

ABSTRAK

Enjelina Sihombing, NIM 4222431018 (2026). Pengaruh Media PhET Interactive Simulation Berbasis Pendekatan STEM terhadap Hasil Belajar Siswa pada Materi Asam Basa Kelas XI SMA.

Penelitian ini bertujuan untuk mengetahui pengaruh penggunaan media *Physics Education Technology (PhET) Interactive Simulation* berbasis pendekatan *Science, Technology, Engineering, and Mathematics (STEM)* terhadap hasil belajar dan peningkatan hasil belajar siswa pada materi asam basa. Penelitian ini merupakan penelitian eksperimen semu dengan desain *pretest-posttest control group design*. Populasi penelitian adalah seluruh siswa kelas XI MIPA SMA Negeri 4 Medan, dengan sampel yang diambil secara *purposive sampling* sebanyak dua kelas yang terdiri dari kelas eksperimen dan kelas kontrol. Data dianalisis menggunakan uji hipotesis (*independent sample t-test*) dan analisis N-Gain. Hasil penelitian menunjukkan bahwa rata-rata nilai posttest kelas eksperimen lebih tinggi dibandingkan kelas kontrol. Uji hipotesis menunjukkan bahwa terdapat pengaruh yang signifikan ($p < 0,05$) dari penggunaan media *PhET Interactive Simulation* berbasis pendekatan STEM terhadap hasil belajar siswa. Analisis N-Gain menunjukkan bahwa peningkatan hasil belajar pada kelas eksperimen berada pada kategori tinggi, sedangkan kelas kontrol berada pada kategori sedang. Dengan demikian, penggunaan media *PhET Interactive Simulation* berbasis pendekatan STEM efektif dalam meningkatkan hasil belajar siswa pada materi asam basa.

Kata kunci: asam basa, hasil belajar, PhET Interactive Simulation, STEM.

ABSTRACT

Enjelina Sihombing, NIM 4222431018 (2026). The Effect of PhET Interactive Simulation Media Based on the STEM Approach on Students' Learning Outcomes on Acid–Base Material in Grade XI Senior High School.

This study aims to determine the effect of using *Physics Education Technology (PhET) Interactive Simulation* based on the *Science, Technology, Engineering, and Mathematics (STEM)* approach on students' learning outcomes and their improvement on acid-base topic. This research is a quasi-experimental study with a *pretest-posttest control group design*. The population of this study was all students of class XI MIPA at SMA Negeri 4 Medan. The sample was selected using *purposive sampling*, consisting of two classes: an experimental class and a control class. The data were analyzed using hypothesis testing (*independent sample t-test*) and N-Gain analysis. The results showed that the average posttest score of the experimental class was higher than that of the control class. The hypothesis test indicated that there was a significant effect ($p < 0.05$) of the use of *PhET Interactive Simulation* based on the STEM approach on students' learning outcomes. The N-Gain analysis showed that the improvement in learning outcomes of the experimental class was in the high category, while the control class was in the medium category. Therefore, the use of *PhET Interactive Simulation* based on the STEM approach is effective in improving students' learning outcomes on acid-base topic.

Keywords: *acid-base, learning outcomes, PhET Interactive Simulation, STEM.*