



The Effectiveness of Biodiversity on Mount Ungaran Central Java Electronic Encyclopedia as Learning Resources in The Pandemic Era

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Article history	Abstract
Submission : 2021-12-28	This study aims to determine the effectiveness of the Biodiversity on Mount Ungaran electronic encyclopedia in learning Biology in the Covid-19 Pandemic Era. The research design used was one group pretest-posttest design. The instrument used was about thinking skills. The sample in this study was 34 public school students in Central Java. The instrument used was a test of learning outcomes with 35 questions. Data were analyzed using the N-Gain test and Paired Sample t-test. The percentage analysis was used to see students' responses to the e-encyclopedia used during the learning process. Google classroom and google meet were used in the learning process. The data analysis showed that the N-Gain result was 0.625 with a classical completeness value of 94.11%. The t-test results showed a significant difference in the pretest and post-test data with a significant value of <0.05. In addition, the response of students tested on a small scale obtained 76.90% in the high category. Therefore, the effectiveness of the electronic encyclopedia of biodiversity on Mount Ungaran was moderate.
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1. INTRODUCTION

The industrial revolution 4.0 is currently a challenge for education in Indonesia. One of these challenges is the use of technology in life. The world of education cannot be separated from the use of technology in learning. The Covid-19 pandemic has limited all aspects of life. There has been a big change for teachers and students in the teaching and learning process. Distance learning needs to be used as an effort to overcome the spread of the Covid-19 virus. The implementation of learning process is carried out online or with a learning management system (LMS) (Sobaih et al., 2020). Distance learning allows teachers and students to use online or digital platforms as tools to drive the learning process.

Online learning has several notable things to prepare, namely supporting facilities and developing learning materials, especially the development of learning resources (Kebritchi et al., 2017). Selecting the right learning resources will make online learning more attractive. In addition, learning resources must be well-prepared so that they can attract students' attention to study. The unique and well-prepared learning resources will greatly affect the content suitability with the competencies to be achieved. The electronic <https://jurnal.unimus.ac.id/index.php/JPKIMIA/index>

learning used can provide opportunities for students to learn more flexibly (Dhawan, 2020; Sobaih et al., 2020). With the challenges and problems occurring today, online learning can improve the learning process for students (Coman et al., 2020). The learning success can be seen from a learning process and the method used (Nadeak, 2020), in this case, the use of e-learning in the learning process. The development of online-based teaching materials can improve students' scientific literacy skills (Fadhilah A. & Haryani, 2021).

Currently, the use of learning resources in schools is still using a general textbook worksheets and PowerPoint presentations (Setyorini et al., 2021). Thus, the material studied is limited to a general description of biodiversity in Indonesia. Meanwhile, each region has its biodiversity potential.

The need for electronic and online learning resources is increasing rapidly during this pandemic era of Covid-19 (Abidah et al., 2020). Nowadays, there are many types of research in developing electronic media, such as books, modules, applications, and websites that facilitate better self-study for students at home. Therefore, this research focuses on determining the effectiveness of the electronic encyclopedia as a learning resource in the learning process.

An electronic encyclopedia is used as a learning resource on a biodiversity topic. The development of learning resources in the form of electronic encyclopedias based on local potential needs to be carried out. The electronic encyclopedia supports the needs of students by providing actual pictures and explanations related to the concept of biodiversity on Mount Ungaran. An electronic encyclopedia as a learning resource for biodiversity material is designed attractively with images, colors, and easy-to-understand language. Interesting learning resources can attract students' motivation to learn which will result in the increase in learning outcomes (Noviar, 2016). Based on the problems mentioned, this study aims to analyze the effectiveness of using the electronic encyclopedia of Mount Ungaran biodiversity learning resources in learning in the Covid-19 Pandemic Era.

Mount Ungaran has a fairly wealth of biodiversity, including flora and fauna with various types of medicinal plants, protected wild fauna, and distinctive flora (Rahayuningsih et al., 2017). Mount Ungaran is a place or habitat for flora and fauna. Based on previous research, 177 species of birds, 45 species of dragonflies, 62 species of butterflies, 57 herpetofauna, 17 species of mammals, and 366 species of flora, including several types of orchids (Utami R.N. et al., 2018). The biodiversity of Mount Ungaran is used as a supplemental learning resource in the learning process in the classroom. Learning resources that have been developed include the Herbarium, Fotonovela and cards education (Edu Card) in Mount Ungaran (Lintang & Rahayuningsih, 2017; Mualimaturochmah et al., 2020; Muktisari et al., 2017). Learning resources are utilized in the learning process in the class. However, it has not yet been developed to an electronic encyclopedia.

