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Analysis of the Potential of Citizen Science Projects In Supporting Biodiversity Learning

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ABSTRACT

Conservation actions for biodiversity in Indonesia are significant to carry out. Action is needed to integrate local communities in learning to support conservation. Therefore, it is essential to analyze the potential of citizen science projects in studying biodiversity. This research aims to provide an overview of the potential of citizen science projects and the conditions for learning about biodiversity in schools. The research is classified as descriptive qualitative. Data collection techniques using random sampling and data collection using interviews, distributing questionnaires, and literature studies. The results obtained show that citizen science projects have great potential in supporting biodiversity learning in Indonesia. Students and teachers agree to support citizen science project innovation in meaningful and enjoyable learning.

Keywords: citizen science project, biodiversity, learning.

INTRODUCTION

Indonesia has abundant natural resource wealth. This is in line with the evaluation results of the Indonesia Biodiversity Strategy and Action Plan (IBSAP) 2003-2020, which gave Indonesia the nickname of one of the most mega biodiversity countries in the world. This condition is supported by Indonesia's diverse geography, making it a living niche for flora and fauna. Not only that, Indonesia is also rich in endemic plants and animals. This makes Indonesia unique with its potential. However, Indonesia's wealth must be commensurate with the conservation measures. As a result, much of Indonesia's flora and fauna were damaged and even became extinct before they were identified. Various efforts have been made to strengthen this issue in schools by studying Biodiversity in high school biology lessons, but to date, the problem of the general decline in Biodiversity still needs to be resolved (Aripin, I., Hidayat, T., Rustaman, N., & Riandi, 2021; Setiawan, 2022). So, serious efforts are needed to deal with conservation problems in Indonesia.

The actions that will be taken will achieve maximum results if accompanied by collaboration between the world of education and society (Sugiarti, 2023). This collaboration will help the government and educate the public and students. The world of education has long been proven to help resolve various local and national issues. This is an opportunity for

conservation. Indonesia's high population has encouraged acceleration in efforts to identify and educate its Biodiversity. This concept has been adopted by developed countries in overcoming conservation problems through education, known as citizen science projects. Several studies have also proven that citizen science projects can support the conservation and identification of living creatures. It does not rule out the possibility of this concept being applied in Indonesia. This is an excellent opportunity for innovative learning in conservation actions from an early age.

Citizen science is community involvement in learning to foster awareness (Somerwill, L., & Wehn, 2022). Meanwhile, what is meant by a citizen science project is the involvement of students, the community, teachers, and experts in the learning process. Apart from that, citizen science projects can train students in collaboration, communication, critical thinking, and creative skills. This certainly provides excellent potential for creative learning innovation. However, more research needs to be conducted on citizen science in Indonesia. Therefore, this research will examine the learning potential of citizen science projects in supporting Biodiversity learning in Indonesia. The results of this research can be a reference for teachers and policymakers in conservation and identification efforts in integration in schools.

METHOD

This research is included in descriptive qualitative research. Qualitative descriptive is a research design commonly used for researching natural objects or actual conditions without any special treatment (Sugiyono, 2017). The data sampling technique used is random sampling. The research population used was high school students in Indonesia, with a sample of 109 students. Data collection techniques using questionnaires, interviews, and analysis of relevant literature. Expert lecturers validated the results obtained. The data analysis technique adds and calculates the percentage of indicators in the instruments used and is complemented by interview results and analysis of relevant sources. This results in comprehensive research in revealing the research object.

RESULT AND DISCUSSION

This research involved 109 high school students in Indonesia, consisting of 4 schools. Research results were obtained from instruments given to students, interviews, and analysis of relevant literature. This aims to obtain complex and correct results. The research sample data can be seen in Table 1.

Table 1. Sample of research

Schools	Location	Class X	Class XI
SMAN 1 Padang	Padang, West Sumatra	44 People	17 People
SMA Negeri 1 Koto Balingka	Pasaman, West Sumatra	17 People	14 People
SMA Al Kenzie	Bandung, West Java	11 People	3 People
SMA BPPI Baleendah	Bandung, West Java	3 People	-

Based on the table presented it can be interpreted that the majority of samples used came from West Sumatra and West Java, consisting of classes X and XI. This sample level was chosen because those who received biodiversity material were high schools. Six analyses were carried out to reveal the research objectives, namely an analysis of the potential of citizen science projects in supporting biodiversity learning in Indonesia, namely an analysis of problems, students, learning objectives, tasks, and concepts. Interviews and literature studies complement the results of distributing research instruments.

