Contextual-Based Animal Encyclopedia: HOTS on Elementary School’s Students

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ABSTRACT
This study aims to determine the effect of contextual use of animal encyclopedias in developing HOTS ability of Elementary School students. The subjects of this study were fifth grade students in 15 elementary schools in Malang Regency. The Data was collected using a test instrument consisting of indicators from C4 to C6. The design used in this study is non equivalent control group design. The results showed Animal encyclopedia contextual-based learning effect on HOTS ability of fifth grade students on 15 elementary schools in Malang Regency. The gain score test results showed that from 15 SD trials showed 11 elementary schools using contextual animal-based encyclopedias were effective in increasing students' HOTS. Contextual learning can develop students' high-level thinking skills.

Keywords: HOTS, animal, encyclopedia, contextual, elementary school

1. INTRODUCTION
The 21st century is characterized by 4C capabilities namely Creative, Collaborative, Critical thinking and Communicative. The 4C ability is part of the higher order thinking ability. Higher order thinking skills (HOTS) are thinking abilities that not only require the ability to memorize and remember, but also require other higher abilities, such as the ability to think creatively and critically [1]. Bloom classifies high levels of thinking in the cognitive realm in the form of analyzing/C4, valuing/C5, and Creating/C6 [2]. High-level thinking ability is an ability that must be developed by students [3], because high-level thinking skills can make students learn deeply, students understand concepts well [4], distinguish ideas and ideas clearly, able well-reasoned, able to solve problems, construct explanations, hypothesize and understand complex things [5], able to think concretely [1], as problem solvers [6], and able to interpret, analyze and manipulate information [7], and be able to make students become independent thinkers [8]. The use of HOTS in the learning process will produce learning activities that can improve students' thinking abilities. Therefore, high-level thinking skills are needed and useful for elementary students.

However the fact is students still have difficulty in thinking at a high level. According to research conducted by (Henniengsen & Stein [9]), states that learning still leads to conceptual limitations on students, starting with thinking problems, reasoning, and problem solving skills. [10], states that the elementary students' thinking abilities only display limited understanding and no complex systems, students lack in constructing concepts and theories in a complex manner [5], students have not been able to think hypotheses and solve abstract problems [1], performing demanding tasks to think at a high level is still low [11], students have not been able to apply information to solve problems [7].

All this time HOTS has been developed in several ways including through PBL-based mobile phones [12], Collaborative learning [13]; Flipped classroom [14], 5P model [15]; Problem based method [16]; E-learning [17]; exploring the potential of students directly with a broad, systematic and detailed scope of objects and environments [18]. But so far the development of HOTS has never been through encyclopedias adapted to the characteristics of the child's environment. Even though the encyclopedia is able to facilitate students in accessing information sought alphabetically [19], [20]. encyclopedias discuss topics of knowledge and cognitive development from various perspectives [21]; Acquisition of complete knowledge so that it becomes easier and more enjoyable, reliable and clear because it comes from several experts and compiled with a hierarchical system (Sader in [22]; improving learning outcomes, understanding concepts and
student motivation [23], [24], and [25]; [26]; [27]; [28]; [29]; Enhancing Creativity [30]. Encyclopedia will be preferred by students when contextual - based or appropriate to the student's environment. Contextual based learning, will help students link material taught with real-world situations and encourage students to make connections between knowledge and application in their lives [31]. With the linkage of the learning process with student experience, will make learning more meaningful [32], [33]; students are more productive and innovative [34]. So that the learning process takes place naturally in the form of students’ activities in work by experiencing, not transferring teacher knowledge. For this reason, this study examines the effect of using encyclopedia-based animal encyclopedias in improving HOTS or high-level thinking skills of elementary school students.

