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Project-Based Online Learning towards Student Creativity Development

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Abstract

The purpose of this research is to discover student creativity during project-based online learning. The researchers illustrated how project-based online learning was implemented in Taxonomy Course and how this learning could develop the creativity of the 4.0 Industrial Revolution on student projects using a descriptive quantitative approach as the method of study. The subjects of this study were 22 UNPARI students, specifically from the Biology Education study program, with 22 female students and one male student. As a data collection technique, documentation was used in the form of student projects. A descriptive statistic was used to perform quantitative data analysis. The data was collected using the creativity rubric and analyzed so that the results could be converted into percent (%) from each indicator. According to the findings of this study, 5 students have a very high level of creativity, 14 students have a high level of creativity, and 3 students have a moderate level of creativity.

Keywords
online learning; project-based; creativity

I. Introduction

Learning in the 21st century is oriented toward the industrial revolution. Even now, the term "4.0" has been used to refer to the process of learning about the Industrial Revolution. 5.0. The learning of the industrial revolution is a learning that incorporates the industrial term into the learning processes. The existence of significant changes in various industrial fields as a result of the combination of these technologies can reduce the existing barriers between the physical world and the digital world, also known as the virtual world. According to Handarini and Wulandari (2020), The current state of technological development has a significant influence on changes in all areas of life. Learning in the Industrial Revolution 4.0 era necessitates the ability of teachers/lecturers and students to quickly adapt to changes. Dito and Pujiastuti (2021) assert that the Industrial Revolution 4.0 has had an impact on fundamental changes in human civilization, particularly in the education sector and other sectors. The education sector is one of the basic capitals for the development and progress of the nation's next generation, and it requires the involvement of many parties in the future, as well as good regulations, through efforts to improve the quality of education and teaching.

Education is a very important human need because education has a duty to prepare Human Resources (HR) for the development of the nation and state (Pradana et al, 2020). According to Astuti et al (2019) Education is an obligation of every human being that must be pursued to hold responsibilities and try to produce progress in knowledge and

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experience for the lives of every individual. Education is one of the efforts to improve the ability of human intelligence, thus he is able to improve the quality of his life (Saleh and Mujahiddin, 2020). Education is expected to be able to answer all the challenges of the times and be able to foster national generations, so that people become reliable and of high quality, with strong characteristics, clear identities and able to deal with current and future problems (Azhar, 2018). Education and skills are the main keys in gaining social status in community life (Lubis et al, 2019).

The fact that Indonesia, especially in the city of Lubuklinggau, South Sumatra province, still has many infected with the Covid-19 virus, makes the learning system still online. The learning system that existed prior to the COVID-19 pandemic was almost entirely based on face-to-face in class (offline), but has now been replaced with a learning system that is integrated through the internet network (online learning). According to Pislae-ngam (2018) online learning can help students become more self-directed learners, while lecturers serve as learning facilitators. Goyal (2012) asserts that online learning is a learning that uses information technology with the internet network. According to Budu, Yinping, and Mireku (2018), online learning is a combination of communication information technology tools with internet networks to convey subject matter, knowledge, and can improve the process. Al-Fraihat et al. (2020) argue that online learning is the result of a collaborative effort between educators/teachers/lecturers, students, communication technology, and internet networks. Based on (Abidin.Z., Rumansyah. 2020), Online learning is a type of distance learning that allows the use of telecommunications and information technology via the internet network (directly and indirectly). Online learning is a learning process that connects learners/students to learning resources that are physically separate or even remotely located but they can communicate, interact, or collaborate (directly/synchronously and indirectly/asynchronously). According to Cidral, Aparicio, and Oliveira (2020), online learning can also be accessed by everyone without the use of a classroom, and it can accommodate a large number of students, making it suitable to be used by teachers/lecturers to teach the students.

Gillett-Swan (2017) state that online learning presents many challenges for teachers or lecturers because the level of competencies required in online learning technology is higher, more sophisticated, and proficient. Muzaki (2021) claims that learning during the COVID-19 pandemic is a major challenge for universities and schools. The results of study conducted by Almaiah, Al-Khasawneh, and Althunibat (2020) and Meggie (2020) explain that challenges in universities can come from lecturers and students. Online learning challenges for lecturers include mastering various communication technology platforms, mastering the learning model used in online learning, and being able to package learning materials to make them more interesting so that students do not get bored. Meanwhile, one of the difficulties of online learning for students is the frequent miscommunication with lecturers or student friends about the material being explained.