Analysis of the Potential of the Citizen Science Project

Citizen science's contribution to education has provided results in developed countries around the world. Learning outcomes increase with the involvement of citizen science in the learning process in the form of projects (Greving et al., 2022; Haklay, 2012). In general, citizen science projects are used to collect large amounts of data regarding biodiversity. Unsurprisingly, researchers widely use it to identify plants and animals. Citizen science helps collect data and can even educate the public about science. This is in line with improving the quality of human resources. The results reveal that teachers and students are very interested in the citizen science project program, which is integrated into schools because it is more fun and stimulates student activity in every stage of learning in class. The presence of experts in learning as one of the conditions for implementing a citizen science project encourages students' curiosity while learning. Thus, citizen science projects in Indonesia help teachers create diverse learning processes and encourage action to conserve plants and animals.

Previous research conducted around the world proves that citizen science projects can improve students' knowledge, skills, and attitudes (Bonney et al., 2016; Cooper, C. B., Dickinson, J., Phillips, T., & Bonney, 2007; Cornwell & Campbell, 2012; Fernandez-Gimenez et al., 2008; Jordan et al., 2012; Krasny, M. E., & Bonney, 2005; Lewandowski & Oberhauser, 2017; McKinley et al., 2017; Trautmann et al., 2012; Trumbull et al., 2005). This provides concrete evidence of the success of the citizen science project in encouraging students in a positive direction while helping to maintain Indonesia's biodiversity. Implementing citizen science projects in schools will speed up the identification of Indonesia's biodiversity so that appropriate conservation actions can be taken. This also avoids claims of Indonesian plants by foreign nations. This means that citizen science projects are one of the preventive solutions that the government can apply.

The results of interviews and distribution of questionnaires that have been carried out found that learning about biodiversity in Indonesia has involved many people, but it has yet to be optimal. This is supported by the teacher's explanation that the involvement of the community and students is beneficial in recognizing biodiversity in the surrounding environment. These two elements are integrated to support conservation actions. For example, people are more familiar with the plants around them, such as their use and maintenance, but need to know their scientific names. Meanwhile, students understand the scientific name but need to know the benefits. Therefore, collaboration between society and the world of education supports the development of science and quality human resources. This was confirmed by students who stated that

community involvement benefited learning. Therefore, citizen science projects have great potential to support biodiversity learning in Indonesia.

Analysis of Problem

In general, students in Indonesia are still experiencing difficulties learning biological diversity. This is influenced by infrastructure, learning resources, and materials that contain many essential terms. The research found that 29.35% needed help understanding learning resources about biodiversity. Meanwhile, 70.64% of students had no difficulties. The results of distributing the questionnaire differ from the results of daily assessments held by students who tend to be below the KKM. This condition indicates that students only understand learning when studying, and when the daily assessment is carried out, they are unable to answer it. This was reinforced by the study teacher, who explained that it was difficult to answer questions in the form of cases. From these results, there is a need for innovation in learning about biodiversity. Learning with surrounding users can encourage students to think critically to answer problem-oriented questions (Adinugraha, F., & Ratnapuri, 2020). This aligns with the mandatory indicators for implementing citizen science projects in schools. Involving the surrounding community using local potential is very helpful in students' understanding. This citizen science project program concept's potential will help encourage quality learning with good learning outcomes. This means that citizen science projects are a solution that teachers can use.

Analysis of Learner

This research also conducts student analysis to discover the problems students face learning biodiversity. The aim is to strengthen the analysis of the problems found. The results of distributing the questionnaire showed that students needed additional learning resources to support their understanding. Based on research data, it was found that 84.40% of students agreed that there was learning innovation. Students also stated that the expected learning was fun and manageable during learning. This hope is still far from reality. The majority of students still learn by listening to the teacher's explanation. Thus, the learning process is more boring because students are more passive than teachers. The following is an overview of the learning methods used by teachers on biodiversity material.

