JURNAL EDUSCIENCE (JES)
p-ISSN : 2303 - 355X | e-ISSN : 2685 - 2217
PUBLISHED BY : LPPM of UNIVERSITAS LABUHANBATU

Eduscience Journal (JES)

Volume 10, No. 1

April 2023

Submit : 11 February 2023

Accepted : April 5, 2023

STUDENT LEARNING OUTCOMES IN BASIC NATURAL COURSES VIEWED FROM THE ASPECT OF ATTITUDES, PRODUCTS, AND SCIENCE PROCESS SKILLS

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Abstract

Science learning outcomes that are only seen from one aspect cannot be called mastering science, even though the learning outcomes are good. The purpose of this study was to analyze student learning outcomes in the Basic Natural Sciences course in terms of attitudes, products and science process skills. This quantitative descriptive research was carried out in the PGSD Study Program on Campus 2, University of Mataram. The sample consisted of 116 5th semester students who programmed IKD courses. Learning outcome data were collected using the documentation method. Data that has been successfully collected is analyzed descriptively and visualized in the form of tables and figures using Ms. Excel. The findings that we get from the results of the descriptive analysis are that the average student science learning achievement is 67.02 with grade B, and the interpretation is good. Judging from the visualization results in the form of a histogram, the learning achievement data tended to be between 40.00 and 100.00. As for proportion, the predominant grade was B+ with a frequency and percentage of 34 and 29.30%, respectively. Based on these facts it can be concluded that student learning outcomes in the Basic Natural Sciences course in terms of attitudes, products and science process skills are in the good category.

Keywords: Student learning outcomes, aspects of attitudes, products, and science process skills

Abstrak

Hasil belajar sains yang hanya dilihat dari salah satu aspek belum dapat disebut menguasai sains, walaupun hasil belajar tersebut sudah baik. Tujuan dari penelitian ini adalah menganalisis hasil belajar mahasiswa pada mata kuliah Ilmu Kealamiahan Dasar ditinjau dari aspek sikap, produk dan keterampilan proses sains. Penelitian deskriptif kuantitatif ini dilaksanakan pada Prodi PGSD di kampus 2 Universitas Mataram. Sampel terdiri dari 116 mahasiswa semester 5 yang memprogramkan mata kuliah IKD. Data hasil belajar dikoleksi menggunakan metode dokumentasi. Data yang telah berhasil dikoleksi dianalisis secara deskriptif dan divisualisasi dalam bentuk tabel dan gambar menggunakan Ms. Excel. Temuan yang kami peroleh dari hasil analisis secara deskriptif adalah rata-rata capaian belajar sains mahasiswa sebesar 67.02 dengan grade B, dan interpretasi baik. Ditinjau dari hasil visualisasi dalam bentuk histogram, data capaian belajar tertendensi pada nilai di antara 40.00 dan 100.00. Adapun secara proporsi, grade yang predominan adalah B+ dengan frekuensi dan persentase secara berturut-turut 34 dan 29.30%. Berdasarkan fakta tersebut dapat disimpulkan bahwa hasil belajar mahasiswa pada mata kuliah Ilmu Kealamiahan Dasar ditinjau dari aspek sikap, produk dan keterampilan proses sains berada pada kategori baik.

Kata kunci: Hasil belajar mahasiswa, aspek sikap, produk, dan keterampilan proses sains

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INTRODUCTION

The Study Program or Department of Elementary School Teacher Education (PGSD) is a study program or department that is unique. This is because PGSD is the only Study Program or non-science group major whose students are facilitated to master science through certain subjects outside the Basic Natural Sciences (IKD) course. At the University of Mataram, the PGSD Study Program equips its students to master science through Elementary Science Education courses. The weight is 3 credits(Compilation Team, 2020). This means that students have 3 x 50 minutes to study face to face, 3 x 60 minutes to study unscheduled but planned by the lecturer and 3 x 60 minutes to study independently(Compilation Team, 2019). From the IKD course with a weight of 2 credits, students have 2 x 50 minutes for face-to-face study, 2 x 60 minutes for unscheduled study planned by the lecturer and 2 x 60 minutes for independent study. So that when totaled, PGSD students at the University of Mataram receive 5 credits of science course facilities.