Riastuti et al. (2022) in their research stated that during the Covid-19 pandemic, online learning/lectures are thought to be the best solution for learning/lecture activities. According to Mulawarman (2020), Learning/lectures delivered through an online system are expected to be more beneficial for students in following the ongoing learning process and gaining knowledge without having to travel to school/campus. The requirements for online learning/lectures are internet network support and mobile devices such as computers/laptops or cell phones that can be used to participate in the learning/lecture process, as well as information on learning/lectures with flexible times and places that can be done anywhere and at any time. Willems (2019) reveals that the most commonly used facilities/forms during online learning/lectures are WhatsApp Group, Google Classroom,

Google Meet, Telegram, Zoom Meeting, and E-mail. Depending on the agreement between lecturers and students, the forms used by the University of PGRI Silampari vary. According to the findings of interviews with several lecturers from various study programs, the forms most commonly used in general are Google meet, Google Classroom, and WhatsApp group. In the academic year 2021/2022, the University of PGRI Silampari imposes lectures on a fifty:fifty basis, i.e. one face-to-face and one online. Each study program has a different schedule, with one week for face-to-face and one week for online. This is to prevent the spread of the most recent Covid-19 virus variant. A strict protocol is followed during face-to-face learning/lectures.

Sadikin and Hamidah (2020) assert that there is no guarantee that the online learning process will be maximized; however, the students listen to the material explanation from the teachers/lecturers. The results of the research by Dewantara and Nurgiansah (2020) mention that the results of online learning during the COVID-19 pandemic are very ineffective. Rendy Setyowahyudi (2020) encountered several obstacles in the online learning process, which made students less interested in learning, resulting in low learning outcomes. Surya, A, P., et al (2018) Mention that the low learning outcomes and creativity of students during the online learning process are caused by a lack of a place to express and argue based on each child's creativity.

This is also a problem with UNPARI's online learning, particularly in the Plant Taxonomy Biology Education Study Program. The incompatibility of the learning model used is the cause of students' low creativity when learning online. This issue can be solved if the learning model used is suitable for the students' personalities and needs. According to Widiyono (2020), an interesting and fun learning/lecture process will eliminate boredom during learning. According to (Mustakim 2020), the online learning/lecture process requires a separate variation to eliminate boredom. Hamidah, Isrohani,. et al (2021) assert that the low learning outcomes and creativity of students are caused by the lack of a place to express the creativity of each student and the lack of a place to express opinions. Therefore, teachers/lecturers need to create creativity/innovation in the learning process in order to create a pleasant learning atmosphere and encourage students to be able to express their ideas.

Project Based Learning is one implementation of a learning model that can integrate online/offline learning (PjBL). The main component of Project Based Learning (PjBL) is composing and starting activities that emphasize a number of projects until the final result is a product as a series of individual communication activities or various task results that answer the questions. And hence, project-based learning can allow students to study concepts in greater depth while also increasing student creativity. According to Susilawati (2021), A project-based model, also known as Project Based Learning (PjBL), integrates new knowledge and learning experiences from design to evaluation in order to produce a product. The inquiry process is carried out by guiding and directing students as they integrate various materials as collaborative projects.

Based on the description above, an effective learning model must be implemented in order to increase student creativity. As a result, project-based online learning is one solution to the problems encountered in order to solve the problems.

II. Review of Literature

The quantitative descriptive approach was used as the study method, with the process of discovering knowledge using data in the form of numbers and analyzing descriptions of what was known (Kuntojoyo, 2019). Wina (2013) proposed that researchers used

quantitative descriptive studies to describe certain phenomena, how project-based online learning was implemented in the Plant Taxonomy Course, and how this learning could develop the creativity of the 4.0 Industrial Revolution on students. The subjects of this study were UNPARI students enrolled in the Study Program of Biology Education, with 22 female students and 1 male student. Following the explanation, the results of student projects were evaluated, and student feedback was used to interpret the results. Documentation was used as a data collection technique. A descriptive statistic was used to perform quantitative data analysis.

