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Project-based learning based on local wisdom through google classroom to improve process skills in pandemic times

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ABSTRACT

This research aims to improve the science process skills of biology education students during the Covid 19 pandemic. This research was carried out at the Biology Education Study Program, the University of Flores, from May to July 2021. The type of research used is experimental research with observation and product assessment. The process skills, performance, and product assessment data are then analyzed using a simple statistical formula and then converted into value categories and interpreted based on the criteria. The quality of improving science process skills is measured using the N-gain formula and categorized based on the rubric of improvement interpretation. The results show that project-based learning based on local wisdom through google classroom is proven to train science process skills 85% to 89% in the good category with the quality test for improving science process skills in the high category. In addition, the results of measuring project performance skills that integrate the potential of local wisdom in the project get a score of 85% to 90% in the good and very good categories. Product ratings get an average score of 87% for product appearance and 83% for product quality, and both are in a good category. So, it can be concluded that the project-based learning (PjBl) model based on local wisdom through the google classroom media can train and improve several science process skills and performance can also increase the competence of prospective biology teacher students through real work of scientific product creativity.

Introduction

The COVID-19 pandemic has caused various problems in every aspect of people's lives, including social, economic, health and education. Changes in learning patterns and models occur massively, not only at the local level but also at the global level. The Indonesian government through the Ministry of Education and Culture issued a policy regarding the implementation of education in an emergency period for the spread of the Covid 19 virus as stated in the circular

letter of the Minister of Education and Culture Number 4 of 2020 which contains the principle "the health and safety of students, educators, education staff, families, and the community is a top priority in setting learning policies" (Kementerian Pendidikan dan Kebudayaan, 2020). Learning activities in the form of direct face-to-face have suddenly switched to distance learning and also online learning that utilizes technology such as the internet, by implementing physical distancing to break the chain of the spread of the COVID-19 virus (Rulandari, 2020). Online learning is one of the solutions to the pandemic problems that hit. Students and educators are required to be able to adapt to the speed of change in today's world.

Learning by utilizing this technology is in line with the vision and mission of 21st-century learning (Abidah et al., 2020; Nelson & Hawk, 2020; Pheeraphan, 2013). The government through the revised 2017 edition of the 2013 curriculum emphasizes four main points in learning, namely, including strengthening character education, 21-century skills, and Higher Order Thinking Skills, and Literacy. Effendi and Wahidy (2019), 21st- century learning applies learning and innovation skills, information skills, media, and technology so that educators are required to be able to utilize internet technology and various technological applications in the learning process, including for Pre-service teacher.

One example of a technology application that can be used is the Google Classroom media which can be used for free and easily. Sudarsana et al. (2019), described based on the explanation of Law No. 20 of 2003 article 31 (1) it can be explained that educational institutions can take advantage of communication technology by using education-based applications, namely, google classroom. The advantages of using Google Classroom are that it facilitates long-distance communication, students are more independent, easy to operate, saves time, is environmentally friendly, increases collaboration, communication is not limited by time, can archive tasks in the Learning Management System for free (Hapsari & Pamungkas, 2019; Sudarsana et al., 2019).

Science as the basic science that underlies the development of technology is one of the keys to success so that students can adapt to changes in their environment, especially in the development of biology (Rustaman, 2011). Biology learning is designed according to its nature as a science guided by three things, namely process, product, and attitude (Sudarisman, 2015), and emphasized by the government which emphasizes the use of a scientific approach as the main learning process in learning so that students actively build concepts, laws or principles through science process skills. This hope can be achieved if prospective biology teachers also have skills in learning management involving science process skills, therefore prospective biology teachers need to be trained through learning activities involving science process skills.

In the 2013 curriculum, it is explicitly stated that one of the 21st- century learning models capable of developing science process skills are the project-based learning model (Redhana, 2019; Sudarisman, 2015). According to Widiyatmoko and Pamelasari (2012), project-based learning is a learning effort that reflects aspects of the environment in which students are located and learn and acquire knowledge through the process of inquiry. Thus, it can be concluded that project-based learning is constructivist-based contextual learning that provides opportunities for students to solve problems encountered through discovery. Contextual learning is certainly related to local wisdom. According to Prasetyo (2013), local wisdom is local ideas that are wise, full of wisdom, of good value, which are embedded and followed by members of the community. In the learning process, teachers can improve their scientific abilities and skills by integrating the potential of local wisdom so that students can solve problems related to the real world.

