CULTIVATING CRITICAL THINKING SKILLS OF THE 21st CENTURY IN MATHEMATICS LEARNING ACTIVITIES IN ELEMENTARY SCHOOLS

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HALAMAN PENGESAHAN

PEMBUDAYAAN BERPIKIR KRITIS DALAM PEMBELAJARAN MATEMATIKA DI MIM GONILAN

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Abstrak

Tujuan penelitian ini adalah (1) menganalisis pembiasaan penanaman berpikir kritis pada kegiatan inti pembelajaran matematika di MIM Gonilan, (2) mendeskripsikan kendala dalam pembiasaan penanaman berpikir kritis pada kegiatan inti pembelajaran matematika di MIM Gonilan. Penelitian ini bersifat deskriptif kualitatif. Penelitian dilakukan di MIM Gonilan dengan objek penelitian adalah kegiatan siswa dalam pembiasaan penanaman berpikir kritis dalam kegiatan inti pembelajaran matematika. Subyek penelitian adalah siswa di MIM Gonilan, guru matematika, dan kepala sekolah. Pengumpulan data dalam penelitian yaitu observasi, dan wawancara. Tujuan dari penelitian ini adalah (1) menganalisis pembiasaan penanaman berpikir kritis dalam kegiatan inti pembelajaran matematika di MIM Gonilan, (2) Data yang telah dikumpulkan peneliti akan dianalisis dalam tiga tahap yaitu (pemadatan data), (display data), (penarikan kesimpulan dan verifikasi). Untuk keabsahan data dengan triangulasi teknik dan sumber. Temuan dalam penelitian ini adalah bahwa budaya berpikir kritis siswa di MIM Gonilan dilakukan dalam penilaian pembelajaran matematika yang disiapkan oleh guru pada level kognitif C6. Soal HOTS berbasis soal kontekstual dengan menggunakan stimulus, dan menggunakan ragam soal yaitu pilihan ganda, isian singkat, dan uraian.

Kata Kunci : Peradaban, Berpikir Kritis, Keterampilan Abad 21, Matematika

Abstract

The aims of this study were (1) to analyze the habituation of cultivating critical thinking in the core activities of learning mathematics at MIM Gonilan, (2) to describe the obstacles in the habituation of cultivating critical thinking in the core activities of learning mathematics at MIM Gonilan. This research is descriptive qualitative. The research was conducted at MIM Gonilan with the object of the research being the activities of students in the habituation of cultivating critical thinking in the core activities of learning mathematics. The research subjects were students at MIM Gonilan, math teachers, and school principals. Collecting data in research namely observation, and interviews. The data that has been collected by researchers will be analyzed in three stages, namely (data condensation), (data display), (conclusion drawing and verification). For the validity of the data with triangulation techniques and sources. The findings in this study are that the critical thinking culture of students at MIM Gonilan is carried out in the assessment of mathematics learning prepared by the teacher at the C6 cognitive level. The HOTS questions are based on contextual problems by using a stimulus, and using a variety of questions, namely multiple choice, short entries, and descriptions.

Keywords : Civilization, Critical Thinking, 21st Century Skills, Mathematics

1. INTRODUCTION

Current technological developments greatly affect changes in academic achievement. Students' academic achievements are required to adapt learning to prepare students for the 21st century or the industrial revolution 4.0.The world of education has played a big role in the rapid development of artificial intelligence. To face this era, students must have a variety of complex competencies and skills in order to compete and survive. So that through quality

education that is relevant to the needs of society which is always developing following science and technology (IPTEK) will produce quality human beings (Qurniati et al., 2015).

Education and learning will develop along with the changing times. In the 21st century, learning is not only centered on cognitive abilities, but also includes a number of personal and social skills. These skills are known as 4C 21st Century Learning: *critical thinking, creativity, collaboration,* and*communication*.

Skills 4C 21st Century Learning The above must be owned by students from all levels of education, including children of Kindergarten (TK) age who are just entering the world of learning. Apart from being applied by teachers or educators at school, these skills can actually be developed by parents at home. One of them is by stimulating children's learning strategies through digital media such as (Juniati & Widiana, 2009).

