Research Article

Student Perceptions of Web-based Virtual Tour Application Development for Learning Biodiversity

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Abstract.
The development of learning using virtual applications has now been widely developed to be able to help students understand material about biology. This web-based virtual tour application was developed based on the need for information on biodiversity potential nearby. Student perception is determined by feasibility, content, and aesthetics. The application development method uses the waterfall method with the communication, planning, modeling, construction, deployment, and maintenance sequences. Each stage of development provides an overview of the stages of each process in developing the device. Overall, the devices gave me a very good perception of students. The web-based virtual tour application provides clarity, material content, and aesthetics for biology learning on biodiversity material. The information contained in the application is very helpful in obtaining data on potential local diversity. However, its use still has obstacles, especially a stable internet connection.

Keywords: virtual tour, biodiversity, student perceptions

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1. INTRODUCTION

Technological advances in the modern era that occur today go hand in hand with the development of existing learning. These developments affect various education systems so that they transform into something new and are very important in improving the quality of education (1). Virtual technology, part of today's technological developments, has been widely used in learning. Biology learning has also developed following current progress; it can be a set of virtual media currently widely used in biology learning related to learning inside and outside the classroom. In classroom learning related to learning in the laboratory, such as cell concepts, virology, genetics, microbiology, cell culture and molecular biology which are designed so that students can develop knowledge and skills about the concepts learned (2–4). While learning outside the classroom, virtual

technology can be used for virtual experiences and the simulation of ecological models, which can reach and cover a wider spatial scale (5). This virtual technology can also be used in learning related to biodiversity. Learning the concept of biodiversity requires in-situ learning, namely by conducting direct observation activities in the field (6). to study biodiversity can be done in various places, both natural and artificial ecosystems in schools and external environments such as mountains (7). Learning biodiversity within a short time outside the classroom makes the information obtained incomplete, especially related to animal diversity. Animals with a dynamic nature are sometimes difficult to find at any given time. Some plants also grow and flower in certain seasons, so sometimes what can be obtained is less than optimal.

Tasikmalaya, there is an area that has high biodiversity, namely Mount Galunggung. Research on the biodiversity of Mount Galunggung has been carried out; it is related to plant biodiversity such as orchids, ferns and other vegetation, then about animals such as herpetofauna, avifauna, spiders, ichthyofauna and other animals, in addition to research on fungi (8–17). Information about biodiversity that has been recorded is a potential that can be used as a source of learning and learning. In addition, the place is also one of the outdoor laboratories commonly used by students from various regions, including students of Siliwangi University.

Before carrying out observation activities in the field, students need to be equipped not only concerning the content of the material to be studied but information on the conditions of the observation location is also important. Initial observations that can be made using 360^o-based virtual technology can overcome the problem of limited space and time (18). Virtual technology based on biodiversity currently needs to be widely created. This technology is often made for indoor-based tour activities such as museums and laboratories (19–21). Therefore, this technology can still be developed into various forms: learning outside the classroom. In order to be used to provide an understanding of biodiversity, this technology is created by providing information about it. This website-based virtual technology was developed based on these needs. The website can be easily used on computer devices or devices today. Website-based learning is also quite effective in improving academic performance for students (22). Therefore, for the technology to be better, it takes students' perceptions and opinions on using these devices. The potential possessed by virtual technology can improve learning and training for students (23). Students, as targets in developing this virtual technology, can provide feedback on what they have gotten. This study aims to see students' perceptions of the development of website-based virtual technology that can

be used as information in studying the biodiversity of local potential in the Galunggung mountain area.

2. METHOD

The application development method uses the waterfall method with the Communication, Planning, Modelling, construction, Deployment, and maintenance sequence. Each stage of development provides an overview of the stages of each process in developing the device. This method is called waterfall because step-by-step is carried out in accordance with the completion of each stage, as shown in Figure 1 (24).

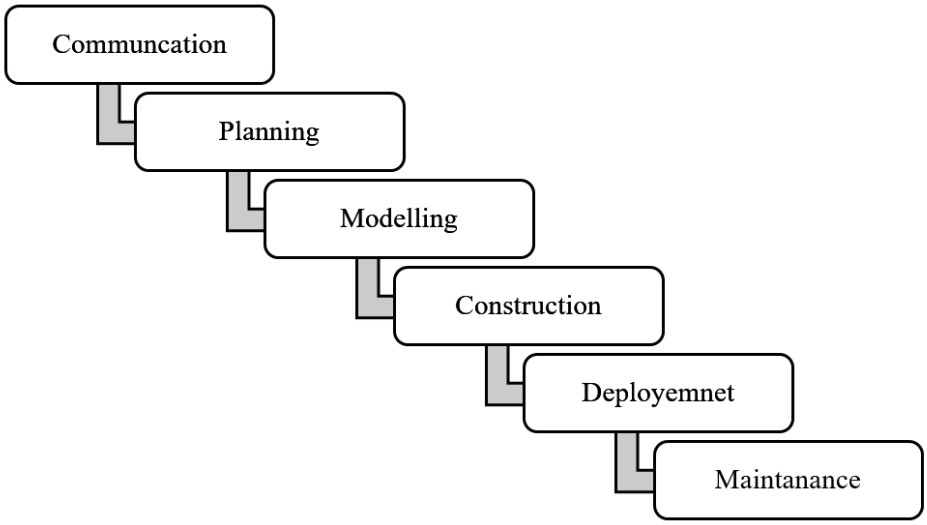

Figure 1: Waterfall method in application development.