2. METHOD

The research design used was one group pretest-posttest design. This research was conducted virtually in a high school in Central Java from August to October 2020. The research subjects were 34 students in 10th grade. Before testing the effectiveness of an electronic encyclopedia, validation was first done. Two validators performed the validation. One expert assessed the feasibility of the material content and media experts. The validity analysis results were employed to improve the e-encyclopedia that had been repaired and tested on students. If the validation results reached 61%, the product was declared valid and could be continued with the effectiveness test. Meanwhile, the readability and difficulty test data were analyzed descriptively by reviewing the results of student responses. Student questionnaire responses were used to measure students' opinions about the electronic encyclopedia used in online learning. The instruments used were questionnaire sheets for electronic encyclopedia validation by the material and media experts. Indicators of the validation material include assessment as feasibility content material and suitability with the objectives and basic competencies in learning. In addition, conformity with the Indonesian language use and traceability in the unity of the problem. The assessment aspect of media validation is the aspect of the display with the suitability of image quality, color, and form of writing. The usability aspect is also an assessment, including the products utilization for teachers and students in the online learning process. This electronic encyclopedia product can be useful in conservation efforts for the Mount Ungaran environment. Pre-test and Post-test item sheets and student response questionnaire sheets. The item was used to pretest and posttest as the same but with different numbers. The indicators of the pre-test and post-test questions developed by identifying differences in diversity at the level of genes, species, and ecosystems through observation activities in the surrounding environment,

expressing the type of ecosystem in the ecosystems diversity with both abiotic and biotic characteristics, presenting the wealth of flora and fauna of Indonesia, explaining the distribution of biodiversity in Indonesia, linking biodiversity in Indonesia with its functions and benefits, analyzing the causes of the loss of biodiversity, identifying threats to the sustainability of various Indonesian animals and plants, and proposing efforts to conserve (conservation) living natural resources communicated in many forms of information media. Data collection techniques were questionnaires, observations, and interviews. The data were analyzed using Percentage, N-Gain, and t-test to see the relationship between the data.

3. RESULTS AND DISCUSSION

The results of the validator assessment on the electronic encyclopedia Biodiversity Mount Ungaran are presented with two validator content and media. The results of expert validators were averaged so that the validation results on the electronic encyclopedia of Mount Ungaran biodiversity of 93.83 were very valid for use in classroom learning.

The value of students' cognition can be seen in detail at the comparison of the pre-test and post-test data as shown in Table 1. Students' cognitive can be assisted using 35 items of multiple-choice questions.

Table 1. The Mean Results of *N-Gain* Test

Class	<i>Pre-Test</i>	<i>Post-Test</i>	Classical		
			Completeness (%)	<i>N-Gain</i>	<i>Criteria N-Gain</i>
X IPA 1	56.0	83.5	94.11	0.625	Medium

Based on the analysis of the students cognitive learning outcomes, it is found that the utilization of electronic encyclopedia of biodiversity on Mount Ungaran as learning resources results in an increase in the student learning outcomes. The mean result of post-test score was 83.5. This value has reached the minimum criteria of mastery learning at school. Products developed are categorized as "*Effective*." Data *N-gain* value in class X IPA1 showed an increase in understanding or mastering of concepts with a value of 0.625 in the medium category.

The assessment of learning outcomes pretest and posttest was used to see the difference between the two data. The analysis used was Paired Sample t-test with a significance of 0.000, less than a significant level of 0.05. This means that there is a significant difference between the average values before and after treatment. Based on these data, it can be concluded that there is an increase in the experimental class learning outcomes from pretest to post-test.

The results of student psychomotor learning can be known using the observation sheet instrument on the creativity of making videos. A total of 34 students were observed to determine their psychomotor value. The results of psychomotor scores are briefly presented in Table 2.

Table 2. Student Learning Outcomes on Psychomotor Aspects

Aspects Psychomotor	Learning Outcomes	Criteria
Presentation	83.08	Very Skillful
Skilled Use of Language	77.94	Skilled
Creativity Video creation	75.73	Skilled
Video accuracy with Material Concept	81.61	Skilled
Average	79.60	Skilled
Classical Completeness (%)	85.29	Completed

Classical completeness of psychomotor learning outcomes exceeds 75% with skilled criteria. All aspects assessed have fulfilled the skill criteria, although there is one aspect that receives a percentage of 85.29% with the category "*Very Skilled*."