Findings in the field explain that the integration of local wisdom in biology learning both at the school/madrasah level and at universities has not been implemented in Ende Regency, NTT Province. Local research of the local community has not touched the realm of collaboration between local wisdom and biology learning which is known these two studies are closely related to each other. Similar studies in Ende Regency include Khalikin (2016) who examines local traditions as a medium of interaction in

building a spirit of tolerance. Sunimbar and Mari (2020), integrate the values of the local wisdom of joka'ju to build disaster awareness characters at the high school level. Jehamat and Mbadhi (2018) examined the role of Tura Jaji culture in preventing social conflict in Aewora Village. See (2021) designed the digitalization of social studies learning based on local wisdom for the elementary school level to preserve local culture. Resmini et al. (2019), describe that the pulmonary Udu and Joka Ju traditions of the Mbuliwaralau community contain social, cultural, economic, and religious values. Some of these studies are limited to the study of the values contained in the potential of local wisdom that can be integrated into character education and have not led to the utilization of the existing potential to train process skills needed in the world of work as well as at the university level.

Learning activities that can train process skills are needed in the 21st-century so that these skills are not only trained on students but also for prospective teachers, in this case, prospective biology teachers. Therefore, it is necessary to use an appropriate learning model, namely a project-based learning model in online learning for prospective biology teachers to overcome learning that is not optimal due to the COVID-19 pandemic and also to prepare reliable prospective teachers in this 21st- era. Project-based learning through google classroom is effective in increasing knowledge and skills. This is because, through local wisdom-based projects assisted by Google Classroom media, students are allowed to deepen concepts and they are trained to solve real problems encountered in a scientific, rational, empirical, and systematic way while still applying physical distancing. The purpose of this research is to improve the science process skills of biology education students during the Covid 19 pandemic through project activities based on local wisdom assisted by the google classroom media.

Method

The type of research used in this research is experimental research with One group pretest-posttest research design. The research has been carried out at the Biology Education Study Program, University of Flores, Ende Regency, NTT Province from May to July 2021.

The research subjects in this study were students of the biology education study program at the University of Flores with a total population of 72 students. The sampling technique used the purposive sampling technique. The sample selected is the fourth-semester students as many as 24 students.

The technique used in collecting data is the technique of observing the creativity of student process skills, performance, and product assessment using observation sheets and product assessment sheets Process skills and performance data obtained were then analyzed using the formula percentage = (score obtained/maximum score) X 100%. The data obtained from the data analysis is then converted in the form of value categories and interpreted based on the criteria in Table 1 (Modification of Khairunnisa et al., 2020; Shofatun et al., 2017).

Table 1. Interpretation of process skills and student performance

Score	Category
91 ≤ science process skills ≤ 100	Very good
71≤ science process skills ≤ 90	Good
61≤ science process skills ≤ 70	Enough
60≤ science process skills ≤ 0	Not good

To show the quality of improving science process skills between before and after being given treatment, the normalized average gain (N-gain) formula was used. The results of the N-gain measurement are then interpreted in the form of categories contained in Table 2. The N-gain Formula I.

$$g = \frac{X_{posttest} - X_{pretest}}{X_{max} - X_{pretest}} \times 100\% \text{.....(I)}$$

Hake (1998), average normalized gain (g) defined as the ratio of the actual average gain (%(post)−%(pre)) to the maximum possible average gain (100−%(pre)).