2. METHOD

This study uses a quantitative approach that aims to determine the effect of animal encyclopedias contextual -based in improving students' HOTS abilities. The study design uses non equivalent control group design. The sample in this study was fifth grade elementary school students in 15 elementary schools in Malang City and Regency. Data collection using the HOTS ability test instrument of students. Before the instrument was used the validation, reliability, difficulty level and different test problems were tested. The following development of HOTS students’ ability instruments is shown in table 1, as follows:

| Table 1 Development Of HOTS Students’ Ability Instruments |
|----------------------------------------------------------|
| Indicator      | Sub Indicator Question                                      |
| C4 (Analyze)   | Analyze (search and select) information appropriately      |
|                | Find assumptions in a text                                 |
|                | Analyze parts of text                                      |
|                | Analyze the relationship between the text information read |
|                | with the experience gained                                 |
| C5 (Evaluates) | Draw conclusions from the text                             |
|                | Find the implications of a text                            |
| C6 (Compose)   | Convey clear information using your own language           |

Hypothesis testing uses Independent Sample t-test, with the following formula:

\[
t = \frac{\bar{x}_1 - \bar{x}_2}{S_{p} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}
\]

(Prayitno D, 2010)

With the following criteria:

a. Ho is accepted if \( t_{table} \leq t_{count} \leq t_{table} \)
b. Ho is rejected if \( t_{table} > t_{count} \)

Then the gain score test is performed with the formula:

\[
N = \frac{Posttest \ score - Pretest \ score}{Ideal \ score - Pretest \ score}
\]

(Hake, R.R 1999)

The gain test criteria are shown in table 2.

| Table 2 The Gain Test Criteria |
|-------------------------------|
| Precentage (%)                | Criteria              |
| < 40                          | Ineffective           |
| 40 – 55                       | Less effective        |
| 56 – 76                       | Effective enough      |
| >76                           | Effective             |

(Hake, R.R 1999)
3. RESULTS AND DISCUSSION

The results of the study at 15 elementary schools in Malang City and Malang regency are shown in table 3.

| Paired Differences | 95% Confidence Interval of the Difference | t | df | Sig. (2-tailed) |
|-------------------|------------------------------------------|---|----|----------------|
| Mean | Std. Deviation | Std. Error Mean | Lower | Upper | |
| Pair 1 | Pre-Post Test C4 | -2.8282 | 2.72478 | 0.12946 | -3.0826 | -2.5738 | -21.847 | 442 | 0.000 |
| Pair 2 | Pre-Post Test C5 | -3.7409 | 2.42446 | 0.11519 | -3.9673 | -3.5145 | -32.477 | 442 | 0.000 |
| Pair 3 | Pre-Post Test C6 | -4.6508 | 3.24204 | 0.15403 | -4.9536 | -4.3481 | -30.194 | 442 | 0.000 |

Based on table 3, it can be explained that the results of the analysis through hypothesis testing, the results of the posttest values obtained tcount of -21.847, -32.477, and -30.194, because tcount was negative, the researchers wrote | tcount | to posit with values 21.847, 32.477, and 30.194, and ttable obtained values of 1.648. Results | tcount | > ttable, so that you can write 21.847, 32.477, and 30.194 > 1.648, and the value of sig. (2-tailed) 0.000 < 0.05. So it can be concluded that there are differences in the ability of HOTS students before and after using Animal Encyclopedias Contextual-based.

Based on the results of the gain test shown in Figure 1. Based on figure 1 the calculation of the Gain Score test shows that the average value of the N-Gain Score on SD 1 gets 65% (quite effective), SD 2 gets 48% (less effective), SD 3 gets 67% (quite effective), SD 4 gets 67 74% (quite effective), SD 5 got 89% (effective), SD 6 got 79% (effective), SD 7 got 71% (quite effective), SD 8 got 71% (quite effective), SD 9 got 89% (effective), SD 10 got 79% (effective), SD 11 got 76% (quite effective), SD 12 got 74% (quite effective), SD 13 got 35% (not effective), SD 14 got 72% (quite effective), SD 15 gets 56% (less effective).

Based on the description it can be stated that from 15 elementary schools in Malang City and Regency there are 4 elementary schools in the effective category, 7 elementary schools in the effective category, and 4 elementary schools in the category of ineffective use of animal-based contextual encyclopedias to determine the HOTS of fifth grade students.
The use of contextual-based animal encyclopedias can improve students’ higher order thinking skills. Contextual based learning can develop meaningful learning for students. Meaningful learning will be easily remembered by students because it matches with the daily lives of students so that students are able to develop the ability to reason and creativity of students, especially in everyday life.

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