
Analysis of Biology Education Students' Learning Outcomes in Environmental Biology Practicum Plankton Identification Material

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ABSTRACT

KEYWORDS:

*Environmental Biology,
Learning outcome,
Cognitive,
Psychomotor.*

Practicum is an activity that supports students to interact directly with real material. One of the practical activities is observing objects so they are easy to learn. This research aims to determine the implementation of environmental biology practicum materials on plankton identification for biology education students at Muhammadiyah University of Surakarta. This type of research is descriptive qualitative. The sample for this research was 42 first semester students at the Biology Education Study Program, Faculty of Teacher Training and Education, Muhammadiyah University of Surakarta. Data collection techniques for cognitive learning outcomes were carried out using pretest and posttest, as well as observation questionnaires regarding student activities in practice as a result of psychomotor learning. Data analysis uses descriptive statistics. The research results show that cognitive learning outcomes seen from the average test results have differences, namely, the pretest average is 58.5 and the posttest average is 86.3. Psychomotor learning results were 78.8 with good criteria.

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1. INTRODUCTION

Education is defined as business humans used for grow as well as develop talent as well as the potential it has since born Good physical nor spiritual in accordance with the values that exist within life society and culture (Pristiwanti et al., 2022). Education in schools tall make generation This as figure role model from teaching previous generation. Until Now This is education No have limitation For explain the meaning of education in a way complete Because its complex nature like the target that is man . Its nature is complex That often called knowledge education . Knowledge education is continuation from education. Knowledge education more relate with theory priority education thinking scientific (Rahman et al., 2022). Education and science education own linkages in meaning practice as well as theoretical. So , in the process of life man both of them each other collaborating , for one is knowledge Biology .

Biology is one The science studied is very broad about creature life and life . In learning biology No free from role from lecturer as educator and motivator for students, meanwhile student is object active learning in do activity invention in obtain knowledge his knowledge (Aryani & Nugroho, 2022). Biology is very close connection with life everyday, then from That as lecturer as educator must collaborate between knowledge knowledge with life daily when implementation of the learning process going on , so will obtained meaningful learning . Knowledge Biology is closely related with practice (Mahrawi et al., 2022).

Practice Biology is closely related fiber with Skills in knowledge knowledge like observation, creation questions, communication, as well as use tools and materials can explained

as required capabilities in carry out the scientific process. Method practice can increase skills and results Study (Putri et al., 2021). Practicum is very good for develop and improve skills and results Study Because student can Study direct through practical, so they can find Alone facts and concepts (Purnamasari, 2020). Activity practicum also has a number of goals, for one is for hone skills required by students, provide chance for apply knowledge and skills in a way direct in practice. One of them is in practicum biology environment (Hamidah, 2022).

Biology environment is courses that discuss various draft about biology as well as environment (Chan & Budiono, 2021). Biology one 's environment branch knowledge studying biology interaction organism with environment they as well as impact activity man to ecosystem . Ecosystem waters own abundant diversity , for one is plankton diversity . Subject biology the environment also learns regarding plankton that can made as bioindicators water pollution through activity practice . student can identify structure and types of deep plankton activity the .

Learning outcomes is acquisition from the learning process student in accordance with objective teaching (ends are being attained). Objective teaching become results Study potential that will achieved by students through activity learning (Sapitri , 2020). Learning outcomes cognitive is behavior that occurs covers the area of cognition . Learning outcomes cognitive can interpreted as change behavior in scope encompassing cognition a number of aspect cognitive domain abilities . Learning outcomes cognitive be measured aim For get accurate information about aspects ability in the cognitive domain (Qomariah & Utama, 2022). Learning outcomes cognitive refers to achievement or results achieved by someone in realm cognitive , that is related aspects with thinking , knowledge , and abilities intellectual . Learning outcomes cognitive covers various type skills and knowledge that can be measured and assessed.

2. MATERIALS AND METHODS

2.1. Research design

The design of this research is a pre-experimental one group pretest posttest design. The research design according to Sugiyono 2008 is as follows:

Table 1. Research design one group pretest posttest design

Pretest	Treatment	Posttest
O1	X	O2

Information :

- O1 : Test initial (pretest) before treatment given
- O2 : Test final (posttest) after treatment given
- X : Treatment to group experiment that is with apply practice
For identify plankton

2.1.1. Population and Sample

Population in study This is first semester students taking eye studying practice biology environment totaling 42 students . Sample in research This is Senua There were 42 first semester students in the Biology Education Study Program , Faculty Teacher Training and Education , Muhammadiyah University of Surakarta.

2.1.1.1. Instruments

Test questions are used For get mark results Study cognitive with method administering the test. Test given before practice carried out (pretest) and after implementation practicum (posttest). Observation and documentation sheet used at the time activity practice taking place For get mark results Study psychomotor . Observation sheet For results Study psychomotor includes (observation , filing question , using tools and materials , and communicating).

2.1.1.2. *Data Collection Techniques*

Analysis of result data Study cognitive.

Analysis of result data Study cognitive done with analysis quantitative which includes two stages, namely First testing precondition with normality and homogeneity tests , secondly next with hypothesis testing using paired sample t-test.

Analysis of result data Study psychomotor

Analysis of result data Study psychomotor done in a way descriptive from results observation . According to (Putri et al., 2021) observation data obtained analyzed with use formula as following :

$$Persentase \% = \frac{Total\ score\ obtained}{Maksimum\ score} \times 100\%$$

From the results the can categorized as into the criteria in **table 2**.

