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# The Influence of Thematic HOTS Questions and Critical Thinking Skills on Learning Outcomes of Elementary School Students

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**Abstract:** In the 21st century, a student is required to have high-level thinking skills in learning activities, also called High Order Thinking Skills (HOTS), the teacher's role is quite important in this case, namely the need for habituation to work on high-level questions. The purpose of this study was to determine the effect of applying thematic HOTS questions and critical thinking skills to the learning outcomes of fourth grade elementary school students in Grobogan Regency. The approach of this research takes a quantitative approach, and uses an *ex post facto model design*. This study used a sample of 47 students, data collection techniques in the study used questionnaires and documentation, using validity and reliability tests. The prerequisite test uses normality and linearity tests. Simple linear regression hypothesis test using t test, multiple regression using F test. Research Results (1) The application of thematic HOTS questions has a significant effect of 14.5% on learning outcomes. (2) Critical thinking skills have a significant effect of 22.9% on learning outcomes. (3) The application of thematic HOTS questions and critical thinking together have a significant effect of 0.33% on learning outcomes

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## Introduction

Education is the most essential element of a country, the government definitely wants to give the best for realizing a good and practical education, and one of the efforts is to make a good curriculum. To realize students can learn independently, actively, creatively, and can think critically. Indonesia often suffers curriculum changes, from the KBK and KTSP to the 2013 curriculum concept curriculum (Wasifatun Najiroh, 2020). The quality of learning in Indonesia is currently still lacking so it needs to be improved so that it can be measured from the low results of TIMSS version 15 according to measurements by TIMSS, "Indonesian students may on average only have a few basic facts, such as not being able to communicate, connecting different topics, and apply complex and abstract concepts to subjects. Therefore it is included in the category of Low International Benchmark". Students' skills in critical thinking, especially in Indonesia, are still very lacking. The problem was found based on the results of the 2012 program (PISA), which used questions consisting of 6 levels (one lowest level and six highest) students were always able to work on questions at stage level 1 and level 2. So that it can reach rank 64 with a score obtained by Indonesia is 382 (Rachmedita et

al., 2017) this condition showed a tendency for critical thinking skills to be so lacking. This problem is becoming an evaluation material for improving the quality of learning in Indonesia in the face of changes in the 21st century, an era where everything that used to be conventional is now digital and even automatic, one of which is in the field of education by inculcating High Order Thinking Skills (HOTS) that must be learned by students and must be developed by teachers as educators who teach to prepare for the achievement of 21st-century learning goals (Fanani & Kusmaharti, 2018).

According to (Abdul Majid, 2014) thematic learning is a planned strategy to unite several points of view with subject that related to thematic or with subjects. Meanwhile (E. Mulyasa, 2015) integrated thematic learning is the provision of knowledge used at the basic education level that displays the learning process according to the theme which is integrated with other subjects then. So the conclusion from the theory above is that several understandings by experts can be drawn from the outline that thematic learning is an approach that is set on learning which is applied to the level of elementary school by intentionally linking several aspects based on the theme and then unification with the subject.

Thematic learning also has weaknesses. Although it has advantages, thematic learning has several weaknesses, namely: (1) skills and concepts are less systematic. (2) the themes used in curriculum learning are quite complicated (3) storage is needed to support thematic teaching activities in LKS books, module books or the like, some are not carried out coherently, (4) transitions lead to learning, curriculum transitions are shown to be thematically based on the time and obligations of the teacher and the partner involved, (5) The comprehensive and continuous evaluation of the various methods is difficult to reconcile (Wolfinger in Chumdari et al., 2018). Teaching and learning activities will be more fun and make an impression on students with supporting factors, one of which is the environment because if the student environment provides a sense of security and comfort, students can absorb the material well. Learning can be interpreted as an individual and contextual process, which means that students' self-development is under the state of the surrounding environment. Therefore, learning by doing can be more meaningful than just hearing an explanation (Setiawan et al., 2020).

Critical thinking is a high-level thinking process by emphasizes the quality of speculative, independent, clear, and rational learning. According to (Baderan, 2018) critical thinking dexterity is a person's mental strategic ability which includes clear and sequential reasoning, analysis, and evaluative abilities with experience or special training so that they can make these decisions and bring goodness.