The data collected using the creativity rubric was analyzed so that the results could be converted into percentages (%) for each indicator. The creativity percentage formula was as follows:

$$NP = \frac{R}{SM} X100$$

(Purwanto, 2009)

Description:
NP = Score Percentage of Creativity
R = Raw Score
SM = Maximum Score

The percentage data obtained were then categorized based on standards as shown in the following table:

Table 1. Category Scale

No	Percentages	Result Criteria
1	81-100%	Very High
2	61-80%	High
3	41-60%	Moderate
4	21-40%	Low
5	0-20%	Very Low

(Purwanto 2009)

The following was project assessment rubric from student creativity aspect:

Table 2. Creativity Rubric

No	Creativity Components	Indicators	Assessed student behavior
1	*Originality*	Students are able to create different plant taxonomy videos.	Students are not able to show video about plant taxonomy in a *YouTube* account using new information. Students are less able to show video about plant taxonomy in a *YouTube* account using new information. Students are quite capable to show video about plant taxonomy in a *YouTube* account using new information.

			Students are able to show video about plant taxonomy in a *YouTube* account using new information.
2	*Flexibility*	Students use relevant and appropriate references based on plant taxonomy Semester Course Plan (*RPS*).	Do not use relevant references based on *RPS.* Use one relevant reference based on Lesson Plan *RPS.* Use two relevant references based on Lesson Plan *RPS.* Use three relevant references based on Lesson Plan *RPS.*
3	*Fluency*	Students can inform material of plant taxonomy through the pictures and writings in the video.	The video is not interesting and meaningful and the message is difficult to understand. The video is less interesting and meaningful and the message is not understood. The video is quite interesting and meaningful and the message is quite understandable. The video is interesting and meaningful and the message is easy to understand.
4	*Elaboration*	Students are able to present information based on the *RPS* and provide contrasting colors to emphasize information.	The content of the text is too long, poor information, the color match is not in the video slide. Readability is not clear (all criteria do not meet). The content of the text is long, lack of information, lack of color suitability in the video slide. The content of the text is short, enough information, enough color suitability in the video slide. Prosperous text content, rich in information, good color match in video slides.

After being evaluated using the aforementioned rubric, student creativity could be incorporated into the score intervals, allowing the criteria to be discovered by looking at table 1.

III. Result and Discussion

According to the analysis results, project of student creativity level can be seen in the table 3. Analysis of student creativity in creating project that can be accessed online is categorized into 4 indicators, namely originality, flexibility, fluency and elaboration as presented in the following table:

Table 3. Student creativity score

No	Name	YouTube Link	Percentage (%)				Mean	Criteria
			Originality	*Flexibility*	*Fluency*	*Elaboration*		
1	RA	https://youtu.be/AuMCAqe79Y8	82%	80%	81%	82%	81,25%	Very High
2	FA	https://youtu.be/2FjAgQbJ_TY	75%	76%	75%	78%	76%	High
3	WU	https://youtu.be/0K4ECn_d26k	84%	80%	80%	82%	81,5%	Very High
4	PN	https://youtu.be/rnUdSHjBI1U	59%	60%	61%	60%	60%	Moderate
5	EN	https://youtu.be/crby_JjTPOs	85%	90%	90%	88%	88,25%	Very High
6	NO	https://youtu.be/ZWTUw6Y6_7Q	83%	81%	81%	81%	81,5%	Very High
7	DL	https://youtube.com/watch?v=uVumud18ssI&feature=share	75%	72%	73%	75%	73,75%	High
8	SAS	https://youtu.be/sK9GDfmypeg	77%	75%	75%	75%	75,5%	High
9	NP	https://youtu.be/FkIcPGLX7Jk	70%	68%	68%	68%	68,5%	High
10	WT	https://youtu.be/UXSEDyYXc6g	77%	78%	75%	75%	75,25%	High
11	AM	https://youtu.be/YjlHTHt6YLc	72%	70%	70%	70%	70,5%	High
12	SA	https://youtu.be/3PstMMFbaqU	72%	70%	70%	75%	71,75%	High
13	NJ	https://youtu.be/iO0ygGdZf9s	62%	58%	58%	60%	59,5%	Moderate
14	DS	https://youtu.be/TknI9BiYtew	82%	80%	80%	82%	81%	Very High
15	FE	https://youtu.be/4b6SY0DeQlU	75%	72%	75%	70%	73%	High
16	FN	https://youtu.be/iHXocNkJP1Y	70%	65%	66%	72%	68,25%	High
17	DY	https://youtu.be/GewxOuI7f60	75%	75%	75%	72%	74,25%	High
18	BA	https://youtu.be/oaz6KpgfzAI	74%	74%	75%	75%	74,5%	High
19	AL	https://youtu.be/hfZ_mf3gDsY	75%	73%	73%	74%	73,75%	High
20	RA	https://youtu.be/p0ptXhinKCI	60%	60%	60%	60%	60%	Moderate
21	RW	https://youtu.be/tOLmbeflrO8	81%	75%	78%	77%	77,75%	Moderate
22	YA	https://youtu.be/QJSju-iBaA4	70%	72%	73%	72%	71,75%	High

