly.

4. Conclusion

Google Earth gives students more insight into the study of earth science. This can be seen from the result of the assignment given to the students. By using google earth as a learning media, students shows better understand of the process occurs on the earth. Students are able to understand the

coordinate system, impact of rotation and tilting of rotation axis, distance calculation, making a cross section and also in doing mini project which must integrate several sciences to produce this hydropower project. With this task, students are more confident in providing an explanation of something that concerns the science of earth. It is recommended that all the earth science that has the character of the navigation needs of the location can also use google earth for the learning in the classroom.

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