Table 2. Normalized Gain category

Score Range	Category
g ≥ 0.7	High
0.7 > g ≥ 0.3	Medium
g < 0.3	Low

(Hake, 1998)

Results and Discussion

The COVID-19 pandemic situation demands that learning activities be carried out online. This research was carried out using a project learning model based on local wisdom through google classroom media and was carried out for 10 meetings. According to Mahdiansyah et al. (2017), in the 2013 curriculum assessment system project assessment is carried out starting from the planning stage, implementation to the final project result. In this study, project assessment refers to the three stages above which include assessment of science process skills, performance, and product assessment. Then to measure the high or low increase in science process skills using the N-gain formula (normalized gain). The process skills trained through the local wisdom-based project learning model in this study are skills in organizing materials, planning and designing skills, preparing tools and materials, assembling tools, making observations, analyzing observational data, making project activity reports, displaying products, and mastering material, while the product assessment includes an assessment of the appearance and quality of the product. The results of the analysis of the nine indicators of the science process skills of students in carrying out the project are shown in Figure 1.

The data in Figure 1 shows the percentage of the results of the assessment of the nine process skill indicators that were trained. In the planning stage of the indicator of organizing the material, the percentage of 89% is in a good category, while the planning and design stage is 85% with the good category. Furthermore, at the implementation stage, namely preparing materials and tools, the percentage obtained was 88% in the good category, assembling tools reached 89% in the good category, making observations reached 88% in the good category, and analyzing data from observations of 86% in the good category. At the final stage of reporting, namely making reports, the percentage is 88%, product appearance is 85%, material mastery is 86% and all are in a good category. The high score of observations at each stage of project activities involving science process skills shows that project-based learning can train many students' academic skills and measure the high improvement between before and after being given treatment using the N-gain formula. The results of the analysis of the increase in science process skills are presented in Table 3.

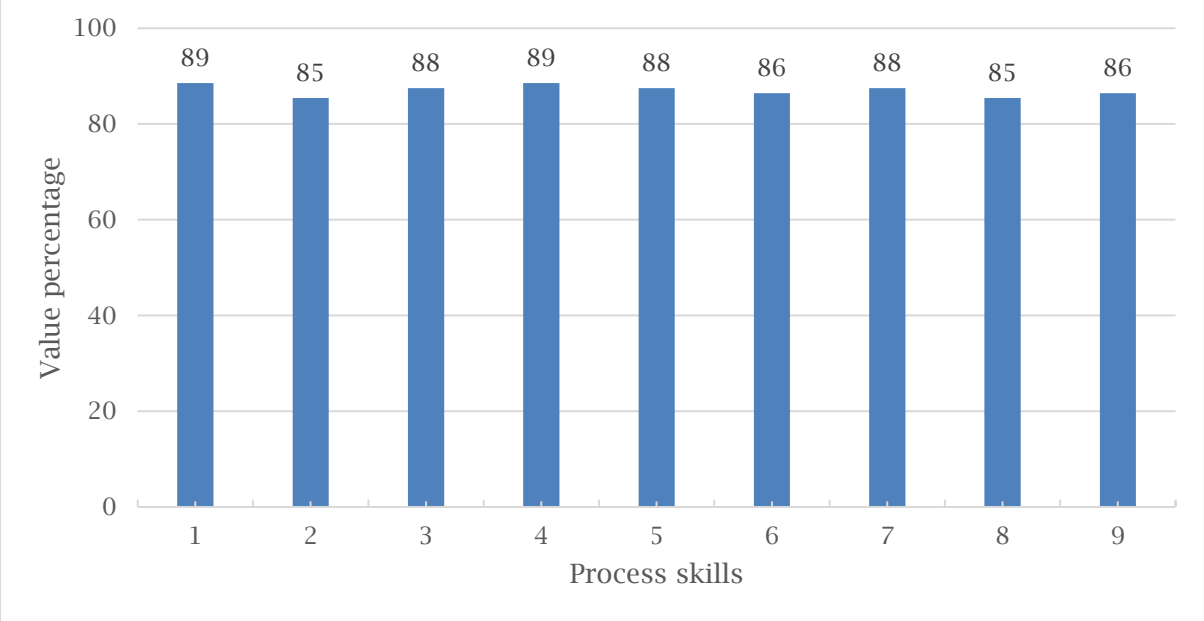

Figure 1. Project assignment process skills

Note: Description of the indicator process skills are Organizing materials (1); Planning and designing (2); Prepare tools and materials (3); Assembling tools (4); Make observations (5); Analyzing observational data (6); Making reports (7); Product appearance (8); Material mastery (9)

Table 3. Value of science process skill gain score

Class	Average				Category
	Pretest	Posttest	Gain	N-gain	
Science process skill	48.9	87.1	38.2	0.74	High

Student skill assessment is also measured based on performance during project implementation. In working on projects students are trained to think creatively by developing an idea related to local wisdom in the study of biological sciences. The integration of local knowledge and local resources as potential local wisdom in learning aims to preserve cultural values that are starting to become extinct, stimulate student creativity and also create an active and fun learning atmosphere. The results of the assessment of student project performance relating to the potential of local wisdom are presented in Figure 2.