According to the table above, there are five students who receive a very high criterion, 14 students who receive high criterion, and three students who receive moderate criterion. The outcomes of this project are also depicted in the diagram below:

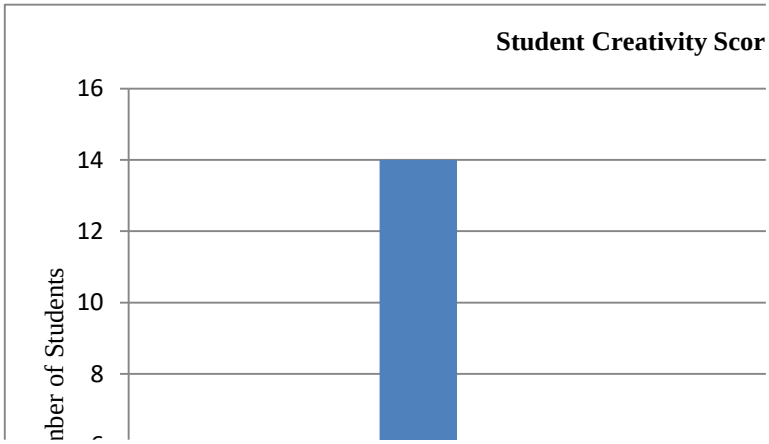

Figure 1. *Chart of student creativity score*

According to the study's findings, project-based learning implementation stages include six (6) stages, namely: 1) Determination of the type of project (in this case, the project is in the form of videos and paper reports; for projects in the form of videos, it must be accessible online due to the demands of the industrial revolution; 2) Determination of the type of project (in this case, the project is in the form of videos and paper reports; for projects in the form of videos, it must be accessible online due to the demands of the 2) Project step planning; 3) Scheduling; 4) Monitoring project completion progress; 5) Composing and presenting project reports; and 6) Evaluation of project results by lecturers (Ismuwardani, et al. 2018). The stages of Project-Based Learning are all listed in the Semester Course Plan (*RPS*). The *RPS* used has been developed with stages and assessment of a project-based model; these will also be distributed to students as guidance. The developed *RPS* also refers to the *RPS* of the subject taught, namely Plant Taxonomy, which follows the *KKNI* (Indonesian National Qualification Framework) Curriculum.

The student project assessment is carried out by evaluating the learning videos that have been uploaded to each student's YouTube account, as well as their reports. Each student creates a learning video using various materials that are customized with *RPS* material, particularly for Plant Taxonomy. To avoid problems with material selection, the lecturers will distribute or determine the materials before constructing the project. The project evaluation will take the form of a video, which will be analyzed using the student creativity rubric, as shown in table 2. After the video has been evaluated using the rubric, the next stage is to interpret the students' scores in the form of percentages, which will then be classified according to which criteria. According to Achmad.Z.A (2017), The term "project assessment" refers to an investigative assessment that begins with project planning and ends with project completion in the form of reporting for the students' tasks or exercises. Project evaluation has numerous advantages, particularly in terms of student creativity and critical thinking development.