Researchers (Aizikovitsh-Udi & Cheng, 2015) said that preschool to high school experience and also supported by university experience for structured programs are the foundations that students need to have, started by thinking critically; recognizing potential, valid and changing behavior leads to the development of particular thinking. According to (Facione, 2011) critical thinking skill has some indicators as follows:

1. Analysis, Skills to identify and describe a piece of information that is obtained to express a belief or opinion.
2. Inference, the skill to find out and look for elements to get a logical conclusion.
3. Evaluation, Skills to test the existing validity based on responses, experiences, beliefs, or opinions.
4. Explanation, Skills to express and justify reasons by giving valid opinions.
5. Self-Regulation, Skills to monitor one's cognitive activity by correcting one's results.

(Maulina et al., 2019)explained that in Grobogan Regency found several facts in the field, which is "teachers have not mastered the understanding of learning tools that support HOTS, they are still inclined to use the verbs C1 (remember), C2 (understand), and C3 (apply). In addition, teachers have not been able to create a creative and innovative classroom atmosphere and the utilizing of learning reference books only uses teacher and student handbooks. Based on the results of after 3 month observed, the result is the difficulties of fourth-grade elementary school students in Grobogan Regency, which is students are accustomed to being given LOTS level questions so from the learning outcomes, it can be seen that tend to be incomplete KKM, this is influenced by several factors such as students who are less able to understand the request for reading questions, the tendency of teachers to teach using the lecture method, the reference for learning material only uses teacher and student handbooks so that reasoning abilities are not as good as students who are accustomed to a discussion in solving a problem. Finally, the teacher usually gives questions to students who are still dominant in LOTS.

Research from the student thesis of the University of Muhammadiyah Makassar by Nurwahida (2018) examined the HOTS approach to the Social Studies subject for fourth-grade Bontomania students it can be concluded based on the data obtained that learning using the HOTS approach has a good influence on student learning outcomes, especially the Social Studies subject so that it is concluded that the evidence showed the results of the study, first, 21.43%, for students who get very high categories, the second is 32.14% in the high student category, the third is 39.29% in the medium group category, the four categories of low students show 7, 14% and the results of students who get the very low category are at a percentage of 0%.

According to (Ricardo & Meilani, 2017), the purpose of learning is to help students understand, and apply the knowledge that has been taught as part of the educational process. The implementation of behavioral reform in educational institutions is based on student learning outcomes. Thus, it can be concluded that learning outcomes consist of cognitive, emotional, and psychological changes as a result of changes in the learning process. The article (Agustin Mutia, 2021) on that topic specifically is " Pengaruh Soal Higher Order Thingking Skill Terhadap Keterampilan Berpikir Kritis Dan Hasil Belajar Siswa Pada Tema 8 Sub Tema 3 Di Kelas IV Sekolah Dasar". The results of the study stated that the so-called HOTS theory has a 49.0% increase in student learning outcomes, and the value showed a high level of relationship, which is around 0.700, it is proven that there is good and effective reciprocity among students, which is the value of 89.09% can be seen with good presentation.

The purpose of this study was to determine the effect of thematic HOTS questions on learning outcomes, the effect of critical thinking skills on sixth-grade students' learning outcomes, and to determine the effect of thematic HOTS questions and critical thinking skills together on the learning outcomes of fourth-grade elementary school students, especially in Grobogan Regency.

**Research Method**

quantitative approach used by the researcher as the research method . According to (Darmawan, 2013) put forward definition of a quantitative approach, is a method of detecting capabilities that use data in the form of numbers to become a benchmark for obtaining information regarding what we want to know. This research design uses ex post facto, which is research to find a cause that triggers changes in the independent variables as a whole such as behavior, symptoms, or phenomena.

This study used a simple random sampling method, the opinion (Sugiyono, 2017) stated that an area that has objects/subjects with special qualities and characters is called a population, the population in the study involves two schools in Grobogan Regency for the 2021/2022 academic year, which are Curut Public Elementary School as many as 22 students and Penawangan Public Elementary School 1 as many as 31 students.

