The Effectiveness of Atlas Media Based On Constructivist Approach in College to Improving Learning Outcome in Plant Anatomy

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Abstract. This study aims to determine the effectiveness of Altas media based on constructivist approach towards improving student learning outcomes in Plant Anatomy. This study used a pretest and posttest pre-experimental design. Data were analyzed descriptively and statistically, namely analyzing observations of the ability of lecturers to manage learning, student activities during learning using atlas media based on constructivist approach abilities before and after using atlas media. The results showed that the atlas media was effectively used in learning with the ability of lecturers to manage 80.5 learning included in the excellent category and during collage activities 80.3 students studied included in the very active category. These results indicate that learning using atlas media is more effective in improving learning outcomes in plant anatomy

1. Introduction

Plant anatomy is the knowledge that can reveal everything related to the inside of plants, such as cell relations, cell functions and tasks as body constituents living things and other cell functions [1]. Based on the results of interviews with researchers from the STKIP PGRI West Sumatra Biology Education students who had attended plant anatomy courses, several problems were found, among others, organ material was only studied using simple media, namely the appearance of practicum images and looking at the structure of plant organs using a monocular microscope and binocular microscope. The ability of students to provide practicum objects is lacking, so that the results of observations do not match the original object. The unavailability of plant anatomy atlas for guidance in the learning process and practicum.

Based on a report on the study of standardization and utilization of learning media in Higher Education, from 826 types of media and learning technology in Higher Education, 29.66% used computer-based media, print media (46.13%), audio-visual media (10, 53%), and laboratory media kits (13.68%). Seeing from the results of these studies, the print media dominates and is much favored to be used as a source of learning in universities, while other media receive less attention.

Education media plays an important role in the learning process. The use of educational media can help lecturers in delivering the lecture material. Learning success is determined by two main components, namely the method of teaching and learning media [2]. Lecturers should use a constructivism approach and motivate students to be able to learn according to their characteristics [3].

Based on the background above, the media that are presumed to be appropriate for dealing with the problem are print media in the form of Anatomy-oriented Atlas of constructs. Media Anatomy

Atlas Plants oriented constructivism can visualize the material so that students can learn independently and can build their own knowledge by directly being actively involved in the learning process. The purpose of this study was to develop effective atlas in the Plant Anatomy subject.

2. Experimental Method

The study was conducted in February-May 2019 which consisted of initial observations to determine the state of students. This type of research is a pre-experimental research. The population in this study were collage students of Program Study Pendidikan Biology STKIP PGRI Sumatera Barat class. The technique in sampling is cluster sampling. The subject of the research is the 2018A science class. The independent variable in this study is the representation atlas. The dependent variable in this study is plant anatomy ability consisting of root, stem and leaf. The design used in this research is the static group pretest-posttest design [4]. The form of research design is shown in Figure 1.
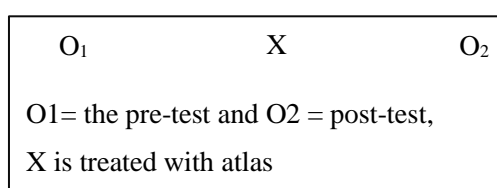
O_1	X	O_2

O1= the pre-test and O2 = post-test,

X is treated with atlas

Figure 1. Research Design [4]

Data collection techniques using several methods, namely the observation method, and the test method and documentation method. Non-systematic observation method, aimed at lecturer and collage students to determine the ability of lecturer in managing to learn and observations of student activities during learning using atlas based on constructivism. Systematic observation method is used to find out the ability of plant anatomy students have when learning takes place. The test used to determine the ability of plant anatomy is an essay test. The documentation method used to collect the initial ability scores taken from the plant anatomy ability test scores before using the atlas. Data analysis techniques in this study were carried out with the analysis of statistical analysis in the form of 1) normality analysis to determine whether the data obtained were normally distributed or not after that then performed statistical analysis using 2) test paired sample t-test to determine the improvement value before and after using learning atlas. 3) N gain test to determine the effectiveness of learning using atlas.