Communication, at this stage, is the initiation stage, where the virtual technology developed is discussed based on the needs in learning biodiversity with teachers in schools. Planning at this stage, make plans related to the virtual technology to be created, the location of 360 shooting and what biodiversity information data has been found. Modelling, at this stage, makes a design from the results of the data collected at the planning stage, then continues with the location and inventory of what biodiversity data is included in the program. At this stage, it is also developed using JavaScript programming language.

Construction, at this stage, is the combination and creation of website-based virtual technology. The 360-figure data was combined with photographs and descriptions of animal and plant species found. Deployment, at this stage, is part of looking at how students and teachers perceive the use of devices. Maintenance, at this stage, is a

stage of improvement to input from students on virtual tour technology that has been made. Improvements were also made to develop this virtual technology with other databases, such as specifically for Android devices or offline-based use on personal computers.

2.1. Data collection and analysis techniques

Data collection techniques carried out with a questionnaire of 8 questions. The questionnaire used was based on students' perception of the use of virtual web-based applications, which were related to self-efficacy in information literacy (25,26). Statements related to Virtual Tour technology, such as information presentation, interest, interesting ideas, providing new information, existing visuals, program effectiveness, ease, and image clarity. The questionnaire was given to 59 high school students located not too far from the area in the website-based virtual tour technology, namely the Galunggung mountain area, Tasikmalaya.

3. RESULTS AND DISCUSSIONS

The virtual tour website application for biodiversity learning has been made based on needs and developed based on the potential in the Galunggung mountain area. The application contains 360 images or images that can be viewed in 360 degrees (Figure 2a), which are combined with photos of flora and fauna found in the area (Figure 2b and 2c). Information for this website application can be accessed at the address: https://vtgallungung.com. Fauna data information is taken from the results of previous research that has been carried out in the Galunggung area, including herpetofauna (14), birds (16), insects (8), spiders (27), butterflies (28), and other field identification data (29). For flora data found also such as moss (30), orchids(12), pitcher plants(30) and etc are the results of research that has been done. The following is a picture of the virtual tour website that has been created:

In the picture, students can not only see potential locations in the Galunggung mountain area but also can see species information contained in it. The use of virtual technology is well-accepted to improve the place information, motivation and interest of learners (31).

Figure 2 shows that the highest response was students' interest in virtual tour technology, with a score (4.59). This can be seen in the enthusiasm of students when