Figure 2 shows that the percentage of student performance skills assessment is in the range of 85% to 90%. This shows that students have been able to explore, develop and relate their ideas to local knowledge and local resources and then apply them to solve real problems encountered. The high percentage of the results of the assessment of process skills and performance of prospective biology teacher-students is supported by the results of product assessments with good categories which include two aspects, namely product appearance and product quality. Product assessment is an assessment of the manufacturing process and product quality (Mahdiansyah et al., 2017). The average value of product appearance is 87 in the good category and the value of product quality is 83 in the good category. The average data for the product assessment group is presented in Figure 3.

Based on the data shown in both Figure 1 and Figure 2, it is known that project learning based on local wisdom through google classroom has been able to train students' science process skills. Measured from nine process skill indicators, it can be explained that in a series of planning stages, students can organize the material well so that they can understand, examine and relate concepts to one another so that it helps in solving the problems encountered. This has an impact on the ability to plan and design projects well. Students are trained to identify real problems encountered in their daily lives and then collaborate with colleagues in their groups to design and implement local wisdom-based projects that prioritize local potential in the implementation of project activities. Similar results were also seen in the final stages of project activities. The research findings explain that students can make project reports and display products well and master the material well. The application of local wisdom-based project learning through google classroom has been proven to have resulted in increasing students' science process skills. This is evidenced by the results of the N-gain calculation which are in the high category as contained in Table 3.

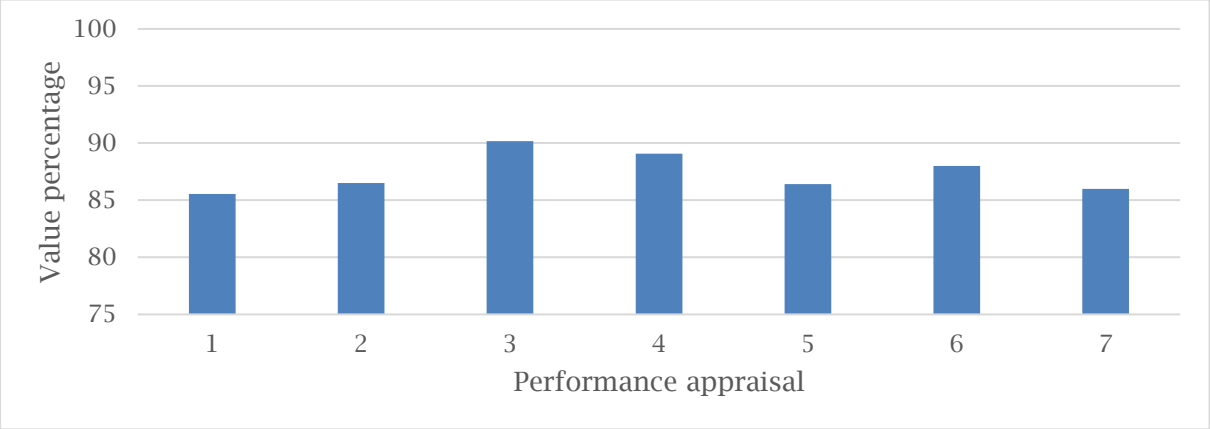

Figure 2. Performance assessment based on local wisdom

Note: Setting up experimental tools (1); Prepare the plant (2); Acclimatization process (3); Prepare planting media (4); Prepare River water and tofu factory liquid waste (5); Phytoremediation process (6); Test the levels of BOD (Biological oxygen demand) (7)

