The Effect of Inquiry-Based Ecosystem Learning Module from Fishponds as a Learning Resource on Students' Cognitive Ability

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Abstract. Cognitive abilities are important abilities that students have to be able to construct and understand lessons. The development of students' cognitive abilities can be done through modules where the use of modules can improve learning activities and student learning outcomes. The use of modules with local potential learning resources makes learning more meaningful. The research aimed to compare student’s cognitive skills between students using the ecosystem module based on inquiry with fishpond as a learning resource and worksheet. The research was a quasi-experiment using a nonrandomized control group pretest-posttest design. The subjects of this research were two classes including 28 students of grade X IPA 3 as an experimental class and 28 students of grade X IPA 4 as a control class. The data were analyzed using analysis of covariance (ANCOVA). The result showed that the p-value was less than α or p < α (α = 0.05) that meant H1 was accepted. It was concluded that there was a difference in student’s cognitive skills using the ecosystem module and worksheet. Therefore learning using ecosystem module based on inquiry with fishpond as a learning resource empowered student’s cognitive skills. The effectiveness of modules based on local potential improves students' cognitive abilities so that modules with learning resources from local potential can be applied in schools, especially ecosystem materials.

1. Introduction
The formation of human resources cannot be separated from the important role of education. Through education, it is hoped that it can develop various innovations and potentials that play a role in various life developments [1]. One of the efforts to realize quality education to prepare for future challenges is to develop learning tools and teaching materials that are in accordance with the curriculum and in accordance with the conditions of students [2] [3]. Teaching materials are developed based on the needs of teachers, students, and adjusted to the factors that need to be developed to improve the quality of learning [4]. The planning of the learning process can run well if the teacher can organize learning regularly and is easy to understand [5]. Good teaching materials not only develop conceptual understanding but also develop student skills such as analyzing, interpreting, concluding, and solving problems with creative solutions [2]. One of the teaching materials that can be used for learning is a module.

Modules play an important role in learning because they are not limited by time and can be used for active learning and details of the learning material being studied. [6]. The use of modules in learning by utilizing local contexts is in line with research conducted by [7] [8] [9]. The use of modules supports effective learning that can prepare students with knowledge, skills, values, and prepare
supportive and contextual learning [10]. Contextual learning can be done by integrating local potential into learning. Local potential can provide a local context in the development of knowledge that is able to connect scientific theory with local conditions so that the learning that students get is more accessible and meaningful [11]. Local potentials that are often found in Lamongan are fishponds and are supported by large fish yields so the Lamongan Regency is designated by the Governor of East Java as the largest fish producer in East Java [12]. It is important that the implementation of the school curriculum innovation depends on the knowledge, skills, and commitment of teachers and students [13]. The learning process should be carried out through a scientific, thematic approach both between subjects and within a subject so it is necessary to apply research-based learning (inquiry) [14] [15]. This study aims to determine the effect of the inquiry-based learning-based ecosystem module on students' cognitive abilities.

2. Methods

2.1. Design
This study was quasi-experimental with a pretest-posttest nonrandomized control group design. The population of this study were students of class X IPA SMA N 1 Karangbinangun for the 2019-2020 school years. The research subjects consisted of 28 students of class X IPA 3 as an experimental class and 28 students of class X IPA 4 as a control class. The experimental class is a class that is learned using modules and the control class is a class that is a worksheet. The hypothesis of this research is that the inquiry-based ecosystem module sourced from pond learning affects the student’s cognitive abilities. Data were analyzed using ANCOVA.

2.2. Assessment
Students' cognitive abilities were measured using a multiple-choice test instrument. Cognitive ability indicators refer to Bloom's taxonomy which consists of (1) remembering, (2) understanding, (3) analyzing, (4) organizing, (5) evaluating, and (6) creating.

3. Results
There are differences in the student’s cognitive abilities that are taught using inquiry-based ecosystem modules based on pond learning with students who are taught using worksheets. This can be seen from the comparison of the pretest and posttest in the experimental class and the control class (Figure 1), the comparison of each indicator in the experimental class (Figure 2), and the control class (Figure 3).

