

**PROSES BERPIKIR MATEMATIS DAN BERPIKIR KRITIS SISWA
DALAM MENYELESAIKAN MASALAH MATEMATIS NON RUTIN
BERDASARKAN KERANGKA TEORI SITUASI DIDAKTIS**

DISERTASI

Diajukan Sebagai Sebagian Syarat untuk Memperoleh Gelar
Doktor Pendidikan Matematika



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UNIVERSITAS PENDIDIKAN INDONESIA
2023**

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Universitas Pendidikan Indonesia

Januari 2023

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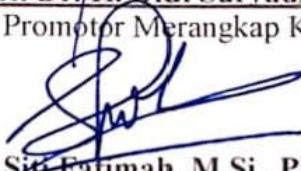
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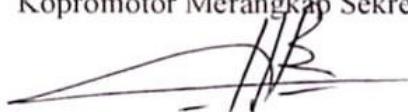
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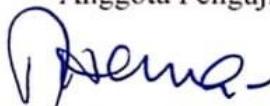
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ABSTRAK

Berpikir matematis dan menggunakan untuk menyelesaikan masalah adalah tujuan penting dari belajar matematika di sekolah. Oleh karena itu, penelitian yang dilakukan bertujuan untuk memaknai dan mendeskripsikan proses berpikir matematis dan berpikir kritis siswa dalam menyelesaikan masalah matematis non rutin dalam kerangka teori situasi didaktis. Metode penelitian yang digunakan adalah penelitian kualitatif dengan pendekatan fenomenologi *hermeneutik*. Tahapan analisis dilakukan dengan tiga tahap, yaitu tahap prospektif, metapedadidaktik, dan retrospektif. Partisipan yang terlibat dalam penelitian sebanyak 46 siswa dari salah satu MTs Negeri di Banda Aceh. Pada tahap analisis retrospektif diperoleh temuan tiga kategori siswa dalam menyelesaikan masalah matematis non rutin yaitu: pertama, kategori menyelesaikan masalah dengan *critical reflection*, kedua menyelesaikan masalah dengan cara *explicit reflection*, dan ketiga kategori siswa yang tidak dapat menyelesaikan masalah matematis. Kedua, situasi didaktis siswa *critical reflection* dapat memahami kedua masalah pada situasi aksi, merencanakan dan melaksanakan penyelesaian dalam situasi formulasi dan memeriksa penyelesaian pada situasi validasi; siswa *explicit reflection* memahami bilangan rasional pada situasi validasi dan masalah pola bilangan pada situasi aksi, merencanakan penyelesaian pada situasi formulasi, melaksanakan penyelesaian dan memeriksa hasil penyelesaian masalah pada situasi validasi. Sedangkan siswa yang tidak dapat menyelesaikan masalah hanya dapat memahami masalah bilangan rasional pada situasi validasi dan masalah pola bilangan pada situasi aksi. Ketiga, proses berpikir matematis: Siswa *critical reflection* adalah spesialisasi dengan contoh, generalisasi dalam bentuk matematika, melakukan dugaan bentuk Bahasa dan matematika dan meyakinkan dalam bentuk aljabar. Siswa *explicit refelction*, spesialisasi dengan contoh, generalisasi dalam bentuk bahasa, melakukan dugaan bentuk bahasa atau matematika dan meyakinkan dalam bentuk aritmetik. Sedangkan siswa tidak dapat menyelesaikan masalah hanya dapat melakukan specialisasi dengan memberi contoh. Ketiga, WoT siswa *critical refelction* menentukan apa yang diketahui, ditanyakan, dan diperlukan; menentukan nilai khusus atau contoh; menentukan pola; dan menggunakan masalah yang mirip. siswa *explicit refelction* menentukan apa yang diketahui, ditanyakan, dan diperlukan; menentukan nilai khusus atau contoh; menentukan pola. Sedangkan siswa tidak menyelesaikan masalah hanya menggunakan pendekatan menentukan nilai khusus atau contoh. Keempat, proses berpikir siswa *critical* dan *explicit refelction* dalam menyelesaikan masalah semua indikator Ennis dengan strategi mengklarifikasi dan menganalisis kata dan frasa; mengidentifikasi fakta yang relevan; memeriksa alasan; menyempurnakan generalisasi, mengidentifikasi alternatif penyelesaian, mengklarifikasi kata/konsep yang digunakan; dan memeriksa hasil pekerjaan. Sedangkan proses berpikir kritis yang tidak dapat menyelesaikan masalah hanya dapat mengidentifikasi fokus pertanyaan dengan strategi mengklarifikasi dan menganalisis kata dan frasa dari masalah. Kelima, *learning obstacle* yang dialami siswa yaitu *ontogenic obstacle*, *didactical obstacle*, dan *epistemological obstacle*.

Kata Kunci: Berpikir Matematis, Berpikir Kritis, Situasi Didaktis, Way of Thinking, Learning Obstacle

THE PROCESS OF STUDENTS' MATHEMATICAL THINKING AND CRITICAL THINKING IN SOLVING NON-ROUTINE MATHEMATICS PROBLEMS BASED ON A DIDACTICAL SITUATION THEORETICAL FRAMEWORK

ABSTRACT

Thinking mathematically and using it to solve problems is an essential goal of learning mathematics at school. Therefore, the research aims to interpret and describe students' mathematical and critical thinking processes in solving non-routine mathematical problems within the framework of didactic situation theory. The research method used is qualitative research with a hermeneutic phenomenological approach. The stages of analysis were carried out in three stages, namely the prospective, metapedagogical, and retrospective stages. The participants involved in the study were 46 students from one of the State MTs in Banda Aceh. In the retrospective analysis stage, it was found that three categories of students were able to solve non-routine mathematical problems, namely: first, the category of solving problems by critical reflection, the second, solving problems by means of explicit reflection, and the third category of students who could not solve mathematical problems. Second, the didactic situation of critical reflection students can understand both problems in action situations, plan and carry out solutions in formulation situations and check solutions in validation situations; Explicit reflection students understand rational numbers in validation situations and problem number patterns in action situations, plan solutions in formulation situations, carry out solutions and examine the results of solving problems in validation situations. Whereas students who cannot solve problems can only understand rational number problems in validation situations and number pattern problems in action situations. Third, the process of thinking mathematically: Critical reflection students are specializing with examples, generalizing in mathematical form, making predictions in language and mathematical forms and convincing in algebraic forms. Students are explicit reflections, specializing with examples, generalizing in linguistic forms, making predictions in linguistic or mathematical forms and convincing in arithmetic forms. While students cannot solve problems, they can only specialize by giving examples. Third, critical reflection students' WoT determines what is known, asked, and needed; specify a special value or instance; define patterns; and using similar problem. explicit reflection students determine what is known, asked, and needed; specify a special value or instance; determine pattern. While students do not solve problems only use the approach of determining special values or examples. Fourth, students' critical thinking processes and explicit reflection in solving the problems of all Ennis indicators with strategies of clarifying and analyzing words and phrases; identify relevant facts; check reasons; improve generalizations, identify alternative solutions, clarify words/concepts used; and check the results of the work. Meanwhile, critical thinking processes that cannot solve problems can only identify the focus of the question with a strategy of clarifying and analyzing the words and phrases of the problem. Fifth, the learning obstacles experienced by students are ontogenetic obstacles, didactical obstacles, and epistemological obstacles.

Keywords: Mathematical Thinking, Critical Thinking, Didactic Situations, Way of Thinking, Learning Obstacles

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