The gain score is the ratio of the actual gain to the maximum gain. The actual gain is the difference between the posttest score and the pretest score. The N-Gain formula is as follow :

$$N\text{-}Gain = \frac{Posttest\ score - pretest\ score}{Ideal\ maximum - pretest\ score}$$

Interpretation criteria for N-gain proposed by Meltzer in Abdurrahman, et al[5], as in Table 1

Table 1 N-gain interpretation criteria

The amount of Gain	Interpretation Criteria
$g > 0,7$	High
$0,3 < g \leq 0,7$	Medium
$g \leq 0,3$	Low

The criteria for the effectiveness of atlas are said to be effective if the level of achievement of N-gain is at least in the medium category.

3. Result and Discussion

The results of the test of the effectiveness of static electricity atlas based on constructivism are seen from the observations of the lecturer's ability to manage learning using atlas.

3.1. The ability of lecturers to manage to learn

The ability of lecturer to manage to learn as a whole is in a good category. Graph of lecturer's ability at each meeting can be seen in Figure 2.
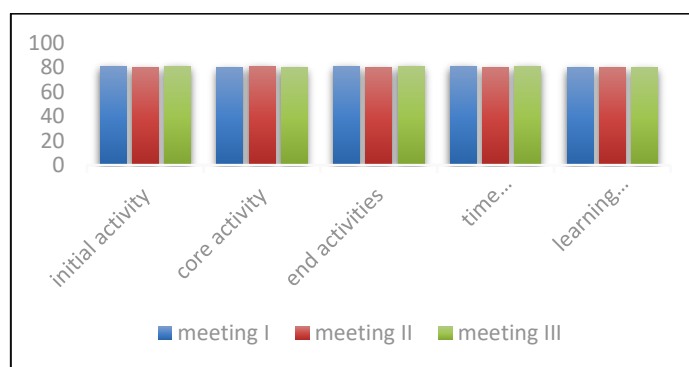

Figure 2. Lecturer ability to manage to learn

3.2. Collage student activity

Collage student activity during learning is relatively stable with the overall average being 80,3 inactive categories. Collage student activities in learning using atlas are active because students are involved in each phase of the activity from the phase of explaining the concept of the target to the phase of reflection and assessment. Collage students are more confident if they ask, answer and discuss with their peers compared to their lecturers. Collage students are motivated by their peers in asking questions and responding to questions from other groups. In the discussion, the lecturer only directs students to the achievement of learning goals. Results of observation in learning use atlas displayed in Figure 3
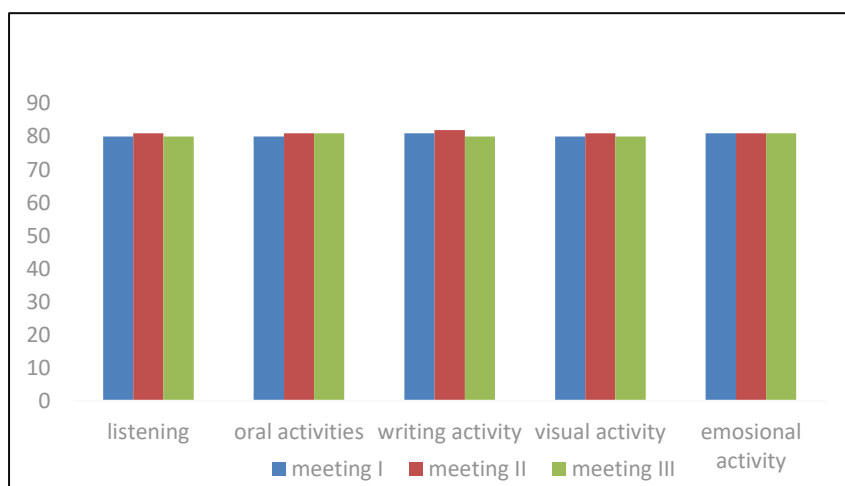

Figure 3. Observations of collage student activities

3.3. Test results for plant anatomy ability tests

3.3.1. Normality test

Analysis of the normality ability of microchemical analysis was carried out using the SPSS 16.0 program and produced the overall output of the data group showing the significance value (sig value)> 0.05. Because the sig value is> 0.05, Ho is accepted which means that the data group is normally distributed.