Table 2. Percentage category psychomotor

Percentage (%)	Category
86-100	Very good
76-85	Good
60-75	Enough
55-59	Not enough
≤ 54	Very less

3. RESULTS AND DISCUSSION

3.1. Learning outcomes cognitive students in practicum biology environment material plankton identification

The research implementation involved 42 students as samples. Data on students' cognitive learning outcomes were obtained from the average of the pretest and posttest in the plankton identification practicum. A description of the cognitive learning outcome data is presented in table 2 below:

Table 3. Learning outcomes cognitive student in practicum material plankton identification

Description	Pretest	posttest
Amount sample	42	42
Lowest value	10	30
The highest score	60	80
Mean	58.5	86.3
Standard Diviation	12.33	14.91

Based on table 2. Analysis results show that results Study students on the pretest was 0 for minimum value and 60 for mark maximum with an average pretest score of 58.5. Whereas results Study students on the posttest was 60 for minimum score and a score of 90 for mark maximum with the average of 86.3.

Learning outcomes cognitive student furthermore tested hypothesis . Before testing the hypothesis so preceded with normality and homogeneity tests . The test results show that the data is normally distributed and homogeneous Because mark significance more from 0.05. Hypothesis

testing done with paired sample t-test. Hypothesis test results done For know difference in average values before practicum and after practice . Hypothesis test results shown in table 3 below :

Table 4. Results of the paired sample t-test

Test category	Mean	Significance Value
Pretest	58.5	0.007
Posttest	86.3	

Based on Table 3. Shows that mark significance $0.007 < 0.05$ then there is difference between the average values pretest with the average value posttest. That matter means There is significant difference between results Study cognitive student before do practicum and after practice . So that results study This show that implementation practice biology environment on the material identification of influential plankton to results Study cognitive student.

Research result This show that implementation practice make student more understand March plankton identification. With do observation direct on student plankton can identify in a way concrete types of plankton. That matter in line with (Ikhsan , 2020), which states that with method practice student more understand material Because faced direct with things related concrete with material studied.

Implementation practice is possible activities teach student For think critical and analytical so that can build broad and creative insights Power more detailed knowledge. Activity practicum is very necessary done in learn required materials studied directly by students. Especially regarding material plankton identification, student must do practice plankton observations directly in the laboratory. Practice according to (Winangun, 2021) it is activity Study teaching carried out by participants educate with do experiment in face in a way direct material to be studied it. Therefore That practicum is very helpful student in build knowledge and understanding to material plankton identification.

3.1.1. Learning outcomes psychomotor students in practicum biology environment material plankton identification

Implementation observation For evaluation psychomotor use four indicators, namely Observation, filing question, using tools and materials and communicating . Result of analysis of result data Study psychomotor served in table 5 as following:

Table 5. Learning Results Psychomotor Student

No	Indicator Skills observed	Percentage	Category
1.	Observation	89 %	Very good
2.	Submit Question	76 %	Good
3.	Using tools and materials	67 %	Enough
4.	Communicate	87 %	Very good

Learning outcomes practicum in the realm psychomotor shows the category average Good . Based on Table . 5 indicators observation show highest percentage with mark by 89%, value percentage indicator observation , incl in very good category . Based on study This is an indicator Skills observation student can use ability sense For gather fact in something object observation . Indicator observation seen when student use microscope to obtain data regarding Observation of plankton found in water samples . Observations made student the For get fact related material lessons learned , such as observation students on the structure of plankton and zooplankton who can observed from shape , color and size found in water samples during activities practice the . According to (Anwar, 2021), stated that observing (observation) can used For find a number results measurements in practice biochemistry with Good .

On research show that Skills submit question student increase interest in answer and submit question , student tend interested with convey results discussion in a way clear , precise and effective (Farikhatun Nikmah et al., 2023). On activities practice material bioindicators Water pollution can also occur bring up Skills form submit question with percentage 76% category Good . Activity This seen moment student submit question during observations , they also ask to One each other about what are they learn and discover moment observation taking place . Activity submit question become form liveliness students at activities practice Because of the 42 students who submitted question as many as 40 students .

Next skill is use materials and tools with percentage results 67% category Enough . That matter seen at the moment student use tools and materials in accordance with its function for example like moment student use a dropper to take water samples during activities practice . Although thereby indicator use tools and materials in research This Not yet maximum because part student Not yet understand principles base about tools and materials practicum that will be used . According to (Eliyart & Rahayu, 2021), in the his research state that use tools and materials practicum that is not in accordance with instruction will influence results practice . Students feel it too Afraid when will use tools and materials practice Because Afraid make error nor damage tool .

Skills The next thing that appears in the practicum is communicate . Communicate is No only seen from delivery in a way verbally , so in Skills observed communication is How ability student communicate results test in form graphics and shapes report (Rahayu, 2020). Percentage achievement Skills communicate namely 87% in the very good category . There is activity communicate This seen from ability students who can communicate results his observations through activity explain results practicum , discuss results , and presenting results practice so that happen exchange information , science and knowledge between student in accordance with material studied . Indicator communicate shown to students can read results practice . Besides that , so that students can also do it explain and explain in a way systematic and clear results from something practice.

4. CONCLUSIONS

Conclusions Based on results study implementation practice influential significant to results Study cognitive and psychomotor student . Average results Study student after implementation practice more tall before implementation practice . Learning outcomes psychomotor of 4 indicators average with criteria Good.

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