As stated in the background, UNPARI uses lectures in a fifty: fifty ratio (once online and once face-to-face); thus, while the online lecture is going to take place, each student creates a project in the form of a learning video that should be uploaded two days before the next lecture, namely the face-to-face lecture. When the face-to-face lecture schedule arrives, the students present the material in the form of a report, which includes a video that has been uploaded to their respective *YouTube* accounts. The students present their projects, which are sorted according to the *RPS* material. As a result, students who receive material in the middle or end of the meeting can more thoroughly prepare their projects.

According to the findings chart for student creativity in project-based online learning, the majority of students receive high creativity scores. This is because the learning model used is adapted to the requirements of the students, allowing them to enjoy and be creative without boundaries. Creativity is the meeting point of three psychological aspects of a person: cognitive style, intelligence, and personality or motivation. Keeping these three things in mind will help students to understand what motivates people to be creative (Nganum, 2011). A study conducted by Muzaki (2021) reveals that female students feel more comfortable to attend the online lecture, female students prefer to be at home while attending the learning by online, and female students tend to choose more learnings that carried out by online than the male students. This can be a factor that causes the average scores of student creativity in class, in which the students can obtain high score, since 95% of total students in class are female students.

Another factor that contributes to high levels of student creativity is students' 21st-century lifestyle; currently, all UNPARI students use Android mobile phones in their daily lives. This is in accordance with the assigned project, which is to create a learning video; in which this is in accordance with current development as seen from the curriculum, educational technology, and others that support this so that the output produced is appropriate. According to a study of Prisecaru (2016), there are 30% of world population that has used social media to connect, look for information, and to learn. Dito and Pujiastuti (2021) assert that changes and development of digital-based information system in Indonesia provide a fundamental change impact, one of them include the way of transacting between friends, with teachers/lecturers, and even between institutions.

In addition to the explanation provided above, the factors that support students' high creativity are the result of the implementation of the appropriate learning model, namely project-based learning. The PjBL model is intended to help students and lecturers be more active and varied in the learning process by using projects as exercises or tasks, as well as learning media. (Chen & Yang, 2019). According to Erisa, Hera. et al. (2021), student creative thinking skills increase since the students feel happy in the learning. The results of study conducted by Hamidah, Isrohani,. Citra, S, 2021 reveal that learning outcomes will increase when the students feel happy and interested in the learning.

Projects carried out by students require students to be more skilled and able to adapt to the industrial revolution 4.0, namely being able to use IT in the learning process. With the ability of students to use IT in the learning process, they will also be able to improve student life skills in the 21st century. This is in line with the results of study conducted by Sucilestari, R., Arizona (2018) which elucidate that the effectiveness of project-based learning can improve students' life skills. Kautsar and Sarno (2019) propose in their study that PjBL is able to assist in preparing vocational students in broad technical skills accompanied by cognitive skills that can adapt and apply new abilities. The findings of Dhaningtyas, P, W., et al (2016) study explain that there are influences and benefits in using project-based learning towards the students' cognitive outcomes.

Another proof is a study conducted by Kristiawan et al. (2021) which explicates that PjBL is an effective method to be used to enhance the student skills. Moreover, previous study conducted by Riastuti (2021) reveals that the use of Project-Based Learning in virtual/online learning during the pandemic is effective. This is the same as mentioned by Susilawati (2021) in her study that the learning outcome scores of PBL and PJBL classes are higher than those of expository classes, and this can improve the quality of learning outcomes.

Continuing from the previous explanation, the PjBL model can both answer and solve the problem of low student creativity when learning online. This is supported by a

results of study conducted by Abidin.Z., Rumansyah (2020) who mentions project-based learning as one of the learning approaches that can maximize online learning. This learning can allow students to study concepts in greater depth while also improving their learning outcomes.

IV. Conclusion

Student creativity during online learning using Project-Based Learning (PjBL) results in a very high criterion score. The data was collected using the creativity rubric and analyzed so that the results could be converted into percent (%) from each indicator. According to the findings of this study, 5 students have a very high level of creativity, 14 students have a high level of creativity, and 3 students have a moderate level of creativity.

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