In the world of education, mathematics has an important role. With mathematics lessons, we learn to reason critically, creatively and actively (Wulandari, D.T., & Sayekti, 2022). Teachers are educators who should equip students with complex skills and competencies in mathematics, one of which is critical thinking skills. Critical thinking in students really needs to be developed in order to support their success in social life and education. Critical thinking skills can be strengthened and developed through learning process activities (Muchtar et al., 2021). Critical thinking skills in solving mathematical problems provide positive input to good attitudes, curiosity, respect for others, and improve interpretive and calculating abilities (Murdhiyah & Suryanti, 2014).

Critical thinking skills are needed in dealing with 21st century learning. Critical thinking is able to increase students' self-confidence and independence in the core activities of mathematics lessons which are considered difficult. The process of critical thinking for learning mathematics should start early and be repeated frequently. In fact, schools are still not accustomed to learning mathematics which can foster students to think critically. Seen in the core learning activities. The characteristics of learning are still dominated by the teacher, so that the learning process is still passive. Achievement on achievement is only based on low cognitive abilities that have been assessed through tests, so students learn by memorizing material.

Based on the description above, there is a need for renewal and research. This is to analyze the implementation of the habituation of critical thinking culture in the core activities of learning mathematics at MIM Gonilan. Therefore, a study was carried out with the title "The Habituation of Cultivating Critical Thinking in the Core Activities of Learning Mathematics at MIM Gonilan".

2. METHOD

The type of research used is descriptive qualitative. The research was conducted to analyze in depth the habituation of cultivating critical thinking in the core activities of learning mathematics at MIM Gonilan.

The research was conducted at MIM Gonilan, Sukoharjo Regency, Central Java. The research location was chosen because students at MIM Gonilan habituation of cultivating critical thinking in the core activities of learning mathematics is still low, so it needs to be analyzed. The research was conducted for 1 semester, namely during semester 1 of the 2022/2023 academic year.

The data in this study used qualitative data regarding the core activities of learning mathematics for students at MIM Gonilan. The data sources used in this study are primary data sources and secondary data sources. Primary data sources can be obtained from school principals, maple teachers and MIM Gonilan students. For secondary data sources from learning device documents, student work, portfolios, photos of learning observations. The informants in the study were school principals, teachers and students in grades Iva and IVb at MIM Gonilan, Kartasura, Sukoharjo, Central Java.

Research at MIM Gonilan is to find data regarding the core activities of learning mathematics for students through subject teachers, school principals, MIM Gonilan students, as well as supporting documents for research process activities. Data collection techniques in this study are observation, interview, and documentation techniques. The object observed is the activity of students in the habit of cultivating critical thinking in the core activities of learning mathematics in semester 1 of the 2022/2023 school year. Interviews were conducted to gather information on the core activities of learning mathematics for students at MIM Gonilan. Researchers also conducted interviews with school principals, teachers and students. The documentation used is in the form of photos, school data, and learning device documents.

Researchers in obtaining the validity of the data using triangulation. Triangulation was carried out through interviews, direct and indirect observation. Triangulation of data from triangulation of sources (data), triangulation of techniques. To achieve the goal of habituating the culture of critical thinking in the core activities of learning mathematics at MIM Gonilan so that the collection and testing of the data that has been obtained is carried out at the research location, namely schools with the object of research being student activities in the habituation of the culture of critical thinking in the core activities of learning mathematics. The data obtained is analyzed, then the researcher describes and categorizes from the same to

the different. The resulting data will be used to draw a conclusion. Technical triangulation is carried out by verifying the data to the same sources using other techniques. Researchers get data from interviews, then check and make observations and documentation. So that information will be obtained whether the source conveys the same data or different data.

The data that has been collected is analyzed using several steps according to theory (Miles & Huberman in the book (Sutama, 2019)), namely analyzing data in three steps: data reduction, data presentation, and drawing conclusions. Data condensation refers to the process of selecting, focusing, simplifying, abstracting, and transforming data.

3. RESULTS AND DISCUSSION

3.1 Result

Critical thinking skills are one of the higher-order thinking skills, this statement is explained by Massa in (Wardani & Widiana, 2018) that critical thinking is a process of processing information into three levels (Analysis, synthesis and evaluation) these three levels as representations in the participants' critical thinking educate.