Facilities in the form of these courses have a positive impact on students' mastery of concepts. This is evidenced by the good results of learning science in IKD courses where the average student science learning achievement is 75.83(Syazali, Wira, et al., 2021). In terms of gender, male students are able to master science concepts better than female students. The proportion of science learning achievement in the good and very good categories is dominant with a percentage of 93.81%. The rest is in the sufficient category, namely 4.12%. The proportion of very less category is 2.06%. A better phenomenon was observed in Elementary Science Education courses. Student mastery of concepts in this subject only consists of three categories, namely sufficient, good and very good(Syazali & Ilhamdi, 2022). This means that there are no students with abilities in the less and very less categories. The proportion of students with science learning outcomes in the good and very good categories is also greater, namely 98.6%. Even so, these data do not guarantee that students have mastered science.

Students need to have good competence in three aspects of science in order to achieve the title of "already mastered". The three aspects are attitudes, process skills and science products. Mastery of the concept itself is only one part of the aspect of science products. Other parts that need to be mastered are facts, principles, theories and laws. This does not include aspects of scientific attitude which consist of high curiosity, honest, objective, open-minded, caring, conscientious, diligent, courageous, and polite.(Yulianci et al., 2021), and aspects of science process skills which are differentiated into basic and integrated science process skills. Martin states that basic science process skills consist of skills in observing, classifying, communicating, measuring, predicting and concluding, while integrated science process skills consist of skills in identifying and controlling variables, formulating hypotheses,

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experimenting, statement of results depending on data, drawing graphs, and interpretation and modeling(Can et al., 2017).

The learning that has been implemented so far is certainly not enough to facilitate students to have good mastery of all aspects of science. Especially during a pandemic where students' responses to online learning tend to be negative(Rahmatih & Fauzi, 2020; Widodo et al., 2020). This has an impact on learning outcomes from the aspect of science process skills which are still low(Syazali, Rahmatih, et al., 2021). However, the learning innovations that have been carried out can have a positive impact on these aspects. So that in theory, these learning innovations are also able to develop student mastery of product aspects, and train scientific attitudes because in learning they are facilitated to find various scientific products themselves through learning based on attitude and science process skills. Because this is not necessarily proven empirically, evaluation is needed in order to obtain data. To accommodate this, we analyze student learning outcomes in IKD courses in terms of three aspects of science, namely product mastery, level of science process skills and their scientific attitude.

RESEARCH METHODS

We conducted this quantitative descriptive research at the PGSD Study Program, University of Mataram. The population of this study amounted to 210 students. The sample consisted of 116 5th semester students who programmed IKD courses, and were determined using purposive sampling. The number of this sample was determined using purposive sampling. The data on learning outcomes collected is a combination of aspects of attitudes, process skills and science products. The data itself was collected using the documentation method as used(Pramudiyanti, 2018). The document is in the form of a sheet of final value analysis (NA) showing two forms of value. The first is a quantitative value that describes each student's science learning achievement. Science learning achievements are obtained from the results of U1, U2 and U3 analysis for one full semester. The second is the qualitative value of the results of the conversion of science learning outcomes. This qualitative value consists of eight levels. They are E (lowest level), D, D+, C, C+, B, B+ and A (highest level). This qualitative value has an interpretation. The qualitative value of E is interpreted as Very Poor (SK), D and D+ Poor (K), C and C+ (Enough), B and B+ Good (B), and A (Very Good). All collected data were analyzed using descriptive statistics as used by(Syazali & Ilhamdi, 2022). The results of the analysis are then visualized in the form of tables and figures using Ms. Excel.

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RESULTS AND DISCUSSION

Results

Data from descriptive analysis of student learning outcomes in terms of knowledge/product aspects, attitudes and science process skills are visualized in the form of Table 1. The data from the descriptive analysis consist of the mean or average, standard error mean, mean value/median, value the most frequently occurring/mode, standard deviation, variance, range, highest value, lowest value, sum, and 10th to 90th percentile. Specifically for the mode, the value displayed in the table is only the smallest value, while for the other modes with the same frequency are 58.11, 63.55, 72.49 and 80.99.