Student responses to the utilization of Mount Ungaran biodiversity product showed a high

category, as described in Table 3. All aspects of the assessment on a small-scale trial on students received a high category with a percentage of 76.90%. All aspects received a percentage above 70%.

Table 3. Student Response Test

Aspects Assessed	Average Student Assessment (%)	Criteria
Media Display	78.50	High
Material	75.67	High
Language	77.75	High
Quality e-encyclopedia	75.67	High
Rating Average	76.90	High

The electronic encyclopedia contains an explanation of the specific biodiversity of Mount Ungaran. This information can provide knowledge for students that have not been studied before. The biodiversity of Mount Ungaran is presented according to the needs of students, making it easy to understand. The electronic encyclopedia is structured on the principles of technology and engineering. This can be seen in the final product. The encyclopedia electronic looks interesting by displaying images based on examples of biodiversity in the Mount Ungaran environment. The encyclopedia learning resource is designed using an electronic system, so students are more flexible and practical. The utilization of encyclopedias that using technology is not hampered by time and place (Hasanah et al., 2019). The encyclopedia is easy to use, practical, and easy to carry anywhere (Arafah et al., 2012).



Figure 1. Display as Product Electronic Encyclopedia of Biodiversity on Mount Ungaran

The electronic encyclopedia of biodiversity on Mount Ungaran has an attraction, namely the graphic component includes cover design and content. The cover shows the diversity of flora and fauna on Mount Ungaran with the environmental conditions. It makes the cover representative of the contents of the developed electronic encyclopedia. Learning materials are easier for students to learn since they contain attractive pictures in their learning resources (Rahmatih et al., 2017)

Learning resources in the form of electronic encyclopedias of Mount Ungaran biodiversity can improve students' cognitive outcomes because it meets classical mastery of learning outcomes. Learning resources are arranged according to the necessities and basic competencies of students, namely 32 students can analyze various biodiversity in Indonesia along with threats and conservation efforts carried out in daily life. The electronic encyclopedia contains information on gene-level biodiversity along with a variety of interesting *Chrysanthemum* flowers. Species-level biodiversity shows information with pictures of the types of *Orchidaceae* (*Orchids*) and *Aves* (Birds) obtained directly from nature. The biodiversity ecosystem explains various natural and artificial ecosystems found on Mount Ungaran along with their biotic and abiotic characteristics.

Learning resources are arranged according to students' needs and basic competencies, namely KD 4.2, which presents the results of observations of various levels of biodiversity and proposed conservation efforts. Aspect psychomotor learning outcomes of all students have reached the minimum standard of completeness, with classical completeness of 88.23% in the very skilled category. Furthermore, relate these phenomena in everyday life which are arranged in the form of individual videos. The learning involves students observing phenomena that preserve biodiversity in Indonesia by observing the electronic encyclopedia. Students' skills in using technology can affect student activity in the learning process (Yulianti et al., 2020).

Mount Ungaran's electronic encyclopedia of biodiversity is a learning resource designed to support the learning process of biodiversity material. Electronic encyclopedia learning resources have advantages in design and content. Content is contextual because it is developed from the local potential that exists in the environment around students. Contextual learning in the surrounding environment can increase student activities, scientific literacy learning outcomes, process skills, and scientific attitudes (Dwianto et al., 2017; Setiawan et al., 2017; Sunarsih et al., 2020). The diversity of local potential-based learning resources is effective in the learning process (Masduki & Kurniasih, 2019).

4. CONCLUSION

Based on the results of research and discussion, the e-encyclopedia of Mount Ungaran biodiversity was categorized effectively as a source of learning biology in the era of the Covid-19 pandemic, with a medium category. The N-Gain result was 0.625, with a classical completeness value of 94.11%. Based on the t-test showed a significant difference between the pretest and post-test data with a significance value of <0.05 . In addition, the response of students tested on a small scale obtained 76.90% in the high category. Further research should be developed in the form of interactive application through smartphones so that it can be used anytime and anywhere. In addition, further research is needed to examine the effectiveness of using universal learning resources so that they can be used by all schools.

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