MODEL *PROBLEM BASED LEARNING* BERBANTUAN *MIND MAP* (PBL-MM) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR SISTEM DAN REGULASI METAKOGNITIF PADA ISU ENERGI ALTERNATIF

TESIS

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar Magister Pendidikan
Program Studi Pendidikan Fisika

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PROGRAM STUDI MAGISTER PENDIDIKAN FISIKA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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2025

MODEL *PROBLEM BASED LEARNING* BERBANTUAN *MIND MAP* (PBL-MM) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR SISTEM DAN REGULASI METAKOGNITIF PADA ISU ENERGI ALTERNATIF

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S.Pd. Universitas Negeri Jakarta, 2022

Sebuah Tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan (M.Pd.) pada Program Studi Pendidikan Fisika,
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LEMBAR PENGESAHAN TESIS

MODEL *PROBLEM BASED LEARNING* BERBANTUAN *MIND MAP* (PBL-MM) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR SISTEM DAN REGULASI METAKOGNITIF PADA ISU ENERGI ALTERNATIF

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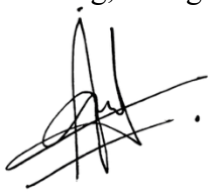
LEMBAR PERNYATAAN

Dengan ini saya menyatakan bahwa tesis dengan judul "**MODEL *PROBLEM BASED LEARNING* BERBANTUAN *MIND MAP* (PBL-MM) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR SISTEM DAN REGULASI METAKOGNITIF PADA ISU ENERGI ALTERNATIF**" ini beserta seluruh isinya adalah benar-benar karya saya. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung resiko/sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, 23 Agustus 2025



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KATA PENGANTAR

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MODEL *PROBLEM BASED LEARNING* BERBANTUAN *MIND MAP* (PBL-MM) UNTUK MENINGKATKAN KEMAMPUAN BERPIKIR SISTEM DAN REGULASI METAKOGNITIF PADA ISU ENERGI ALTERNATIF

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ABSTRAK

Penelitian ini bertujuan untuk memperoleh gambaran tentang bagaimana penerapan model *Problem Based Learning* berbantuan *Mind Map* (PBL-MM) dapat meningkatkan kemampuan berpikir sistem dan regulasi metakognitif peserta didik pada isu energi alternatif. Latar belakang penelitian ini didasari oleh rendahnya kemampuan berpikir sistem dan regulasi metakognitif peserta didik, khususnya dalam memahami permasalahan kompleks yang bersifat multidisipliner. Metode yang digunakan adalah kuasi eksperimen dengan desain *Pretest-Posttest Nonequivalent Control Group Design*. Sampel penelitian terdiri dari 60 peserta didik kelas X SMA di Kabupaten Bandung Barat yang dibagi menjadi kelas eksperimen (PBL-MM) dan kelas kontrol (PBL), masing-masing 30 orang. Instrumen penelitian berupa tes esai kemampuan berpikir sistem dan kuesioner regulasi metakognitif yang telah divalidasi secara isi, konstruk, dan bahasa, serta diuji reliabilitasnya. Hasil penelitian menunjukkan bahwa penerapan *Problem Based Learning* berbantuan *Mind Map* (PBL-MM) efektif dalam meningkatkan kemampuan berpikir sistem dan regulasi metakognitif peserta didik pada pembelajaran isu energi alternatif. PBL-MM terbukti lebih optimal dibandingkan PBL tanpa *mind map*, khususnya dalam membantu peserta didik mengorganisasi informasi yang kompleks dan melihat keterkaitan antar komponen sistem energi secara lebih menyeluruh. Temuan ini merekomendasikan penerapan PBL-MM sebagai model pembelajaran untuk mengembangkan kemampuan berpikir sistem dan regulasi metakognitif metakognitif di sekolah menengah.

Kata kunci: *Problem Based Learning, Mind Map, Kemampuan Kerpikir Sistem, Regulasi Metakognitif, Energi Alternatif.*

PROBLEM-BASED LEARNING MODEL ASSISTED WITH MIND MAP (PBL-MM) TO ENHANCE SYSTEMS THINKING AND METACOGNITIVE REGULATION ON ALTERNATIVE ENERGY ISSUES

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ABSTRACT

This study aims to obtain an overview of how the application of the Problem Based Learning model assisted by Mind Maps (PBL-MM) can improve students' systems thinking and metacognitive regulation skills on alternative energy issues. The study was motivated by the low levels of students' systems thinking and metacognitive regulation abilities, particularly in understanding complex, multidisciplinary problems. The research employed a quasi-experimental method with a Pretest–Posttest Nonequivalent Control Group Design. The sample consisted of 60 tenth-grade students from a senior high school in West Bandung Regency, divided into an experimental class (PBL-MM) and a control class (PBL), with 30 students in each group. The research instruments comprised an essay test for systems thinking skills and a metacognitive regulation questionnaire, both validated for content, construct, and language, and tested for reliability. The results of the study indicate that the implementation of Problem Based Learning assisted by Mind Maps (PBL-MM) is effective in improving students' systems thinking skills and metacognitive regulation in learning about alternative energy issues. PBL-MM proved to be more optimal than PBL without mind maps, especially in helping students organize complex information and see the relationships between energy system components more comprehensively. These findings recommend the application of PBL-MM as an instructional model to develop systems thinking skills and metacognitive regulation in secondary education.

Keywords: *Problem Based Learning*, *Mind Map*, *Systems Thinking Skills*, *Metacognitive Regulation*, *Alternative Energy*.

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