Table 1. Descriptive statistics on student scores that describe science learning outcomes

No	Statistical variables	Quantitative value	Qualitative Value	Grade
1	Mean (average)	67.02	B	Good
2	Standard error mean	1.35		
3	Median	70.12	B	Good
4	mode	15.00a	E	Very less
5	Standard deviation	14.57		
6	Variance	212.42		
7	Range	81.78	B+	Good
8	Min value	13.00	E	Very less
9	Maximum value	94.78	A	Very good
10	Amount	7774.52		
11	10th percentile	52.88	D+	Not enough
12	20th percentile	57.51	C	Enough
13	25th percentile	59.61	C	Enough
14	30th percentile	61.39	C+	Enough
15	40th percentile	65.69	B	Good
16	50th percentile	70.12	B	Good
17	60th percentile	72.54	B+	Good
18	70th percentile	75.62	B+	Good
19	75th percentile	76.63	B+	Good
20	80th percentile	77.98	B+	Good
21	90th percentile	81.06	A	Very good

a: Multiple modest exist. The Smallest value is shown

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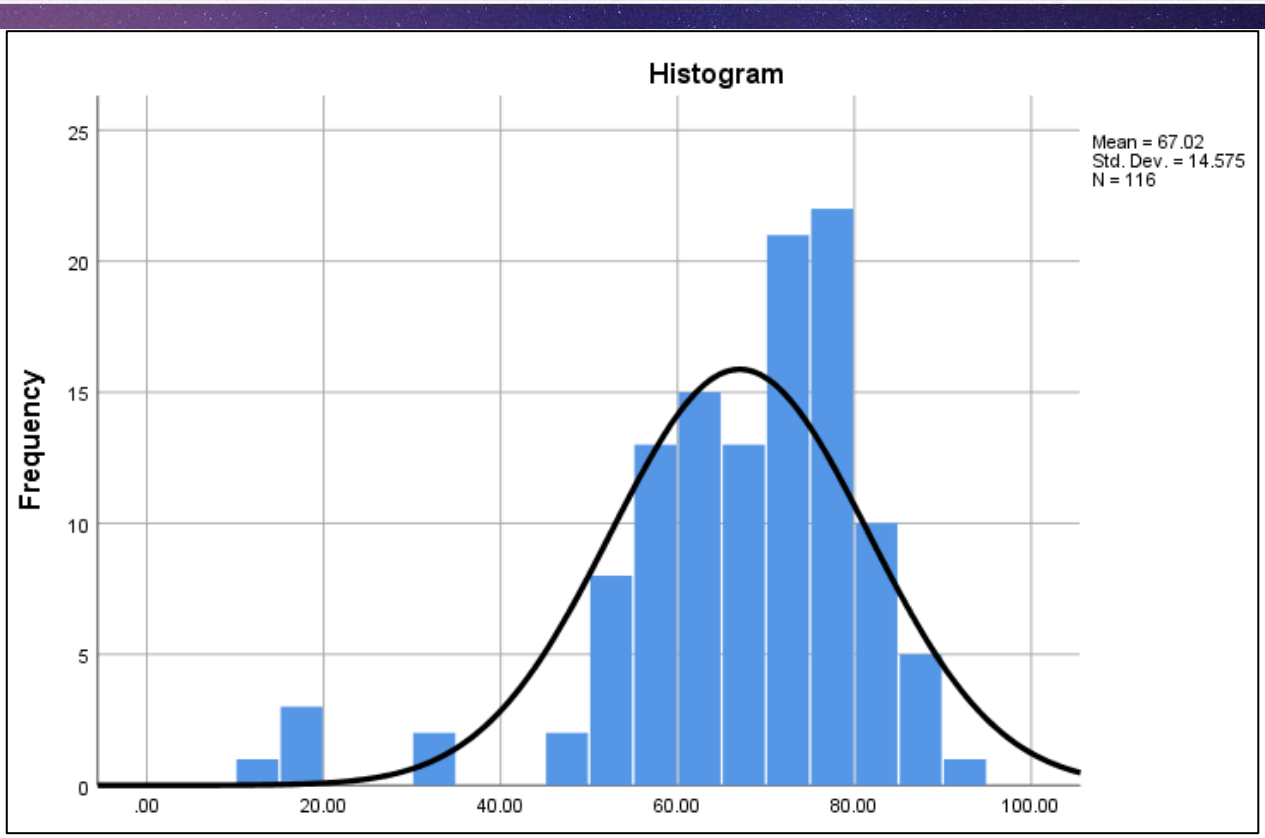

