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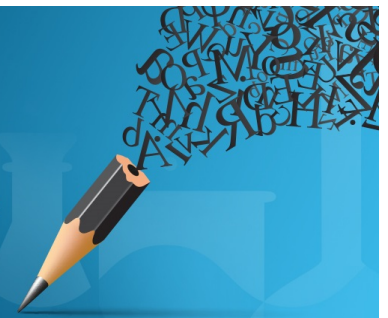


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The Effectiveness of A Field Study on Vertebrate Zoology to Improve the Mastery of Student Concept

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Abstract. Field study on vertebrate zoology is useful for students because students can observe many kinds of vertebrate species found in the location, get physical evidence directly in the form of documentation and describe the characteristics of the observed animals. Method of research used is quantitative descriptive. Techniques of data collections are pretest, posttest and questionnaires. Samples of research are 55 students. The data obtained are analyzed and described to get information as the results of the research. Based on the results of the process of data collected, it is found that the average pretest score is 17.164 and the average score of posttest is 23.709. The average score of N-Gain is 0.375 and the outcomes of the learning enhancement are put into a medium category. Based on the results of the research, it is inferred that the implementation of a field study on vertebrate zoology can improve the mastery of student concept, and with various limitations in the study, it is open to evaluation in order to improve the quality of lecturing process in class and the implementation of field study in the following semester.

INTRODUCTION

Vertebrate Zoology is a subject that studies the development patterns, anatomic characteristics and morphology of vertebrates. Lecturing on vertebrate zoology is performed through the methods of talks, presentation, discussion, practicum and field study. The lecturing materials present the classification of vertebrates, anatomic characteristics and morphology of Pisces, amphibians, reptiles, Aves and mammals. On campus lectures, the lecturing materials are presented on powerpoint slides accompanied with videos.

A lecturing process based on Information and Communication Technology (ICT) is required in facing the industrial revolution 4.0. However, lecturers are still to guide students in implementing their lecturing programs [1]. The students will have difficulties in understanding the presented materials if the lecturing process uses powerpoint slides only. Hence, the use of powerpoint slides is to be complemented with other study sources that can make the students learn to be on their own [2].

For those reasons, field study on vertebrate zoology is required to offer students actual knowledge and learning experience. This field study is carried out by students that take a vertebrate zoology course in even semesters. The objectives of the implementation of the field study are to obtain descriptions of the field study, get information about the effectiveness of the field study, and enhance the mastery of student concept by seeing the outcomes of the student study after the activities of the field study are done. The learning process is not only done by the presentation of material in the classroom but must be able to construct the understanding of students by exploring learning resources and building their knowledge through direct interaction with their experiences and environments [3].

EXPERIMENTAL DETAILS

The method used in the research is quantitative descriptive. It describes the effectiveness of a field study on vertebrate zoology that becomes the center of research without giving any special treatment to the activities. Descriptive research is a kind of research that is conducted to see the values of its variables (either one independent

variable or more) that neither compares nor connects with other ones [4-5]. Stages of research implementation are as follows the first stage of the research implementation is the preparation stage in which the students are made up into 3 groups and given explanation about the technical guidance, the second stage is the stage of the research implementation where each student group observes each vertebrate family such as reptiles, aves, mammals, and the groups take turn in doing it, the third stage is the stage of evaluation by giving tests and assigning students writing group reports.

Research is assigned to a single object, that is, 55 students consist of 45 female students and 7 male students. Data collections are processed through pretest and posttest in the form of essay, multiple choice and questionnaires. Data processing is done by calculating the normalized gain scores on Microsoft Excel. Data obtained through the students' questionnaires are qualitative and converted into quantitative ones. Calculation of N-Gain using the formula [6]:

$$N\text{-Gain} = \frac{\text{Skor posttest} - \text{Skor Pretest}}{\text{Skor Maks} - \text{Skor Pretest}} \quad (1)$$

Interpretation of N-Gain that is N-Gain with a high category with a range of $g > 0.7$, the medium category with a range of $0.3 < g \leq 0.7$ and a low category with a range of $g \leq 0.3$.

