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INFORMATION LITERACY: AN ALTERNATIVE TO SUPPORT LEARNING OUTCOMES IN BIOLOGICAL STUDENTS

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Abstract

The background of this research based on the view that information literacy often considered a separate skill in students, but information literacy also needs to be linked to learning material. The purpose of the study was to determine the effectiveness of information literacy skills on learning outcomes in material Structure of Plant Development. The quasi-experimental research method with the design of the pretest-posttest control group design study. The population in the study were all biology majors at the Universitas Negeri Malang in 2018/2019 and a sample of 120 students each in 2 study groups. One study group consists of 2 classes. One study group use to control model and the second study group applies to the experimental model. The results showed that information literacy skills had a significant impact on the achievement of biology student learning.

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INTRODUCTION

The development of information and technology that is so fast in the 21st century is a challenge for educators to educate students as curious individuals, think critically, and communicate effectively (Erich & Popescu, 2010). Saglam, Cankaya, Ucer, & Cetin (2017) argues that the development of information technology has a significant impact on education, the most important problem to overcome efficiency in the 21st century is to instill competence into the literate information of students. The purpose of information literacy is fundamentally helping students to understand the knowledge-making process and strengthen their capacity in terms of using and creating a variety of information or knowledge products (Fullard, 2017). The definition of information literacy according to the Association of College and Research Libraries a set of integrated capabilities that include 1) identification of the extent of information needed; 2) accessing information effectively and efficiently; 3) critically evaluate information and sources; 4) use information effectively to achieve individual goals; 5) access and use information ethically and legally (Association of College & Research Libraries, 2015). Information literacy is generally needed to find, take, analyze, and use information (Ranaweera, 2017).

Information literacy skills in traditional learning are often not honed because students are only recipients of passive information through the lecture method (Detlor et al. 2012). The results of the study show that some teaching lecturers are more likely to provide extensive scientific content without regard to the process of how students achieve learning goals (Stefani, 2009). Porter et al. (2010) add that it is necessary to provide authentic learning opportunities for first-year biology students by exploring science as a process, so students need information literates. Information literacy can be developed using appropriate learning models/strategies/methods (Dolničar et al. 2017; Genlott & Grönlund, 2013; Hulett et al., 2013; Karimi et al. 2015). One learning model that can improve skills information literacy is project-based learning (Chu et al. 2011; Saliba et al. 2017)

The results of the previous study found that there was no effect of project-based learning models on biology student botanical literacy skills in the Structure and Development of Plants (Sari et al. 2018). In other studies show that Project-based learning can improve ICT literacy (Eliana et al. 2016). One of the subject learning outcomes is that students can find an alternative problem solving through research approaches and related to the structure and development of generative parts. The results of the descriptive analysis show that students experience several obstacles in completing project tasks, such as 1) still having difficulty in reading and taking the core of scientific reading material content; 2) inadequate research sources in compiling articles and analyzing data; 3) students often use reference sources that cannot be justified.

Students often do not realize the role of reading materials in the process of scientific research and lecturers do not always emphasize the importance of finding sufficient reading material (Porter, 2005). If students are aware of reading the material, students will be able to see problems, understand, and digest it; this is because the style of scientific papers is different from most reading material that is commonly used by students such as textbooks, modules, etc. It is crucial to introduce information literacy to students as early as possible in information literacy. The introduction of information can do through analysis of scientific articles (Dunne & Sheridan, 2012).

Biology students need to be trained to be skilled in information literacy in developing scientific methods. McFarlane (2013) states that learning science is advancing factual, principle and procedural knowledge through scientific means. Flierl, Bonem, Maybee, & Fundator (2018) emphasize information literacy as an essential result of undergraduate education. Information literacy is often considered as the separate skill for students to find and evaluate information. Information literacy skills need for students to accommodate the amount of information, but they can also link it to learning materials. Besides that, with information literacy, students will become learning human beings (Feng & Ha, 2016). sSpecific ways for

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students to engage with information when learning can affect learning outcomes.

METHODS

This research used a quasi-experimental design. The study conducted in March - November 2018. The study design used a nonrandomized pretest-posttest control group design that procedurally followed the pattern as shown in Table 1

Table 1. Research Design Non-Randomized Pretest-Posttest Control Group Design

Group	Pretest	Treatments	Posttest
E	T1	X	T2
K	T3		T4

Note:
E=Experiment class
K= control class
T1,3 = Pretest
T2,4= Post-test
X = Information literacy

The population in the study were all Biology Department students at the Universitas Negeri Malang in the 2018/2019 academic year. The sample in this study consisted of 120 undergraduate Biology Education students who took the course of the Structure of Plant Development. The sample divided into two study groups. Each study group consists of 2 classes. The experimental class is two classes, and the control class is two classes. Control class uses a project-based learning model while the experimental class uses a project-based learning model that integrates the information literacy rubric in learning. The measured learning achievement is writing skills using Rubric for Research Project in Education from Wolf & Stevens (2007). Data analysis used descriptive and inferential analysis. Descriptive analysis is used to describe learning outcomes, namely article writing skills. The inferential analysis is used to test the research hypothesis. Inferential analysis using the Anacova test. Also, questionnaires were given to students' responses to the information literacy rubric.

RESULTS AND DISCUSSION

Learning Outcomes

Data analysis used ANCOVA test, before ANCOVA test carried out homogeneity and normality test. Homogeneity Test Results showed in Table 2.

Table 2. Homogeneity Test Results

F	df1	df2	Sig.
1.026	1	118	.313

Based on the table, the Sig value> 0.05, this means that the data is homogeneous. Then the normality test will be carried out to find out the normality of the data. The results of the normality test showed in Table 3.