Figure 1. Distribution of student science learning outcomes in IKD courses

Descriptive data related to science learning achievements listed in Table 1 informs that the average degree of student mastery is 67.02. If converted, the value is qualitatively grade B, where the category has reached a good interpretation. This means that student competence in terms of attitudes, products and science process skills in learning is classified as good. This data is reinforced by the median value which is at 70.12. This indicates that at least 50% of students already have good and very good science learning outcomes. Other data that strengthens this statement is the range value of 81.78. This value has grade A, and the category is very good, and the maximum value reaches 94.78 where the grade is A, and the category is very good. Even though classically it is good, there are still some students whose scientific competence is still relatively low. This can be observed from the smallest mode which is only at 15.00 with grade E, and the category is very poor. There are even students who get a score of 13.00. This becomes the minimum value. In addition, the 10th percentile value is in the less category.

Based on the results of percentile analysis, the distribution of science learning outcomes in the adequate category (57.51 equivalent to C) was observed in the 20th percentile. This proves that the percentage of students with abilities in the less and very less categories in terms of product aspects, attitudes and science process skills is less than 20 %. Grade B (65.69) where the category is good has even

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been observed at the 40th percentile. This indicates that at least 60% of students already have science abilities in terms of knowledge, attitudes and science process skills in good and very good categories. The overall distribution of student science learning achievements is visualized in the form of a histogram (Figure 1) below.

The data visualized in the form of a histogram (Figure 1) shows that a small proportion of students' science learning achievements with a value of 40.00 to a value of 0.00 is only a small part. Learning outcomes are more concentrated in the range of 50 to 90. Although not the largest proportion, science learning outcomes with grades close to 80.00 and above have a higher proportion. Most science learning achievements are concentrated in grades in the range above 40,000 and below 100,000. In more detail, there were 85.40% of students who already had science competence in terms of the aspects of knowledge, attitudes and science process skills in the categories of sufficient, good and very good (Table 2). Among this group of students, the proportion is dominated by grade B+ with a good category (29.30%). Only 14. 7% of students who still have low science competence in terms of knowledge, attitudes and science process skills in learning because their science learning achievements are in the less and very less category. This group is divided into grade D+ (6.90%), grade D (2.60%) and grade E (5.20%).

Table 2. DP interval, grade, interpretation, and proportion of students' writing skills

No	DP intervals	Grade	Interpretation	Frequency	Proportion (%)	Cumulative
1		A	Very good	16	13.8	13.8
2		B+	Good	34	29.3	62.1
3		B	Good	22	19	32.8
4		C+	Enough	14	12.1	85.3
5		C	Enough	13	11.2	73.3
6		D+	Not enough	8	6.9	94.8
7		D	Not enough	3	2.6	87.9
8		E	Very less	6	5.2	100
Amount (Σ)				116	100	

Discussion

The science learning achievements of PGSD students at Mataram University in terms of all aspects of science are already in the good category. This statement is based on the average, median,

range which are in the good category (Table 1), the distribution of data on the histogram which concentrates on values between 40 to 100 (Figure 1) and the percentage which is dominated by grade B+ with good interpretation . This fact implies that the learning facilities used are appropriate. The learning facilities used to improve student science product competence are Unram e-learning, Google Meet and Whatsapp social media. Unram's e-learning is used for activities in the form of assignments and exams. Unram e-learning can store various learning resource soft files, so that students can study independently by accessing it without being constrained by time and space as long as there is an internet quota network. Google Meet is used to carry out scheduled face-to-face learning online via video conferencing. Whatsapp social media itself is used as an online discussion forum. The combination of these media meets the ideal standard of online learning activities during distance learning(Ferdianto et al., 2018). To train attitudes and skills in science processes, the surrounding environment is used as a Natural Laboratory, which empirically based on research results has proven effective(Syazali et al., 2022).