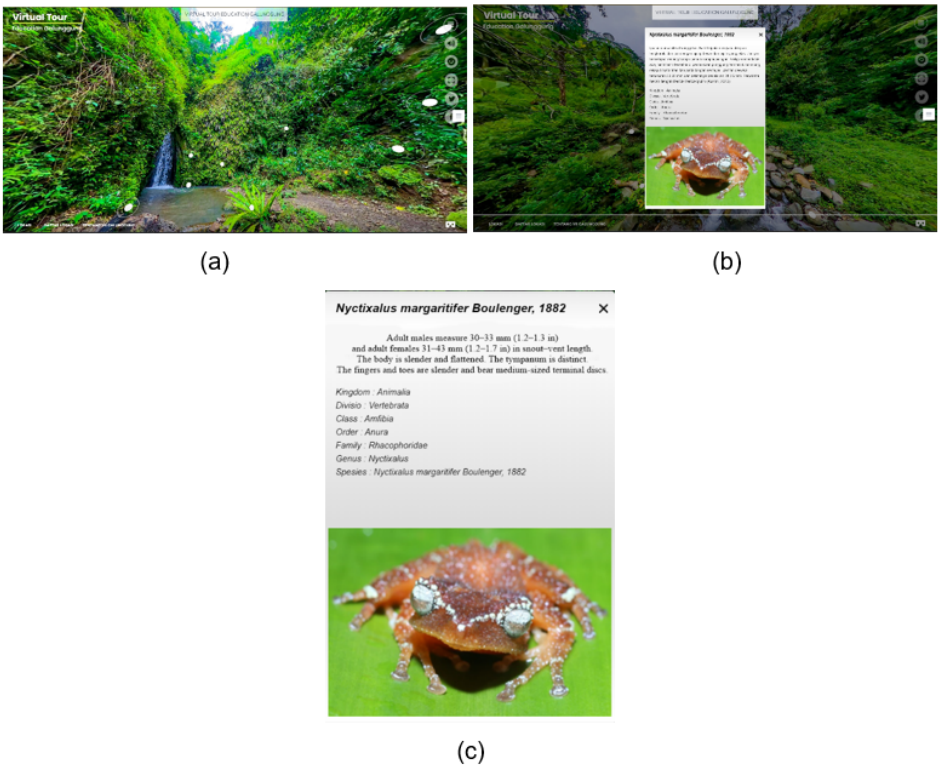

Figure 2: (a) Photo 360 of one of the locations of Mount Galunggung area (b) one of the information obtained in it (c) a picture description of one of the species contained in the virtual tour application.

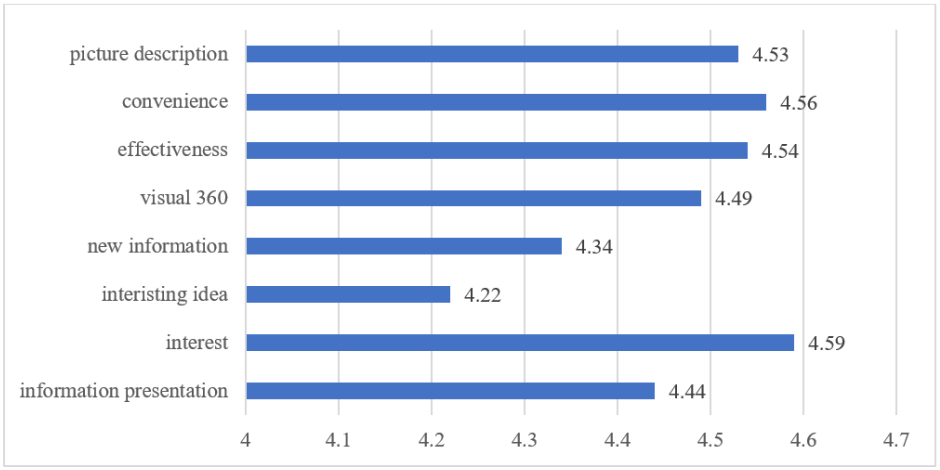

Figure 3: Results of students' perceptions of the use of virtual tours.

they just use the virtual tour application; students feel interested because the application is also a new thing for them. In the picture, the lowest score is an interesting idea, with a score of 4.22. This shows that the use of virtual tour applications has not been able to provide information that makes new ideas for students because all programs and so on have been designed and designed so that they cannot be changed by students.

The average excitement score of 4.46 is closer to the maximum approval score on the Likert scale.

Based on the results of the research, the Virtual Tour application for biodiversity learning is ready to be used. This application has great potential to provide information on biodiversity in nature by providing different experiences contained in it. Virtual technology, in the teacher's view, is also very interesting. The virtual technology teacher's point of view is one of the learning tools that are efficient in increasing student attention and can contribute to improving learning outcomes (32), so this virtual tour application has the potential for further studies to be carried out in improving learning outcomes and student motivation in learning biodiversity.

Students also feel interested in studying biodiversity because this application provides information on the potential of the Galunggung mountain area, which can be seen in 360. Mount Galunggung is one of the tours in Tasikmalaya Regency that relies on nature-based tourism. For teachers in the field of biology, this is also a potential to teach students directly. However, the use of this virtual tour can be used as initial information about this potential. So that students can explore other information by doing direct experience so that learning becomes more meaningful. Based on students' perceptions, the ease of use of this virtual tour is also expected to inspire students to learn more about biodiversity in nature. Learning in direct nature can also have a positive impact, which can affect creativity because nature calms and relaxes (33).

It's just that based on discussions with teachers and students, a stable internet connection and sufficient device and computer specifications are needed so that they can be smoothly used. Some other disadvantages of virtual learning like this include virtual learning not providing a full reflection of the learning experience in the real world; the use of virtual technology that is still realistically simple and close; lack of cooperation and communication in virtual learning (34). Therefore, this virtual application can still be developed for other platforms that are not only website-based, for example, platforms on Android or personal computers that can be used without the need for an internet connection.

Overall, the devices made get a very good perception from students. The web-based virtual tour application provides clarity, material content and excellent aesthetics for use in biology learning on biodiversity material. The information contained in the application is very helpful in obtaining data on local potential diversity. But in its use, there are still obstacles, especially a stable internet connection when using.

4. CONCLUSION

Web-based virtual tour applications for biodiversity learning can already be used. The perception of the application received a positive response from students; this can be seen from the overall average of getting a score of 4.46 which is close to the lift very agree on the scale used. Students also have a high interest in using the application; this is expected to increase student motivation, interest and understanding of learning biodiversity.

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