Samples were obtained and used the Slovin formula, so the detailed calculations are described below:

$$N = \frac{N}{1 + Ne^2}$$

Information:

N = Total population

n = Sample

e = Precision (the estimated error is 0.05)

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{53}{1 + 53(0{,}05)^2}$$

$$n = \frac{53}{1 + 53(0{,}05)^2} = 46{,}79$$

Fulfilled to 47

The total population in the calculation is 47 students in elementary schools in Grobogan Regency. (Arikunto, 2014) argues that the sample that can be taken is half or representative of the population being studied.

An area that has objects/subjects with special qualities and characters is called a population, which is determined by a researcher to be observed, and then conclusions can be drawn from this activity. So the population is not only about the subject, but also objects can be in the form of natural objects, but also others.

So calculating the sample can be described as follows:

**Table 1. sample calculation**

| No | Elementary School | Grade | Sample | Total |
|---|---|---|---|---|
| 1 | SDN Curut | IV | $\frac{22}{53} \times 47$ | 20 |
| 2 | SDN 1 Penawangan | IV | $\frac{31}{53} \times 47$ | 27 |
| Total | | | | 47 |

In column 1 it is explained that Curut Public Elementary School has a population (N) of 53 with 22 students, a sample of 47 so that a sample of 20 students is obtained for Curut Public Elementary School. As for column 2, it is described as follows: the total population (N) is 53, 31 the number of students, and the sample value is 47. Therefore, 27 samples of students are obtained for Penawangan Public Elementary School 1.

Data collection techniques used questionnaires and documentation, using validity and reliability tests. Prerequisite test used normality and linearity tests. Hypothesis testing is carried out using Simple Linear Regression statistical analysis as a test of the effect of one independent variable on the type of dependent variable using the t-test, while as a tool to measure how far Multiple Linear Regression analysis affects the influence of two independent and dependent variables using the F test.

excel calculation as follows:

**Table 2. Determinant coefficient**

| *Regression Statistics* | |
|---|---|
| Observations | 47 |
| Standard Error | 4.003995801 |
| R Square | 0.298592292 |
| Adjusted R Square | 0.266710123 |
| Multiple R | 0.54643599 |

The calculation of the determinant coefficient obtained an R Square of 29.8%

**Table 3. F-test significance**

| ANOVA | | | | | |
|---|---|---|---|---|---|
| | *df* | *MS* | *F* | *SS* | *Significance F* |
| Regression | 2 | 150.1474515 | 9.365495045 | 300.294903 | 0.00040865 |
| Residual | 44 | 16.03198238 | | 705.4072246 | |
| Total | 46 | | | 1005.702128 | |

Judging from the Anova table, it can be concluded that the F-test is 9.36 with a significant level of 0.000 so it has a positive effect.

**Table 4. Correlation and T-Test values**

| | *Coefficients* | *Standard Error* | *t Stat* | *P-value* |
|---|---|---|---|---|
| Intercept | 53.03930732 | 8.197247632 | 6.470380023 | 6.85814E-08 |
| x1 | 0.319677737 | 0.153746227 | 2.079255817 | 0.043454245 |
| x2 | 0.415313911 | 0.133907943 | 3.101488234 | 0.003356219 |

The correlation value and T-test in the table above are t-test of $X_1$ (2.079), $X_2$ (3.101). With a correlation value of $X_1$ (0.04) < 0.05 and $X_2$ (0.003) < 0.05, so the two variables have a positive effect.

## Result and Discussion

### The Influence of Thematic HOTS Questions on the Learning Outcomes of Fourth Grade Elementary School Students in Gorobogan Regency

Researchers (Wardana, 2010) revealed that the definition of HOTS is students' critical thinking knowledge whose activities are in the form of analysis, synthesis, and evaluative but also include mental activity to explore creative, complex, and reflective experiences. In the thinking process that is carried out consciously to achieve the goal so that good results can be obtained, it can be explained that the HOTS Question is a question that required a high-level thinking process starting from Bloom's taxonomy level C4-6.

According to (Wasifatun Najiroh, 2020) based on research results, it is shown that those included in the HOTS question category are space explorers in the sub-theme of students' books in working on HOTS-based questions, students need to have the skills to analyze, create and evaluate critically. The explanation is as follows: a) analyzing (C4) students at this stage should prioritize thinking more operationally. Analyzing by distinguishing, managing, and being able to connect, the verbs used are to distinguish, determine, compare, criticize and sort. b) Evaluating (C5) which has the meaning of producing actions based on moderate categories, for example checking and criticizing the operational verbs used are evaluation, sorting/selecting, assessing, refuting, and giving opinions. c) creating (C6) which requires the ability of students to design, produce, discover, build, plan, strengthen, perfect, beautify, renew, and change. The operational verbs used are to explain, interpret, and predict.

