

ABSTRAK

PENGEMBANGAN MODUL PEMBELAJARAN MATEMATIKA BERBASIS *OPEN-ENDED PROBLEM* UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR KOMPUTASI MATEMATIS

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Penelitian ini merupakan jenis *Research and Development* (R&D) yang bertujuan untuk mengembangkan modul pembelajaran matematika berbasis *open-ended problem* yang valid, praktis, dan efektif dalam meningkatkan kemampuan berpikir komputasi matematis peserta didik. Pengembangan dilakukan dengan menggunakan model ADDIE yang meliputi tahap *Analysis, Design, Development, Implementation*, dan *Evaluation*. Uji coba dilakukan pada peserta didik kelas X MAN 1 Mesuji tahun ajaran 2025/2026 dengan materi fungsi kuadrat. Data penelitian dikumpulkan melalui angket validasi ahli, angket kepraktisan guru dan siswa, serta tes kemampuan berpikir komputasi matematis.

Hasil analisis menunjukkan bahwa modul pembelajaran matematika berbasis *open-ended problem* memiliki tingkat validitas yang tinggi, dengan rata-rata skor penilaian ahli materi sebesar 0,75 dan ahli media sebesar 0,72. Modul dinilai praktis berdasarkan tanggapan guru sebesar 0,78 dan tanggapan siswa sebesar 0,89. Hasil uji efektivitas menunjukkan rata-rata *N-Gain* sebesar 0,76 yang termasuk dalam kategori tinggi. Berdasarkan hasil uji diperoleh nilai signifikansi (Sig. 2-tailed) sebesar $0,048 < 0,05$. Berdasarkan kriteria pengujian, karena nilai signifikansi lebih kecil dari 0,05, maka H_0 ditolak. Dengan demikian, dapat disimpulkan bahwa terdapat perbedaan yang signifikan antara rata-rata *N-Gain* kemampuan berpikir komputasi matematis siswa pada kelas eksperimen dan kelas kontrol. Dari uji proporsi diperoleh proporsi siswa yang mencapai Kategori Ketuntasan Target Pembelajaran pada kelas eksperimen ($KKTP \geq 70$) secara signifikan lebih besar dari 60%. Dari tiga kriteria tersebut modul dinyatakan efektif dalam meningkatkan kemampuan berpikir komputasi matematis. Dengan demikian, modul pembelajaran matematika berbasis *open-ended problem* dinyatakan valid, praktis, dan efektif untuk meningkatkan kemampuan berpikir komputasi matematis peserta didik.

Kata Kunci: Modul Pembelajaran, *Open-ended problem*, Kemampuan Berpikir Komputasi Matematis.

ABSTRACT

DEVELOPMENT OF A MATHEMATICS LEARNING MODULE BASED ON *OPEN-ENDED PROBLEM* TO IMPROVE STUDENTS' *COMPUTATIONAL THINKING* ABILITY

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This study is a type of *Research and Development* (R&D) aimed at developing a mathematics learning module based on the *open-ended problem* approach that is valid, practical, and effective in enhancing students' *Computational Thinking* skills. The development process employed the ADDIE model, which consists of the stages of *Analysis*, *Design*, *Development*, *Implementation*, and *Evaluation*. The product trial was conducted with tenth-grade students of MAN 1 Mesuji in the 2025/2026 academic year, focusing on the topic of quadratic functions. Data were collected through expert validation questionnaires, teacher and student practicality questionnaires, and *Computational Thinking* ability tests.

The research analysis indicated that the mathematics learning module based on the *open-ended problem* approach achieved a high level of validity, with an average score of 0.75 from material experts and 0.72 from media experts. The module was considered practical based on teacher responses with an average score of 0.78 and student responses with an average score of 0.89. The effectiveness test showed that students' *Computational Thinking* skills improved significantly compared to the control class, with an average *N-Gain* of 0.76, categorized as high. Based on the test results, the significance value (Sig. 2-tailed) obtained was $0.048 < 0.05$. According to the testing criteria, since the significance value is lower than 0.05, H_0 is rejected. Thus, it can be concluded that there is a significant difference between the mean *N-Gain* of students' mathematical computational thinking abilities in the experimental class and the control class. The proportion test also shows that the proportion of students in the experimental class who achieved the Learning Mastery Target Category ($KKTP \geq 70$) is significantly greater than 60%. Based on these three criteria, the module is declared effective in improving students' mathematical computational thinking abilities. Therefore, the mathematics learning module based on the *open-ended problem* approach is declared valid, practical, and effective for use in mathematics learning to improve students' *Computational Thinking* skills.

Keywords: Mathematics Learning Module, *Open-ended problem*, *Mathematics Computational Thinking*.