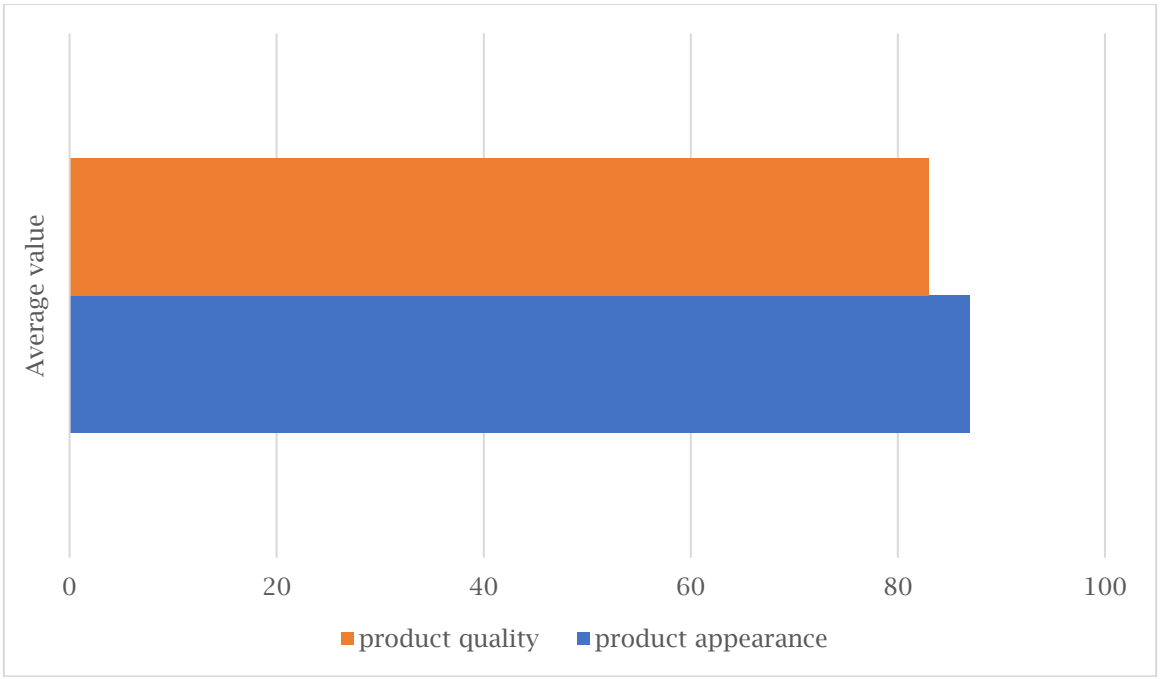

Figure 3. Product rating results

Product assessment as the last step in project learning presented in Figure 3 shows that prospective biology teacher students already have aspects of 21st-century skills that can be seen from project assignments and products carried out. Through Regulation of the minister of education and culture No 53 of 2015 it is explained that skills assessment can be carried out through practical activities, products, projects, portfolios, or other techniques by the competencies assessed (Kementerian Pendidikan dan Kebudayaan, 2015). Creativity can be measured from the uniqueness of the projects and products being worked on, in addition to projects that are done well indicate that students have been able to think critically in solving the problems they face (Wirawan & Sukarini, 2021). Project work requires students in their groups to communicate and collaborate in working on projects. Reinforced by Zubaidah (2016), project-based learning is an ideal learning model to meet 21st-century educational goals, because it involves the 4C principles, namely critical thinking, communication, collaboration and creativity. The characteristics of the 21st-century education model are utilizing technology, being student-centered, contextual, encouraging student creativity, and developing student potential. All the characteristics of 21st-century education are contained in the constructivism approach to the project-based learning model (Mayasari et al., 2016). The application of the project learning model through google classroom by utilizing technology can facilitate students to practice their process skills in finding and constructing their knowledge based on inquiry activities designed by students themselves. The use of technology in learning is one of the characteristics of project learning proposed by Rati et al. (2017) and Sahin (2013), namely the project-based learning model is a learning model consisting of discovery-based tasks that link technology with Real problems are then followed up by creating or developing contextual products by prioritizing the importance of technological, social and core development of the curriculum.