From this research, there are equations of simple linear regression analysis, regression $Y = 53{,}039 + 0{,}319\ X_1$. That way it is substantial, learning outcomes are worth 53,039 if there is no thematic HOTS question (X=0), but learning outcomes can increase by 0.319 if the higher order thinking skill question increases by 1.

The t-test on dk = n – 2 and an error level of 5% obtained a two-party t-table with a value of 2.014103 and a t-count of 2.079 so that the t-count (2.079) lies > t-table (2.014103). Thus, $H_0$ is rejected, which means that learning outcomes are proven to be significantly influenced by the thematic HOTS questions. Based on the calculation obtained a significant probability value of 0.04 < 0.05 then $H_0$ is rejected. The results of the hypothesis test decision showed that there is a significant positive effect on thematic HOTS questions on learning outcomes for grade IV elementary schools in the Grobogan Regency.

The conclusion from these findings is that the thematic HOTS questions have a significant effect, as seen from the determinant coefficient of 14.5% on learning outcomes in elementary schools in Grobogan Regency for the 2021/2021 academic year, the results obtained are similar to the research carried out (Agustin Mutia, 2021) it can be proven that there is a significant effect on the HOTS questions theme 8 sub-theme 3 learning 1 and 2 on learning outcomes by 49.0%.

By contributing to each other, 2013 curiculum synergize in implementation of learning so that it significantly forms the potential of students, one of the efforts is by applying thematic hots questions as an instrument to grow quality, as well as guiding, manifesting students so that they can compete in the global era by indicators of learning

outcomes in the cognitive domain, including knowledge, understanding, application, assessment, manufacture, and evaluation (Ricardo & Meilani, 2017). HOTS is the ability to think high by using "know-how" so that the application of thematic hots-based questions can influence student learning outcomes. High thinking skills in training students skills are classified into 4, which are; first to train students in critical thinking, second to create a creative sense, third to help practice problem solving, and fourth to make decisions.

As for teaching theme lessons to students, the following steps are: (1) Selection of certain themes, (2) Determining certain concepts, (3) Determining learning activities, (4) Determining subject matter to carry out activities, (5) Reviewing activities. and subject matter related to the content, (6) Distribution and implementation can be facilitated by preparing lesson plans, (7) The presentation of learning activities is obtained through the determination of the class order, and (8) Follow-up with discussions (Wollinger in Chumdari et al., 2018)).

**The Effect of Critical Thinking Skills on Learning Outcomes of Fourth Grade Elementary School Students in Grobogan Regency**

This simple linear regression analysis shows the regression equation Y = 53.039 + 0.415 $X_2$. that is interpreted, if the ability to think critically does not exist (X = 0), then the learning outcomes are worth 53,039. However, if critical thinking skills increase by 1, it is estimated that learning outcomes will increase by 0.415.

The t-test on dk = n – 2 and an error rate of 5% obtained t-count 3.101 with t-table 2.014103 for the two-party test, t-count (3.101) lies > t table (2.014103), so $H_0$ is rejected, meaning the ability to think Critical thinking is proven to affect student learning outcomes. Based on the calculation obtained a significant probability value of 0.003 < 0.05, then $H_0$ is rejected. With the results described above, it can be concluded that the application of critical thinking skills can affect student learning outcomes, especially in the fourth grade of the elementary school in the Grobogan area. The higher the critical thinking of students who are positive in solving problems, can improve learning outcomes, one way is by the need for support from various parties (Beddu, 2019), such as teaching teachers in schools to start getting used to 4C including communication, collaboration, creative, critical thinking, and resolution. problems in realizing the success of parental student learning activities, and a conducive environment can be the main factor so that students can think critically and can affect student learning outcomes.