RESULT AND DISCUSSION

Based on the outcomes of the analyses of the scores of the pretest and posttest on the effectiveness of a field study on vertebrate zoology in enhancing the mastery of student concept, it is found out that the average score of pretest is 17.164, and the average score of posttest is 23.709 and the average score of N-Gain is 0.375. The average value graph can be seen in Fig. 1.

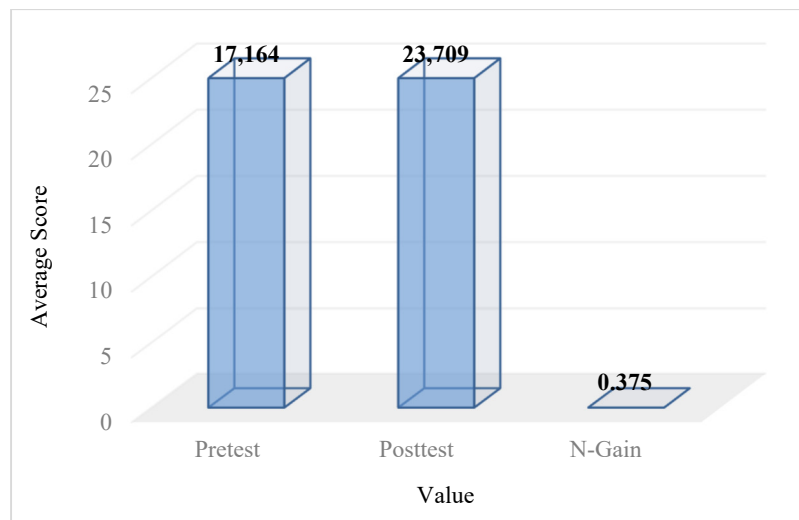


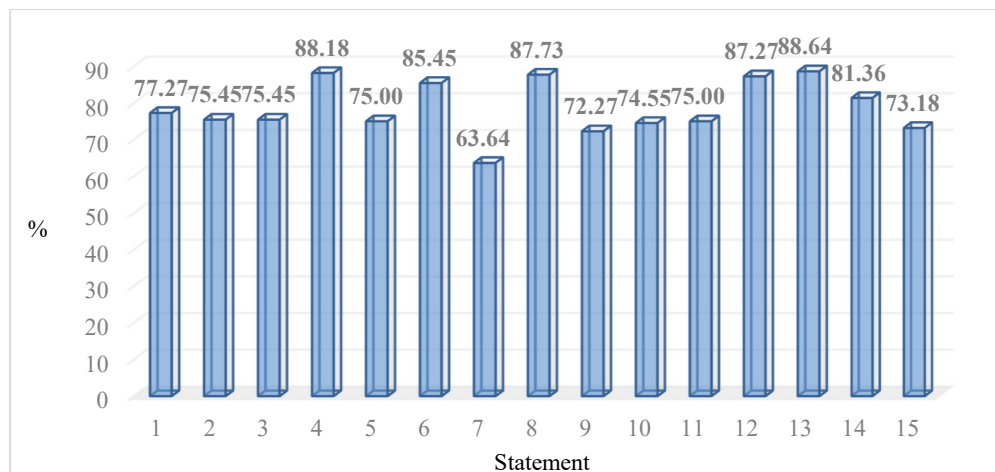
FIGURE 1. Average score of Pretest, Posttest and N-Gain

Effectiveness comes from the word effective that refers to having influence, impact or effect. The meaning of the word effectiveness is referred to as efficiency, being active, and conformity in activity between an individual who carries out a task and a goal that is expected to be achieved [7].

Effectiveness is an activity that can be measured by using several stages, among other things, by knowing the opinions of those who participate in the satisfaction of the whole activity, how much the concept is mastered, evaluate before and after the activity in order to learn about the effect on the performed activity, and to find out the impact of the activity as a whole [8]. Measuring and finding out effectiveness of a lecture can employ 4 indicators, that is, quality of assurance so that the information presented can be easily studied, appropriate level of instructions as to make sure about the readiness level of the students in receiving new materials, incentive, that is, how hard the efforts of a lecturer in completing his tasks and in learning the given materials, and the time needed to get his tasks completed on time [9].