3.3.2. Paired Samples T-Test

Table 2 Paired Samples Test of

| | | | | Paired Differences | | | | |
| | | | | 95% Confidence Interval of the Difference | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	pretest - postest	-2.56667E1	1.15470	.66667	-28.53510	-22.79823	-38.500	2	.001

The results of the statistical hypothesis test on the testing of plant anatomy ability obtained the significance value of 0.001 <0.05, it can be concluded that Ho was rejected and H1 was accepted which means that there were differences in plant anatomy value before and after learning using atlas based on contructivism, and there were differences in measured abilities using the pretest and posttest results of collage students.

3.3.3 N-Gain test

The results of the improvement in plant anatomy ability were seen in the pretest value which was the value before using atlas and the posttest value was the value after using atlas was described in table 2, where it was shown that the percentage of plant anatomy ability in each aspect at the posttest score was higher than the pretest value. The difference in values in procedural aspects is seen to be high compared to other aspects.

Table 2. Test of material of plant anatomy

No	Material plan anatomy	Pretest	Postest	pos-pre	max-pre	N-Gain
1	Root	58,38	90,30	31,93	41,63	0,77
2	Stem	60,67	95,40	34,73	39,33	0,88
3	Leaf	60,58	90,01	29,43	39,42	0,75
	average					0,80

Based on Table 2, it is shown that the results of collage students' ability increased significantly with an average of 0.80 N Gain included in the high category. The improvement of collage students' plant anatomy ability after using atlas for each indicator based on the results of the pretest and posttest is shown in Figure 4.
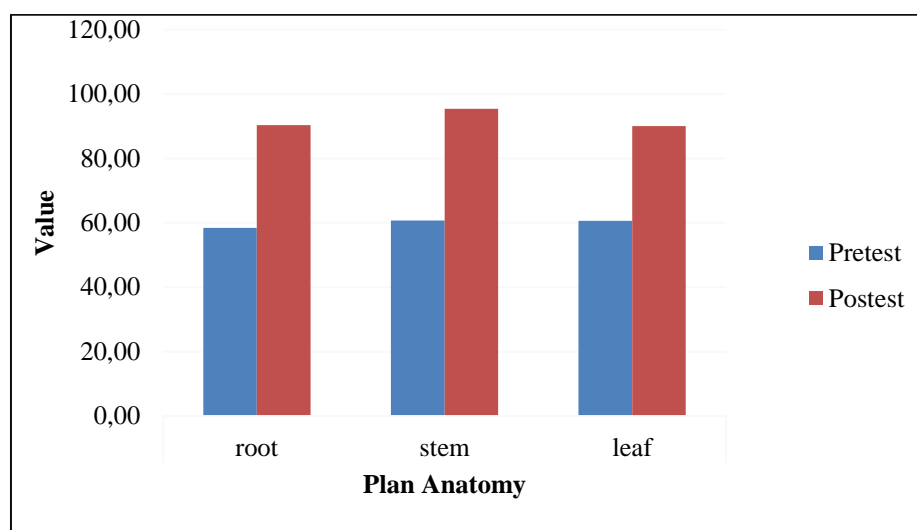
Figure 4. Increased Average Value of Material Plant Anatomy

Based on Figure 4 shows declarative ability shows that most collage students have successfully completed declarative questions that are given well, collage students can declare their ability to solve problems properly. Learn by some representations more effective in developing collage students' mental models in understanding the concepts of learning [6]. Based on the data above, the use of atlas media based on constructivism of has increased that is in the high category with a greater n-gain value. Indicates that atlas media are effectively used in the learning process.

4. Conclusion
The results of the analysis of the standard and discussion of the abilities of the class in STKIP PGRI Sumatera Barat were found that there was a significant increase in collage students value before and after learning using atlas media in the experimental class.

5. Acknowledgments

6. References
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