

ABSTRAK

Oktavia Dwi Argyanti, 2026. Pengembangan Modul Berbasis *Problem Based Learning* (PBL) berbantuan PhET untuk Meningkatkan Keterampilan Berpikir Kritis Siswa Pada Materi Fluida Statik. Skripsi. Program Studi Pendidikan Fisika, FKIP, UNIVERSITAS PGRI MADIUN. Pembimbing (I) Dra. Purwandari, M.M., M.Pd. (II) Dr. Erawan Kurniadi, S.Si. M.Pd.

Keterampilan berpikir kritis merupakan tuntutan utama pembelajaran abad ke-21, namun kenyataan di lapangan menunjukkan bahwa siswa masih tergolong rendah dalam kemampuan tersebut, khususnya pada materi Fluida Statik yang bersifat abstrak. Penelitian ini bertujuan untuk: (1) mengetahui validitas modul berbasis Problem Based Learning (PBL) berbantuan PhET, (2) mengetahui kepraktisan implementasinya, dan (3) menganalisis peningkatan keterampilan berpikir kritis siswa setelah menggunakan modul tersebut. Penelitian ini menggunakan pendekatan *Research and Development* (R&D) dengan model pengembangan ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). Subjek penelitian adalah 37 siswa kelas XI-E SMA Negeri 1 Nglames Kabupaten Madiun Tahun Ajaran 2025/2026. Instrumen yang digunakan meliputi lembar validasi media, soal essay keterampilan berpikir kritis, dan angket respon siswa. Analisis data menggunakan formula *Content Validity Ratio* (CVR), persentase keterlaksanaan, *Normalized Gain* (N-Gain), uji normalitas *Shapiro-Wilk*, dan *Paired Sample T-Test*. Hasil penelitian menunjukkan bahwa: (1) E-Modul PBL berbantuan PhET dinyatakan sangat valid dengan rata-rata skor validasi media sebesar 92,8% dan nilai CVR soal sebesar 0,96; (2) tingkat kepraktisan implementasi mencapai 95,6% (kategori Sangat Praktis); dan (3) terdapat peningkatan keterampilan berpikir kritis yang signifikan, dibuktikan dengan kenaikan rata-rata nilai dari 32,78 (*pre-test*) menjadi 67,27 (*post-test*), rata-rata N-Gain sebesar 0,64 (kategori Sedang), serta hasil *Paired Sample T-Test* dengan nilai $t = -16,994$ dan $p < 0,001$. Dengan demikian, E-Modul berbasis PBL berbantuan PhET yang dikembangkan telah memenuhi kriteria valid, praktis, dan efektif sebagai alternatif bahan ajar fisika materi Fluida Statik di tingkat SMA.

Kata Kunci: E-Modul, *Problem Based Learning*, Simulasi PhET, Berpikir Kritis, Fluida Statik, ADDIE

ABSTRAC

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Critical thinking skills are a key requirement of 21st-century learning; however, the reality in the field shows that students still possess low proficiency in this area, particularly regarding the abstract topic of Static Fluids. This study aims to: (1) determine the validity of a PhET-assisted Problem-Based Learning (PBL) module, (2) assess the practicality of its implementation, and (3) analyze the improvement in students' critical thinking skills after using the module. The study employs a Research and Development (R&D) approach using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The research subjects were 37 students from class XI-E at SMA Negeri 1 Nglames, Madiun Regency, during the 2025/2026 academic year. Instruments used included a media validation sheet, critical thinking essay questions, and a student response questionnaire. Data analysis utilized the Content Validity Ratio (CVR) formula, implementation percentage, Normalized Gain (N-Gain), the Shapiro-Wilk normality test, and the Paired Sample T-Test. The results indicate that: (1) the PhET-assisted PBL e-module was deemed highly valid, with an average media validation score of 92.8% and a question CVR value of 0.96; (2) the implementation practicality level reached 95.6% (categorized as "Very Practical"); and (3) there was a significant improvement in critical thinking skills, evidenced by an increase in the average score from 32.78 (pre-test) to 67.27 (post-test), an average N-Gain of 0.64 (categorized as "Medium"), and Paired Sample T-Test results showing $t = -16.994$ and $p < 0.001$. Thus, the developed PhET-assisted PBL e-module meets the criteria of validity, practicality, and effectiveness as an alternative physics teaching resource for the Static Fluids topic at the high school level.

Keywords: *E-Moduls, Problem Based Learning, PhET Simulations, Critical Thinking, Fluida Static, ADDIE.*