The use of Google Classroom media during the COVID-19 pandemic, not only facilitates and increases interactions between educators and students and between students in cyberspace, but has also been proven to help educators in managing classes and saving time. In project work, educators can open direct discussions and provide feedback regarding project assignments that are done anywhere and anytime without being limited by time. Students can also directly share material and interact with each other and get direct input from educators for the improvement and refinement of the

projects they are working on. In this case, the educator acts as a facilitator in creating a learning atmosphere that can stimulate active student participation so that students can learn independently by solving problems encountered through investigation activities. This finding is in line with the research of Sudarsana et al. (2019), the use of google classroom can improve the quality of teachers and students, save time, be environmentally friendly, overcome the distance of residence, increase collaboration between students, communicate is not limited by time and can store documents safely. Supported by the results of previous research by Daniati et al. (2020), who stated that the application of google classroom during the pandemic was proven to increase student learning motivation by an average of 75%-100% and learning outcomes by 13.82%. Furthermore, Sutia et al. (2019) measuring student responses to the implementation of project learning through google classroom explained that students think google classroom can be used as an online guidance medium in project learning because students find it easy to upload project reports and are effective in guiding students in working on the project.

Online learning becomes meaningful and fun with the integration of the potential of local wisdom in project activities carried out by students. Students who are prospective biology teachers creatively utilize the potential of local wisdom to solve concrete problems they face. It should be noted that in project work, students used the *Limnocharis flava L* plant that grows wild in the rice field and river ecosystems in Ende district as phytoremediation to improve the quality of polluted water in several watersheds in the Ende district. Utilization of local resources in the form of *Limnocharis flava L* as a phytoremediation plant is a form of creative thinking skills that link the potential of local wisdom with biological science and then used it to solve real problems faced through inquiry activities in the form of projects. Through strengthening local wisdom, prospective educators have intellectual skills obtained through the ability to think creatively to solve problems (Tarlina & Afriansyah, 2016). The key to creativity is looking for a special relationship between culture and science based on the subject of culture and science (Nurhikmayati & Sunendar, 2020). The benefits of applying the project learning model based on local wisdom for prospective teachers are to provide learning experiences for students to express themselves in producing creative works through arts and cultural activities, increase mastery of concepts, and foster student attitudes to become cultured individuals and prepare cultured educator candidates (Annafi & Agustina, 2018). In addition, Prasetyo (2013) explains that education based on local wisdom is a conscious effort to explore the potential of the local area and integrate it into the learning process so that students can develop their potential. This is supported by the results of previous research by Susilo (2015), the potential of local wisdom from the Gajah Wong river area, Bantul district, can be used as biology learning material because it meets the criteria as material that includes knowledge, attitudes, and skills. In this study, the project learning model based on local wisdom through Google Classroom also has shortcomings in its application, namely this model can only be used on certain materials, requires time management and high self-motivation, requires a lot of time to complete projects for students who have weaknesses in experimental activities, it is difficult to control students' activities in groups, and it is difficult to assess students' scientific attitudes in detail.

From the description above, it can be concluded that project learning based on local wisdom through google classroom can train and improve the science process skills of prospective biology teacher students. This is because project activities based on local wisdom can create student-centered learning conditions, involving the ability to think creatively, critically, collaboratively, communicate, and the ability to use technology so that prospective biology teachers can explore, interpret, synthesize and create.

Conclusion

The project-based learning model (PjBl) based on local wisdom through the google classroom media is an innovative collaboration during the covid 19 pandemic that can train and improve some science process skills and performance for candidates' biology teacher students. The

science process skills can be include organizing materials, planning and designing projects, implementing and reporting project assignments. The application of the project-based learning model (PjBl) based on local wisdom is very suitable for the diverse conditions of Indonesia. In addition, the project-based learning model (PjBl) based on local wisdom google classroom can improve the competence of prospective biology teacher students through real work of scientific product creativity. Researchers who want to implement project-based learning (PjBl) based on local wisdom google classroom should selectively choose learning materials following the project learning model and the potential of local wisdom of the local community. Educators also provide structured guidance so that student creativity remains.

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