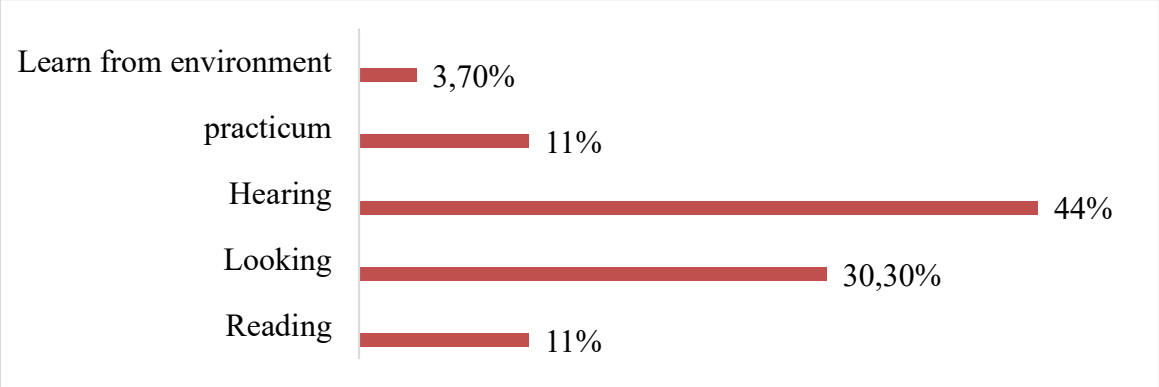


Figure 2. Teaching Methods Used

The method most often used is listening to the teacher. Apart from that, there are several other techniques, such as learning from the environment, practicum, reading, looking, and observing. This condition is also a source of difficulty for students in understanding the material. Innovations like citizen science projects are needed to support an active and fun learning process. Among the difficulties students face, the highest percentage is foreign terms from the Latin names of flora and fauna. Apart from that, students also need help with complicated material; it is rote, there is too much of it, and there is a lack of suitable learning resources. This is a challenge for teachers in reducing students' difficulties in learning. In line with the research, participants admitted they needed help with much material on biological diversity (Surbakti, 2021). So, students still have difficulty understanding biodiversity material.

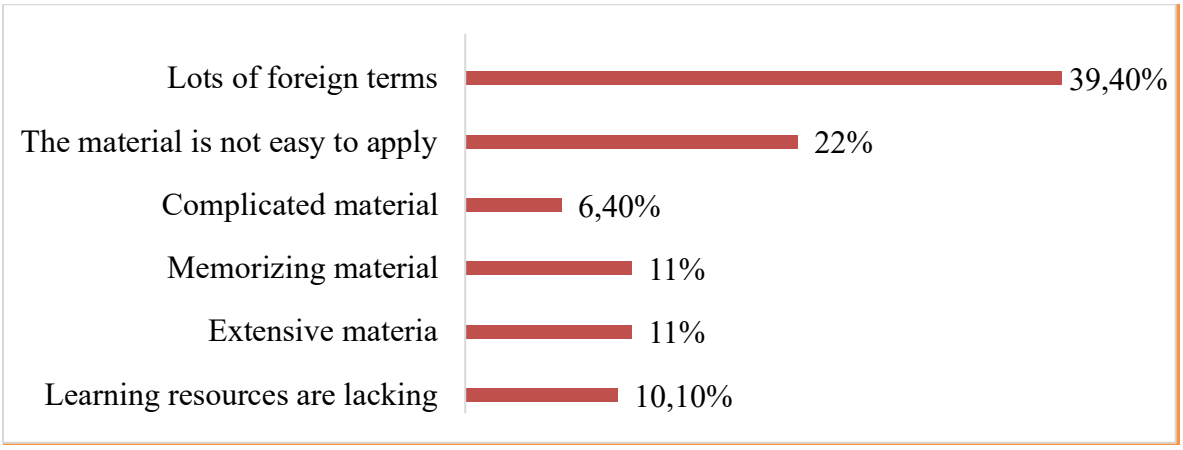


Figure 3. Difficulties experienced in studying Biodiversity material

Not only difficulties but also an analysis of the learning innovations students expect is carried out. The data shows that students prefer short, concise, and precise learning. Besides that, students prefer to learn from the surrounding environment, facilitated by ICT. It cannot be denied that the rapid development of technology has also shifted how students learn at school. Therefore, teachers design learning strategies and consider technology that supports learning. So, learning is more fun and easier to understand. A citizen science project facilitates everything that students expect. Therefore, it is essential to implement citizen science projects to overcome the problems that occur.

Analysis of Learning Objectives and Tasks

Analysis of learning objectives showed that learning was by learning objectives. The fact is that in the field, there are still many students who complain because they receive additional assignments. So, learning innovations that pay attention to learning objectives and the conditions of students are needed. This is to prevent boredom in learning among students. Regarding research, data was obtained that 90.82% students agreed that the learning objectives were appropriate. This means that parts can be adopted from what teachers apply at school.

Analysis of Concept

The learning resources used so far are modules, LKPD, PPT slides, textbooks, teaching materials, grids, and others. This proves that many teaching materials have been used, but students still need the latest innovations to support learning. Students also agree on the need for learning innovations that support teaching materials according to students' needs. The concept of diversity explained is also good. However, the teacher gave recommendations for biodiversity, which, given as an example, should be in the surrounding environment. So, students understand more quickly because it is more contextual.

The presence of the Citizen Science project in Indonesia provides excellent potential to support biodiversity learning. This is very helpful in conservation and learning in schools. It is hoped that CS integrity in learning will improve conservation in Indonesia. Therefore, citizen science provides excellent potential to support biodiversity learning in Indonesia.

CONCLUSION

The results of the research that has been carried out show that citizen science projects can support learning about biodiversity in Indonesia. This is because the citizen science project is appropriate to needs and supported by previous research. Collaboration between teachers, students, teachers, and experts will encourage quality education and address local and global issues. The presence of CSP provides excellent potential as a contemporary learning innovation that students expect.

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