Table 3. Normality Test Result

N		120
Normal Parameters[a,b]	Mean	.0000
	Std. Deviation	4.81630
Most Extreme Differences	Absolute	.079
	Positive	.046
	Negative	-.079
Test Statistic		.079
Asymp. Sig. (2-tailed)		.061[c]

Based on the results of the normality test, the Sig value is 0.61> 0.05; this means that the data distributed normally. Because the data is homogeneous and distributed normally, it followed by an Anacova test. Summary of the Anacova Test Results in the Control and Experiment Classes showed in Table 4.

Table 4. Summary of Anacova Test Results in Experimental and Control Classes

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	6308.783[a]	2	3154.391	133.699	.000
Intercept	3311.249	1	3311.249	140.347	.000
XHBK	3601.283	1	3601.283	152.640	.000

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Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Kelas	2663.597	1	2663.597	112.896	.000
Error	2760.417	117	23.593		
Total	617402.000	120			
Corrected Total	9069.200	119			

a. R Squared = .696 (Adjusted R Squared = .690)

The results of the ANCOVA test in Table 4 show that sig. The value in the model is 0.00 which is less than 0.05; this means that the null hypothesis rejected and the research hypothesis is accepted. Based on the analysis, it can be said that information literacy affects the learning achievement of biology student. Table 5 shows the corrected average student learning outcomes in the experimental class facilitated by information literacy amounting to 75.911% while the learning outcomes in the control class were 66.489%. These findings indicate that the empowerment of learning outcomes with information literacy in the experimental class is better than students in the control class without the information literacy rubric. These results also supported by the percentage increase in learning outcomes in the experimental class which is higher than the control class.

Table 5. Average Comparison Corrected Learning Outcomes in Experimental and Control Classes

Class	Pre-test	Post-test	Differen-ce	Correct-ed Avera-ge
Experi-ment	54.75	75.950	21.200	75.911
Control	54.63	66.450	11.817	66.489

Based on these comparisons, it can be seen that the application of information literacy rubric can improve learning outcomes when compared to class without information literacy rubric. This result is supported by Soleymani (2014) research which shows the existence of a link between information literacy and student academic success at Isfahan University of Medical Sciences. Other research was also conducted by Julien et al. (2009a, 2009b) which shows that there is an influence between information literacy and business student learning outcomes. The results of the ANCOVA test show that information literacy influences learning outcomes. Besides that, it is found that the average corrected learning achievement of students in the experimental class facilitated by information literacy was 75.911 and the average corrected learning achievement of students in the control class was 66.489. These findings indicate that the empowerment of learning outcomes with information literacy in the experimental class is better than students in the control class without information literacy. These results also supported by the percentage increase in learning outcomes in the experimental class which is higher than the control class

The task given by students in one semester is to refer to one Learning Outcome Structure of Plant Development, which is to compile scientific articles, but from the results of previous research shows that students are still not trained and therefore need effort through information literacy (Sari et al., 2018). Klucevsek & Brungard (2016) argue that to be able to write in compiling scientific articles, students must develop skills in information literacy. Information literacy treatment in the experimental class with a rubric to assist students in completing assignments. The research is following Rapchak et al. (2016)opinion that rubric is used as a formative assessment to help students in the learning process. Rhodes & Finley (2013) emphasizes the rubric used in authentic assessments of the tasks applied; students possess not only content mastery but also the ability to use content knowledge in problem-solving. Other research by Sudrajat et al. (2018) shows that the use of formative assessment rubrics can improve critical thinking skills.

The results of the descriptive analysis revealed that students showed an active learning process in carrying out tasks from information literacy rubrics such as identifying the extent of information needed, accessing and evaluating information. Detlor et al. (2012) stated that the

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application of information literacy is an active learning strategy because through rubric literacy information students analyze, synthesize, and evaluate information to support the achievement of student learning in the classroom. Flierl et al. (2018) in line with the results of his research need to assign students to synthesize information and communicate results throughout one semester that are correlate positively with academic achievement. For example, a lecturer can replace the final exam with several small projects that will mature in 16 weeks as in Indonesia

Findings from student responses indicate that the use of rubric information literacy provides several benefits for students such as (1) increasing the substance and consistency of plant structure and development concepts; (2) improve scientific reasoning and writing ability; and (3) students are more confident in carrying out the tasks given. Laurian & Fitzgerald (2013) said that rubric directed at helping lecturers and students to assess to improve learning formally. The use of rubrics is essential when working with complex learning processes. Rapchak et al. (2016) emphasizes that the rubric is used according to the project learning model and allows students to assess their assignments directly and the purpose is to determine the learning outcomes met

The implementation of the information literacy rubric used consists of three criteria 1) beginning Indicators, 2) proficient Indicators and, 3) advanced Indicators. The results obtained from students, in general, are still at the beginning of the indicator because it needs to integrate into several other subjects to help develop students' intellectual abilities. At the beginning of the sign has a concept to connect science with other disciplines, can write scientific terms, but they still have misunderstandings (Fakhriyah et al. 2017). Flierl et al. (2018) research that examines the relationship between information literacy and student achievement varies based on the rating scale. The range of studies of small-scale investigations offers in detail how students use information for specific tasks and large-scale studies related to library resources.

CONCLUSION

Information literacy in this study implemented through rubric which is used as a formative assessment to help students in the learning process in compiling scientific articles, students need to develop information literacy. The results showed that the use of information rubrics had an effect on the achievement of student learning with a corrected average is 75,911.

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