Figure 1. Comparison of Cognitive Ability of Students in Experimental and Control Class
Based on the ANCOVA test results show that the p-value <0.05, which indicates that there is a difference in cognitive abilities between the groups that were taught by the inquiry-based ecosystem module based on pond learning using worksheets. Learning by using modules is more effective in empowering students' cognitive abilities. The significance value of .000 (p <0.05) on the pretest cognitive ability shows that the pretest as a covariate affects the posttest cognitive abilities.

4. Discussion
The ANCOVA test results at the 5% significance level can be concluded that there are differences in the cognitive abilities of students who use modules and those who use worksheets. The mean of posttest results of cognitive abilities in classes that were taught using modules has increased compared to classes that use worksheets. Cognitive abilities are important abilities that every individual has to be able to construct, understand, predict, and shape individual behavior [16]. In this study, students' cognitive abilities were improved with the help of teaching materials in the form of modules. The use of modules can improve learning activities and student learning outcomes [17]. The learning activities in the module refer to the inquiry learning syntax with the help of the teacher or commonly referred to as guided inquiry. The results of research conducted by [18] [19] [20] [21] show that inquiry learning has a significant effect on biology learning outcomes. Inquiry improves students' cognitive learning outcomes [22]. The inquiry syntax consists of (1) presenting phenomena, (2) focusing questions, (3)
planning investigations, (4) conducting investigations, (5) analyzing data and evidence, (6) building new knowledge, (7) communicating new knowledge (23). Inquiry learning is one that is carried out using a scientific approach [15].

In the module, there are activities that support active students in the learning process using inquiry syntax. Learning activities using inquiry make students active during learning. Students are involved in every stage of the learning process, from choosing what they will investigate, formulating the focus of the problem, to getting the final product [24]. The activity of presenting phenomena in this study was carried out by observing the phenomenon of the pond ecosystem, assisted by displaying videos and images in the module. In the activity of focusing on questions, the teacher asks questions [25] to be completed by the observation process. In planning the investigation stage, students are facilitated to convey opinions in accordance with the learning objectives and phenomena presented, this provides an opportunity for students to construct knowledge in their cognitive processes [26].

At the stage of investigating, students make observations in the pond based on the given module. Students observe the components of the pond ecosystem and record what is found in the pond. Students can observe real conditions so as to improve learning outcomes [27]. The stage of analyzing data and building new knowledge was carried out by students with the help of the teacher. The teacher acts as a facilitator who helps students when they experience difficulties in the learning process. At this stage, students also discover new knowledge from the observations that have been made. At this stage there is information processing that can improve students' cognitive abilities [28].

The final stage of the inquiry syntax is to communicate new knowledge. The stage of communicating new knowledge was carried out by students by conveying what was obtained from the observations that had been made after discussing with the group. Group discussions allow students to share thoughts about learning experiences that have been carried out and solve problems on the observations made [29]. Interaction in the discussion process helps students formulate ideas, evaluate thinking, and develop reasoning skills [30]. The teacher provides reinforcement from the results of the discussions that are carried out and allows students to conclude and reflect on learning.

Cognitive abilities are trained through guided inquiry stages by working on questions in the feedback section and formative tests. All questions on learning activities support students’ cognitive abilities with indicators of remembering, understanding, applying, analyzing, evaluating, and creating [31]. The indicator considering that it experienced the highest increase compared to other indicators was 16.97%. The developed module can improve students' cognitive abilities because there is a description of the material [32].

The description of the material contained in the module helps students understand and master the concepts being learned [30]. The material descriptions in the module come from various sources of information, both from direct research conducted by researchers, books, and journal articles. Modules are developed with learning resources taken from local potential, namely ponds. Learning by utilizing local potential is effective for developing practical skills and student responsibility [33]. This module supports contextual learning by linking local potential as a learning resource. This is in line with research [34] which states that the use of local potential-based modules can improve learning outcomes in cognitive, affective, and psychomotor aspects.

5. Conclusion
It was concluded that there was a difference in student’s cognitive skills using the ecosystem module and worksheet. Therefore, learning using the ecosystem module based on inquiry with fishpond as a learning resource empowered student’s cognitive skills. The effectiveness of modules based on local potential improves students' cognitive abilities so that modules with learning resources from local potential can be applied in schools, especially ecosystem materials.
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