TABLE 1. Analyses of Questionnaires of A Field study On Vertebrate Zoology

No.	Statement	Average	(%)
1	Clarity of field study activities	3.09	77.27
2	Quality of field study materials.	3.02	75.45
3	Effectiveness of a field study on vertebrate zoology	3.02	75.45
4	Quality of supporting facilities used	3.53	88.18
5	Achievements of the objectives of a field study	3.00	75.00
6	Students' understanding of the presented materials	3.42	85.45
7	Techniques of the implementation of a field study per group	2.82	70.45
8	Effectiveness of the whole lecturing process	3.51	87.73
9	Conformity between on-campus and off-campus lectures	2.89	72.27
10	Students' knowledge of vertebrates	2.98	74.55
11	Collecting field study assignments	3.00	75.00
12	Implementation of a field study	3.47	86.82
13	A field study offers you benefit	3.55	88.64
14	The existence of vertebrates at the site of a field study	3.25	81.36
15	Lectures' attitudes toward students	2.93	73.18

**FIGURE 2.** Percentage Average Value

Based on the outcomes of the data process, it is known that the average score of the pretest is 17.164, and the average score of posttest is 23.709. N-Gain is a description of the increasing scores, before and after the implementation of the filed lecture. The average score of N-Gain obtained is 0.375. Based on Table 1 about the category of N-Gain value, the score is included in a medium category. Such increase results from the effect of field study implementation so that the students can make verification between theories in class and in the field.

A field study has to be integrated into the process of class instructions since it can help increase knowledge, create cooperative attitudes, and influence biology achievements in the class [10]. A field study has become an important activity as the students can have a different atmosphere to study, gain knowledge of actual objects, and stand a chance to study the anatomic characteristics and behaviour of vertebrates. Such activities can motivate the students to be able to correlate the concepts that have been studied so that the lectures will make sense.

A learning activity is classified into 2 dimensions. The first one is to transfer materials through receptions and findings. And the second one is that the students can correlate the information with the knowledge they have gained [11]. Theories and practices are different activities but both are inseparable since practices are a process of authentication of theories that have been learned in class.

Data obtained for questionnaires shows that around 88.64% or an average score of 3.25 tells us that a field study benefits the students. The students want lectures with actual objects for them to recognize and understand the

vertebrates of each family. In a vertebrate zoology course, it is explained that even many students are unfamiliar with some certain animals and do not know about them in details. And when they see the actual animals, they show their feeling of satisfaction as they can comply with their curiosity. This prompts them to learn more about vertebrates. And the knowledge they gain stays in their memories. This has an influence on their student concept.

The lowest score is 63.64% with an average score of 2.82 on the statements of implementation techniques of a field study. The students are divided into three groups suited to the availability of vertebrates due to the incomplete animal collections. Vertebrates that can be observed are amphibians, Aves, and mammals. The groups take a turn in observing every class of vertebrates. Based on the results of unguided interviews, the gains of the low scores result from the division of the groups in a large term. This leads some certain students to not being able to comply with the rules of field study implementation. This condition needs evaluating for some revision in the next field studies.

Another low score is shown by the achievement of the objective of the field study, that is, 72.27% with an average score of 2.89. The objective of the field study is not completely reached yet due to both external and internal factors. External factors embrace implementation procedure, location of observation, and availability of vertebrates. And internal factors are attributed to the students themselves such as not complying with the procedure, not doing their group assignments, and absence of cooperation among the students. The outcomes of the calculation of questionnaires with low scores can be something to be evaluated concerning the instructions and off-campus lectures in the next semester with the hope that the possible faults can be improved.

SUMMARY

Based on the outcomes of data analyses, it is known that there has been an increase in test results done before and after the implementation of the field study with the score of N-Gain as much as 0.375; it belongs to a medium category. The outcomes of questionnaire analyses show that the students' understanding of the presented material is 85.45%. The effectiveness of the whole activities reaches 87.73%, and the benefit of a field study for the students is 88.64%. Based on the mentioned data, it is known that the implementation of a field study can be effective in mastering a student concept. The implemented field study can provide a different learning experience that teaches students how to understand more about the instructions by seeing actual objects.

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