The data that has been described is relevant to previous research by (Saputri et al., 2020) it is proven that learning outcomes are significantly influenced by critical thinking skills 59.8%. From these findings, it means that, although critical thinking skills only have a significant effect, seen from the determinant coefficient of 22.9% on learning outcomes, elementary schools in Grobogan Resident for the 2021/2022 academic year still need to be improved in inculcating critical thinking skills. According to (Ramdliyani, 2012) the focus of critical thinking is the definition of something that is full of awareness in achieving certain goals and can consider and choose in determining a decision, and the purpose of critical thinking is to find good solutions to the problems at hand.

**The Effect of the Application of Thematic HOTS Questions and Critical Thinking Skills Together on the Learning Outcomes of Fourth Grade Elementary School Students in Grobogan Regency.**

The coefficient of multiple regression analysis found regression Y = 53.039 + 0.319 + 0.415, which means that learning outcomes will get an increase, if the thematic HOTS questions and critical thinking skills are improved, as well, as if the thematic HOTS questions and critical thinking skills are increased by 1, then the learning outcomes are estimated 53,773.

F test at an error rate of 5% dk the numerator = k and dk the denominator = (n-k-1). From the F test obtained F count (9.365) > F table (3.21) with a significance of 0.00, then $H_0$ is rejected and concluded significant, with a determinant coefficient of 0.33% meaning that the thematic HOTS questions and critical thinking skills together significant effect on the learning outcomes of fourth-grade elementary school students in Grobogan Resident.

To succeed the 21st-century learning is also expected to be able to follow the flow of change, one of which is by providing students with HOTS-based questions, one of the characteristics of these questions is having a bloom taxonomy with levels C4-C6 (Maulina et al., 2019) which are analyzing, evaluating, creating, in these questions students are expected to be able to solve problems and be able to relate it to daily life so that indirectly students have critical thinking skills, this can be practiced in the school environment in habituation such as in the learning process, a good classroom ambiance, creative and innovative so that the thematic HOTS questions simultaneously in developing high-level thinking skills affect learning outcomes.

The findings of previous research (Mayasari, 2022) from the results of this research test of student mastery in post-test learning, that student learning outcomes reach a success rate of 100%, by applying HOTS question-based worksheets to form critical thinking skills, the method used is discovery learning. So that it can be concluded that the application of LKPD is suitable for training students' abilities in critical thinking and influencing student learning outcomes.

Thematic learning has some advantages, which are (1) More comprehensive learning and active student participation, (2) Eradication of boundaries between the subjects, (3) Children's growth adapted to authentic material, (4) Conceptualization is more emphasized than memorization, (5) Students choose topics according to their interests and learning projects independently, (6) Students are free to choose the time to study according to their respective abilities, (7) Consideration on problem-solving, (8) Interpersonal skills can be developed through group activities, (9) Diverse learning styles, classical learning, large groups, small groups or individuals based on student interests, (10) According to the characteristics of the material, the assessment technique can be more diverse, not only with general tests.

Through education, students can develop themselves with the support of the surrounding environment. Through the three psychomotor abilities, cognitive abilities in training knowledge, and affective in training sensitivity to feelings, a student can become an expected individual who is ready to enter the world outside of school (Acersta, 2020). In addition, learning outcomes are used as a standard for measuring the success of the learning process and objectives so that they can be described as a standard for teachers in identifying and evaluating students' learning processes so that they can be interpreted to the extent to which students, educators, knowledge transfer processes, and institutions absorb education has achieved the stated goals. The opinion (Andriani & Rasto, 2019) provides that the motivation given to students can affect student learning outcomes because it can encourage enthusiasm in learning, the teacher's role is very important in motivating students before learning activities.

**Conclusion**

The conclusion of this research showed that:

1. The results showed a significant percentage of 14.5% on higher order thinking skills thematic questions and have a positive effect on learning outcomes for fourth-grade elementary school students in Grobogan Regency.
2. The ability of students to think critically in grade IV will be significantly affected by learning outcomes in Grobogan Regency by 22.9%.
3. Thematic HOTS questions and critical thinking skills together have a significant effect on the learning outcomes of fourth-grade elementary school students in Grobogan Regency by 0.33%.

**Recommendation**

Suggestions in this study that changes in the 21st century will not only affect the industrial sector but also the field of education. So that students can keep up with the changing times by making habituation to high-order thinking and critical thinking, therefore teachers as educators are expected to carry out a learning process that can encourage higher-order thinking skills and critical thinking.

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