

**PENGARUH MODEL *PROBLEM BASED LEARNING* BERBANTUAN
SIMULASI PhET TERHADAP KETERAMPILAN BERPIKIR KRITIS
SISWA SMA**

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ABSTRAK

Penelitian ini bertujuan mengkaji perbedaan keterampilan berpikir kritis siswa setelah mengikuti pembelajaran menggunakan model *Problem Based Learning* (PBL) berbantuan simulasi PhET, model PBL, dan model *Direct Instruction* (DI). Penelitian ini merupakan penelitian eksperimen semu dengan desain *one way pretest-posttest nonequivalent control group*. Seluruh siswa kelas XI SMA Negeri 1 Singaraja semester genap tahun ajaran 2025/2026 sebanyak 242 siswa menjadi populasi penelitian, sedangkan sampel terdiri atas 101 siswa yang terdistribusi ke dalam tiga kelas. Data mengenai keterampilan berpikir kritis siswa diperoleh melalui tes esai sebanyak 12 butir soal. Data kemudian dianalisis menggunakan analisis deskriptif, analisis kovarian (ANAKOVA) satu jalur, serta uji lanjut *Least Significant Difference* (LSD). Semua pengujian hipotesis dilakukan pada taraf signifikansi 5%. Hasil analisis menunjukkan bahwa model pembelajaran memberikan pengaruh yang berbeda terhadap keterampilan berpikir kritis siswa. Hasil uji ANAKOVA menunjukkan nilai $F_{hitung} = 82,761$ dengan $p = 0,0001$ sehingga hipotesis penelitian diterima. Setelah kemampuan awal dikendalikan, rata-rata terestimasi kelompok PBL berbantuan simulasi PhET sebesar 72,384, kelompok PBL sebesar 64,149, dan kelompok DI sebesar 52,230. Uji lanjut LSD menunjukkan bahwa kelompok PBL berbantuan simulasi PhET memiliki keterampilan berpikir kritis yang secara signifikan lebih tinggi dibandingkan kelompok PBL dan kelompok DI, serta kelompok PBL lebih tinggi dibandingkan kelompok DI. Berdasarkan hal tersebut, dapat disimpulkan bahwa model PBL berbantuan simulasi PhET memberikan hasil paling optimal dalam meningkatkan keterampilan berpikir kritis siswa.

Kata kunci: keterampilan berpikir kritis, *Problem Based Learning*, PhET.

**THE EFFECT OF THE PROBLEM-BASED LEARNING MODEL
ASSISTED BY PhET SIMULATIONS ON HIGH SCHOOL STUDENTS'
CRITICAL THINKING SKILLS**

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ABSTRACT

This study aimed to examine the differences in students' critical thinking skills after participating in learning through the Problem Based Learning (PBL) model assisted by PhET simulations, the PBL model, and the Direct Instruction (DI) model. This study employed a quasi-experimental design using a one-way pretest-posttest nonequivalent control group design. The population consisted of 242 eleventh-grade students at SMA Negeri 1 Singaraja during the second semester of the 2025/2026 academic year, while the sample comprised 101 students distributed across three classes. Data on students' critical thinking skills were collected using a 12-item essay test. The data were analyzed using descriptive statistics, one-way analysis of covariance (ANACOVA), and the Least Significant Difference (LSD) post hoc test. All hypothesis testing was conducted at a 5% significance level. The results indicated that the learning models had significantly different effects on students' critical thinking skills. The ANACOVA results revealed an F-value of 82.761 with a p-value of 0.0001, indicating that the research hypothesis was accepted. After controlling for students' initial critical thinking skills, the adjusted mean scores were 72.384 for the PBL assisted by PhET simulations group, 64.149 for the PBL group, and 52.230 for the DI group. The LSD post hoc test showed that the PBL assisted by PhET simulations group achieved significantly higher critical thinking skills than both the PBL and DI groups, while the PBL group also outperformed the DI group. Therefore, it can be concluded that the PBL model assisted by PhET simulations was the most effective learning model for improving students' critical thinking skills.

Keywords: critical thinking skills, Problem-Based Learning, PhET simulations.