The good scientific competence of students shows that the combination of online and offline media that is applied is effective. This also means that students can take advantage of the advantages of each of these media. The Unram e-learning is a Moodle-based Learning Management System (LMS). The Moodle LMS itself has proven effective when implemented as an online learning facility for students(Herayanti et al., 2017). The effectiveness of the Moodle LMS is observed from its superiority in increasing active participation. The average active participation when studying reaches a percentage of 83% to 90%, where the interpretation of this proportion is very active(Simanullang & Rajagukguk, 2020). Another advantage of online media in learning is that students can maintain their enthusiasm, autonomy and learning motivation(Bradley, 2021), students can download available learning resources/references and actively participate in online discussions on the discussion forum menu(Mpungose & Khoza, 2020), easy to use so as to increase self-efficacy(Fearnley & Amora, 2020), developing student creativity in verbal, numerical, procedural, and figural aspects(Gunawan et al., 2019), and proven effective in increasing student summative learning outcomes(Saputro & Susilowati, 2019).

Apart from the Moodle LMS, students are also facilitated with the online media Google Meet for online face-to-face learning through video conferencing. This online media is very useful in implementing online learning during "learning from home"(Fuady et al., 2021). This is because learning is not limited by distance and time. PGSD students who come from various regions in the province of West Nusa Tenggara (NTB) can still carry out vertical reciprocity (interaction) with lecturers as facilitators and interact horizontally with fellow students. In online learning, Google Meet has proven effective in

developing verbal communication skills(Darmuki, 2020). This skill itself is a form of communication which is one of the markers of basic science process skills(Can et al., 2017). The use of Google Meet online media is also effective for increasing interest in learning because the time and place for learning become more flexible, easy to operate, and students can be facilitated even though they are far from their lecturers(Septantiningryas et al., 2021). Another advantage/advantage is that it can increase motivation when studying(Son, 2021), and the teaching and learning process runs smoothly and effectively(Nasution et al., 2021).

Student competence in a good category in terms of 3 aspects of science is also supported by the use of Whatsapp social media as an online discussion forum. If face-to-face learning in offline discussion forums is limited by the dimensions of space and time, then online discussion forums using Whatsapp social media can be used during learning, and after learning is over. Students carry out discussions by writing discussion materials, both questions, submission of opinions or other comments. Other discussion materials such as pictures and tables containing certain information can also be posted on the forum. During the lesson, students' active participation in discussions was observed in discussions through the chat menu on social media Whatsapp Group (WAG), and some students also interact with lecturers through direct personal channels. Another advantage of this social media is that students are relatively more active, function effectively as online discussion media during and after learning takes place, are able to increase motivation to play an active role and improve collaboration/collaboration skills both before and after learning.(Dahdal, 2020), online media that can motivate when studying(Pustikayasa, 2019)and have a positive impact on increasing student learning outcomes(Yensy, 2020).

The only offline media whose combination with 3 online media is effective in increasing scientific competence in this study is the Natural Laboratory. Even though learning media is offline, its function is also not limited by space and time variables. The environment around the students who become the Natural Laboratory can be utilized by students by adjusting their respective readiness and opportunities. Of course, this must also be adjusted to the characteristics of data sources in the field. For example, nocturnal amphibians are sampled at night, while diurnal insects can be sampled from morning to evening. Another advantage/advantage that is no less important is being able to develop students' science process skills(Syazali et al., 2022), and without the use of the Natural Laboratory or only online media, students' science process skills are low(Syazali, Rahmatih, et al., 2021). Through the process of constructing scientific knowledge/products using scientific methods, scientific attitudes, especially scientific attitudes, can also be trained during the learning process. The use of offline learning also

increases learning motivation due to boredom when facilitated fully online. Motivation itself has a positive correlation to learning outcomes (Sapitri & Fauziah, 2022)

CONCLUSION

Student science learning outcomes in IKD courses in terms of knowledge/product aspects, attitudes and science process skills are good. This is evidenced from the results of the analysis of learning outcomes where the degree of mastery is worth 67.02. The grade of the quantitative value is B with good interpretation. These results indicate that the implemented learning facilities have proven to be effective. From the internal aspect, students can make good use of these learning facilities, so that they can develop 3 aspects of science during science learning in IKD courses. Therefore, the advice that can be given is that science lecturers can use a combination of online and offline media to improve student science learning outcomes.

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