Media needs of plant anatomy practicum on digital microscope blended learning system on student naturalist intelligence

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Abstract. Naturalist intelligence of students is rarely measured by lecturers and the anatomy practicum media of blended learning systems based on digital microscopes has never been applied by lecturers as a plant anatomy practicum on campus, then conducted research with the aim to determine the media needs of plant anatomy based on microscope towards student naturalist intelligence. This research is a quantitative study using the True-Experimental Design design with the design of the Posttest-Only Control Group. The population in this study were all level II students of Wiralodra Indramayu University which consisted of 3 classes with a total of 96 students. The sampling technique using the cluster random sampling type probability sampling technique obtained Bio C class as the experimental group and Bio A class as the control group. The instrument in this study is a student's naturalist intelligence test which consists of 5 questions. Based on the results of the study, it was found that the average in the experimental class was 74 and the control class was 63.75. With a significant level (α) = 0.05 and degrees of freedom (df) 62, tcount = 28.29 and table = 2.000. Because tcount> t table. This means that the media needs of plant anatomy practicum on digital microscope-based blended learning system have a significant effect on the naturalist intelligence of prospective students of biology education teachers.

1. Introduction
Naturalist intelligence is the ability to observe patterns in nature and understand natural systems and man-made systems. Characteristics of someone who has naturalist intelligence tend to be adept at distinguishing species of birds, trees, and other types of flora and fauna [1]. Plant anatomy practicum can also explore the naturalist intelligence of students, such as students able to distinguish various kinds of plant tissue, students are able to identify the shape and size of cells, and students are able to explain various functions of plant tissue.

Student naturalist intelligence can essentially be explored when practicing plant anatomy, but it can be hampered due to internal learning processes and external factors of the learning process. As the results of observations made at Wiralodra University, that biology education students were bored with practicing plant anatomy using a light microscope because it was not practical in its use and it was difficult to visualize it, so student naturalist intelligence could not be explored maximally. External factors in the learning process are students playing social media on their gadgets when practicing plant anatomy.
Based on these problems, the required media for plant anatomy practicum on digital microscope-based blended learning system in improving student naturalist intelligence. The advantages of a digital microscope are the ability to do Streaming Video, Capturing, and Video Recording.

The advantages of digital microscopes are evidenced by previous research, virtual microscopy systems increase learning productivity, learning efficiency, critical thinking, ease of communication and student self-confidence [2], because the virtual slide microscope is easy to navigate, and the quality of virtual images is better than a normal microscope [3]. Improving students' understanding through the handmade simple boundaries designed by microscope against an optical microscope [4]. The application of Interactive Microscope smartphones can facilitate the stimulation of observational observations of microscopic organisms, this smartphone's interactive microscope incorporates learning elements of microorganisms and games [5]. The epifluorescence microscope can motivate learning and scientific student investigation [6], because the epifluorescence microscope has several advantages such as a selective microscope (SPIM) for several hours to several days [7], consisting of two detection lenses and purpose lighting, fast in toto fluorescence imaging of specimens with subcellular resolution [8], and flexible design with ability to facilitate transition and so on [9].

2. Methods

The population of this research is the level II student of biology education teacher, amounting to 96 people from 3 classes, the sample was selected using the Probability Sampling type of Cluster Random Sampling, the BIO C class was chosen as the experimental class and BIO A as the control class. This study uses a multiple-choice form test instrument for student naturalist intelligence. All instruments are in the valid and reliable category.

Research Procedure, in stage 1 is a preliminary study conducted by the researcher with the intention of finding references in determining problems until they are able to identify them. Thus, researchers can easily get an overview of problem identification from the title to be studied. Stage 2, the researcher prepares all research tools. Stage 3, the research instrument was used in the experimental class that used the media of plant anatomy practicum on digital microscope-based blended learning system and the control class that used light microscopy at the end of learning as posttest. Stage 4, the data obtained in the field were then analyzed to find out the media needs of the anatomy practicum of the blur learning system based on digital mikroskop based on student naturalist intelligence. Stage 5, after the data is analyzed, the results of the study are obtained.

Analysis of student naturalist intelligence test data was analyzed quantitatively by calculating the similarity of two averages (t test) between classes using the media of plant anatomy practicum on digital microscope-based blended learning systems and control classes using light microscopes.

3. Results and Discussion

The experimental class frequency distribution using the anatomical practicum media of digital microscope-based blended learning systems and control classes that use light microscopy can be seen in Table 1.

| Interval Class | Class Limit | Fi | Interval Class | Class Limit | Fi |
|---------------|-------------|----|---------------|-------------|----|
| 50 – 57       | 49.5 - 57.5 | 5  | 44.5 – 51.5   | 4           |    |
| 58 – 65       | 57.5 - 65.5 | 6  | 52 – 58       | 3           |    |
| 66 – 73       | 65.5 - 73.5 | 1  | 59 – 65       | 15          |    |
| 74 – 81       | 73.5 - 81.5 | 9  | 66 – 72       | 3           |    |
| 82 – 89       | 81.5 - 89.5 | 8  | 73 – 79       | 5           |    |
| 90 – 97       | 89.5 - 97.5 | 3  | 80 – 86       | 2           |    |
| Total (Σ)     |             | 32 | Total (Σ)     |             | 32 |

Table 1. Frequency distribution of experimental class and control class.
Table 1 can be explained that from 32 students the results of the student naturalist intelligence test in the class using the anatomy practicum media based on digital microscope-based blended learning system (experimental class) which got the lowest score in the 50-57 interval were 5 students, who got the highest score at the interval 90-97 is 3 students, while the highest frequency is 9 students in intervals 74-81. Whereas, the class that uses a light microscope with 32 students who get the lowest score in the 45-51 interval is 4 students, who get the highest score in the 80-86 interval totaling 2 students, while the highest frequency is 15 students at 59-65 intervals. The percentage of achievement of naturalist intelligence of students of each indicator in the experimental class which is the media of plant anatomy practicum based on digital microscope blended learning system and control class using a light microscope can be seen in Figure 1.

![Figure 1. Percentage of Achievement of Experimental Classes and Control Classes.](image)

Table 2. The results of the students' naturalist intelligence scores obtained a tcount of 28.29 while the t table at a significant level of 0.05 was 2,000. Because $t_{\text{count}} > t_{\text{table}}$. This means that the media needs of plant anatomy practicum on blended learning systems based on digital microscopy have a significant effect on the naturalist intelligence of prospective students of biology education teachers.
This can be reinforced by previous research, that the laboratory Blended learning system in microscopic anatomy delivers histological learning content effectively, so that students' learning interest becomes greater [10]. Path analysis shows that blended learning experiences influence student motivation, namely learning control and intrinsic goal orientation, affect students 'self-effectiveness, influence students' critical thinking, and influence metacognitive regulations [11]. The attitude of medical students towards the element of blended learning is very positive [12], namely the effectiveness of the learning process, and increased motivation [13].

4. Conclusion
Media needs of plant anatomy practicum on digital microscope based blended learning system have a significant effect on naturalist intelligence of students who are biology education candidates.

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