Critical thinking skills at MIM Gonilan are integrated into learning mathematics by compiling the steps of the learning process starting from planning, implementing and also evaluating. The material for the greatest common factor (FPB) and the smallest common multiple (KPK) is compiled by directing students to get used to critical thinking by looking at the learning steps in the table below:

Table 1. Learning Steps

No	Planning	Implementation	Evaluation
1	Explain the purpose of learning to students in relation to the material Factors of unity and Number	The teacher guides students to form groups, each group consisting of four to five people	The teacher reflects on the results of learning about common factors of two numbers
2	The teacher prepares a learning activity about common factors of two numbers	The teacher directs students to write down the factors of each given number	The teacher evaluates the common factors of two numbers, and assigns students to study the next material
3		The teacher guides students in finding the factor of the same number of each pair of numbers given	The teacher informs the next material, namely the greatest common factor (FPB).

	The teacher accompanies the students in making conclusions about the common factor and number	

From the explanation of the steps in the table above, the researcher will describe below how Mim Gonilan's acculturation was carried out in the process of planning, implementing and evaluating.

3.2 Discussion

3.2.1 Cultivating Critical Thinking

1) Critical Thinking Cultivation Planning

Based on the analysis of the data resulting from the habituation of the habituation of critical thinking in the core activities of learning mathematics, it shows that the core activities of learning mathematics in which the habituation of the culture of critical thinking at MIM Gonilan are prepared by compiling lesson plans, teaching materials and HOTS questions. Gteachers must have complete equipment, one of which is learning tools, namely lesson plans, teaching materials, and HOTS questions (Sehgal apoorva., 2018). RPP consists of core competencies, basic competencies and indicators, objectives, materials, approaches and methods, learning activities, assessment, the last is sources and media. The lesson plan components are not much different from research findings (Supriyanto & Mawardi, 2020). The components in the lesson plans are: (1) school data, subjects, class/semester; (2) subject matter (3) time allocation; (4) learning objectives, KD and competency achievement indicators; (5) learning materials; learning methods, media, tools and learning resources; (6) learning activity steps; and (7) assessment. RPP is a learning plan that must be prepared by the teacher before the activity takes place.

2) Implementation of Cultivating Critical Thinking

Implementation of the core activities of learning mathematics students are invited to think critically and discuss the contents of non-lesson books. In the core activities the teacher uses a scientific approach and 21st century skills (4C) by demonstrating aspects of critical thinking skills, namely asking questions, planning strategies, and evaluating conclusions. The indicator of asking questions is the indicator that appears most often in learning mathematics, this is also shown in the results of interviews with teachers, principals, and students. Critical thinking skills on indicators of asking questions are found in many students. Meanwhile, the indicators for planning strategies also often appear, students are able to plan strategies in

solving math problems. However, on the indicators of evaluating decisions, there are still many students who have not been able to. Students are still unsure about the results of working on problems that have been solved, it is proven that students are not capable when students are asked to tell how to solve problems. This happens because there is a view that mathematics is a ready-to-use tool (Efendi et al., 2021). This view can be observed from the attitude of teachers who tend to tell the concepts/theorems/formulas they use. Teachers transfer the knowledge they have and students receive it passively and less critically. Students do not know how it was obtained and cannot explain the reasons for their answers, even though students can solve mathematical problem solving well.

3) Critical Thinking Cultivation Evaluation

The teacher's assessment of mathematics learning compiled by the teacher is at the C6 cognitive level / creating or making. The HOTS questions are based on contextual problems by using a stimulus, and using a variety of questions, namely multiple choice, short entries, and descriptions. The involvement of students in learning mathematics will form a meaningful learning experience for students who develop critical thinking skills. Students are not only passive in receiving learning because they are given the opportunity to express their ideas. However, based on the results of observations that have been made, the process of learning mathematics in the research area lacks two-way interaction because it is still teacher-centered. The condition of learning mathematics at the research site occurs when the paradigm of the teacher explains and the students listen. Learning outcomes are more important than the learning process. When students are able to think critically, optimal learning outcomes will be more easily achieved, whereas when students are only pursuing optimal learning outcomes, critical thinking skills may not necessarily be possessed. So that critical thinking skills will be more beneficial for students than just concerned with learning outcomes.

Learning activities that are useful for students are those that are able to cultivate students to continue to develop. So for students accustomed to thinking critically, students are often given questions that require deep thinking. Teachers in research sites are used to giving problem-based questions. Students practice more varied math questions so that they are more accustomed to solving various forms of questions so that they can improve students' critical thinking skills (Yampap & Bay, 2020). In this development can foster self-confidence and creativity in students.

