# KEMAMPUAN BERPIKIR KRITIS DAN DISPOSISI MATEMATIS MAHASISWA DALAM *PROBLEM-BASED LEARNING* DAN *MATHEMATICAL PROBLEM POSING* PADA PERKULIAHAN KALKULUS

**DISERTASI**

Diajukan untuk Memenuhi Sebagian dari Syarat Memperoleh Gelar
Doktor Pendidikan Matematika

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**PROGRAM STUDI PENDIDIKAN MATEMATIKA**
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## ABSTRAK

**Bambang Eko Susilo (2020). Kemampuan Berpikir Kritis dan Disposisi Matematis Mahasiswa dalam *Problem-based Learning* dan *Mathematical Problem Posing* pada Perkuliahan Kalkulus**

Kemampuan berpikir kritis merupakan keterampilan utama dalam kerangka keterampilan abad ke-21 dan dibutuhkan di era revolusi industri 4.0. Kemampuan berpikir kritis matematis (KBKM) dan disposisi matematis (DM) mahasiswa calon guru perlu ditingkatkan agar mampu mengembangkan KBKM dan DM siswanya kelak. Strategi pembelajaran yang sesuai di antaranya adalah *Problem-based Learning* (PBL) dan *Mathematical Problem Posing* (MPP). Perbedaan individual menjadikan gaya belajar (GB) perlu diperhatikan dalam pembelajaran. Penelitian ini bertujuan untuk menganalisis secara komprehensif pencapaian, peningkatan, dan jenjang KBKM dan DM mahasiswa melalui PBL dan MPP pada perkuliahan Kalkulus. Penelitian ini terdiri dari dua tahap, tahap kuantitatif dengan *the pretest-post-test two treatment design* kemudian dilanjutkan tahap kualitatif dengan desain fenomenologi. Penelitian dilakukan secara berurutan dengan subjek penelitian yang sama yaitu mahasiswa S1 program studi Pendidikan Matematika pada salah satu universitas di Jawa Tengah. Instrumen pengumpulan data kuantitatif meliputi tes KBKM, skala DM, dan angket GB. Instrumen pengumpulan data kualitatif meliputi peneliti dibantu dengan dokumentasi tes KBKM dan skala DM, pedoman wawancara, dan lembar observasi. Analisis data kuantitatif menggunakan statistik uji: anova satu jalur, Kruskal Wallis, anova dua jalur, t, t', Mann Whitney U, dan korelasi bivariat, analisis data kualitatif menggunakan model analisis interaktif. Temuan penelitian menunjukkan bahwa: (1) pencapaian dan peningkatan KBKM mahasiswa yang memperoleh PBL dan MPP secara keseluruhan dan ditinjau dari GB Kinestetik lebih tinggi daripada mahasiswa yang memperoleh pembelajaran konvensional (PK), (2) tidak terdapat pengaruh interaksi model pembelajaran dan GB terhadap pencapaian dan peningkatan KBKM mahasiswa, (3) pencapaian DM mahasiswa yang memperoleh PBL secara keseluruhan lebih tinggi daripada mahasiswa yang memperoleh PK, (4) tidak terdapat pengaruh interaksi model pembelajaran dan GB terhadap pencapaian dan peningkatan DM mahasiswa, (5) ketercapaian aspek KBKM dan DM mahasiswa yang memperoleh PBL dan MPP secara umum dalam kategori baik, (6) terdapat asosiasi yang sedang antara DM mahasiswa yang mendapat PBL dan MPP terhadap KBKM mahasiswa, (7) PBL berkontribusi besar terhadap pencapaian KBKM dan berkontribusi sedang terhadap pencapaian DM mahasiswa, (8) MPP berkontribusi sedang terhadap pencapaian KBKM dan berkontribusi kecil terhadap pencapaian DM mahasiswa, (9) terdapat ciri khusus pada tiap jenjang KBKM mahasiswa dalam PBL dan MPP, (10) ketercapaian aspek KBKM dan jenjang DM berbanding lurus dengan KBKM pada mahasiswa yang memperoleh PBL dan MPP, dan (11) aspek DM percaya diri dan antisipasi kecemasan terhadap matematika serta jenis kesulitan dalam Kalkulus berperan penting dalam penjenjangan KBKM mahasiswa dalam PBL dan MPP.



**Kata Kunci: Kemampuan berpikir kritis; Disposisi matematis; *Problem-based Learning*; *Mathematical Problem Posing*; Kalkulus**

## ABSTRACT

**Bambang Eko Susilo (2020). Students' Mathematical Critical Thinking Skills and Mathematical Disposition in Problem-based Learning and Mathematical Problem Posing in Calculus Lectures**

Critical thinking skills are primary skills within the framework of 21st-century skills and needed in the fourth industrial revolution. Enhancement of mathematical critical thinking skills (MCTS) and mathematical disposition (MD) of prospective teachers are needed to develop students' MCTS and MD in schools. Appropriate learning strategies include Problem-based Learning (PBL) and Mathematical Problem Posing (MPP). Individual differences, make learning styles (LS) need to be considered in learning. This study aims to comprehensively analyze the achievement, improvement, and grading of students' MCTS and MD through PBL and MPP in Calculus lectures. This research consists of two stages, the quantitative stage with the pretest-post-test two treatment design and continued with the qualitative stage with the phenomenological design. The study was carried out sequentially with the same research subject, namely undergraduate students in the study program of Mathematics Education at a university in Central Java. Quantitative data collection instruments include the MCTS test, MD scale, and LS questionnaire. Qualitative data collection instruments include researchers assisted with documentation of the MCTS test and MD scale, interview guidelines, and observation sheets. Quantitative data analysis used test statistics: one-way ANOVA, Kruskal-Wallis, two-way ANOVA, t-test, Mann-Whitney U, and bivariate correlation, qualitative data analysis used interactive analysis models. Research findings showed that: (1) the achievement and improvement of MCTS for students who received PBL and MPP as a whole and in terms of Kinesthetic LS was higher than students who received conventional learning (CL), (2) there was no interaction effect between the learning model and LS on the achievement and improvement of students' MCTS, (3) the achievement of students' MD who got PBL as a whole was higher than students who got CL, (4) there was no interaction effect between the learning model and LS on the achievement and improvement of students' MD, (5) the achievement of aspects of the students' MCTS and MD who received PBL and MPP in general in the good category, (6) there was a moderate association between students' MD who got PBL and MPP towards students' MCTS, (7) PBL contributed greatly to the achievement of MCTS and contributed moderately to the achievement of students' MD, (8) MPP contributed moderately to the achievement of MCTS and contributed little to the achievement of students' MD, (9) there were special characteristics at each level of students' MCTS in PBL and MPP, (10) the achievement of aspects of MCTS and levels of MD was directly proportional to the students' MCTS who received PBL and MPP, and (11) MD aspects in self-confidence and anticipating mathematics anxiety, and and kinds of difficulties in Calculus play an important role in grading of students' MCTS in PBL and MPP.



**Keywords: Critical thinking skills; Mathematical disposition; Problem-based Learning; Mathematical Problem Posing; Calculus**

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