3.2.2 Barriers to Cultivating Critical Thinking

From the results of data analysis, there are several factors that hinder the cultivation of critical thinking in the core activities of learning mathematics, namely:

1) Fear of Presenting Arguments

Students actively ask questions when experiencing difficulties, but some students are still afraid to convey their arguments. Students lack confidence because they are afraid that their arguments will not be accepted or understood by the other person. Students do not practice arguing in class about the material being studied because some students are still afraid to convey their arguments. Students lack self-confidence because they are afraid that their arguments will not be accepted or understood by the other person even though they have actively asked questions when experiencing difficulties. The teacher as a facilitator should be able to guide students to argue properly and correctly. This is in line with (Ningsih et al., n.d.) which states that the opportunity for all students to actively express opinions in an atmosphere of discussion must be created by the teacher.

2) Less space for students to explore

Teaching and learning activities in class, students should be given space to explore by the teacher. The fact found in this study is that students are given less space to explore in the classroom during the learning process. This will cause mathematics learning not to achieve the expected goals in the applicable curriculum design, namely student-centered learning. So that the indicators of planning a strategy are less achieved. It is known from the results of observations made by researchers showing that students are not given broad opportunities in learning because the teacher is still bound to complete the delivery of the material.

3) Monotonous method

The use of methods needs to be varied in order to achieve the desired goal. In the learning process activities that were found by researchers at MIM Gonilan, the methods used by the teacher did not vary and were more monotonous, only using the lecture method. This shows that the teacher does not give space to students so that students think critically in the learning process in order to achieve the desired goals. Learning mathematics demands that teachers use a variety of learning to improve critical thinking skills. In the 21st century, teachers must update in creating an interesting learning atmosphere, the results of research (Haryanti, 2017) state that through the application of innovative learning models and supported by relevant learning media, teachers in elementary schools can actively innovate in designing processes. learning to increase student interest in learning. Monotonous methods tend to fail to achieve learning objectives because students feel bored with the same teaching and learning

atmosphere. This will result in students not being able to learn according to their character, so that their critical thinking skills are never honed and trained for daily needs in the community.

4) Poor class management

Classroom management in question is to regulate the classroom atmosphere so that conditions are always comfortable and conducive. A situation that allows students to learn so that it becomes the starting point for successful learning is a good class. However, the fact that the researchers found in this study was that class management in the learning process was not given proper attention (Sukmana, 2018). The poor classroom management found by researchers is a boring class atmosphere and makes students feel bored in class. Another class management is the teacher who does not change seats, namely chairs and tables so that they are not in the same form in every lesson. This makes students feel uncomfortable in participating in mathematics learning so that students are not motivated to think clearly in exploring mathematics learning material which increases critical thinking (Murdhiyah & Suryanti, 2014). The classroom atmosphere needs to be formed according to the situation and conditions during the learning process. This shows that the teacher in the classroom is only to convey learning, even though the teacher needs to pay attention to situations and conditions by applying a contextual approach in learning. Situations that are not good need to be changed for the better, for example an atmosphere that is not conducive when the lecture method is boring, then the method needs to be replaced with other methods that are not boring for students.

Critical thinking is one of the higher order thinking skills which includes the process of analyzing and also evaluating with three main indicators, the ability to formulate questions. Ability to plan strategies, Ability to evaluate decisions (Ariani, 2020). These three indicators become the benchmark for MIM gonilan to determine students' critical acculturation.

Table 2. Indicators of critical thinking skills

Observed aspect	Presentase	Information
Formulate questions	71,02%	Well
Plan strategy	75,00%	Well
Evaluating Decisions	58,52%	Well

Recapitulation of the results of observations, interviews and documentation related to students' critical thinking skills which were observed as a whole in the learning activities at

MIM Gonilan from the planning, implementation and evaluation processes during learning are shown in the table below:

4. CLOSING

From the results of the research and discussion, there are several conclusions, namely the habituation of cultivating critical thinking in the core activities of learning mathematics at MIM Gonilan is carried out in three stages, namely the implementation and evaluation of the culture of critical thinking. at the implementation stage of learning the teacher carries out preliminary, core and closing activities. In the assessment of mathematics learning prepared by the teacher, it is at the C6 cognitive level.The HOTS questions are based on contextual problems by using a stimulus, and using a variety of questions, namely multiple choice, short entries, and descriptions. There are several factors that hinder the cultivation of critical thinking in mathematics learning, including: (1) students are afraid to convey arguments, (2) students are not given space to explore, (3) use of monotonous methods, and (4) poor class management .

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