

**PENGEMBANGAN E-MODUL EKSPERIMEN BERBANTUAN
SIMULASI PHET PADA MATERI ELASTISITAS DAN
HUKUM HOOKE TERHADAP KETERAMPILAN
PROSES SAINS DAN HASIL BELAJAR SISWA**

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ABSTRAK

Penelitian ini bertujuan untuk mengetahui: 1) validitas e-modul eksperimen fisika berbantuan simulasi *PhET* yang dikembangkan, 2) kepraktisan e-modul eksperimen fisika berbantuan simulasi *PhET* yang dikembangkan, dan 3) keefektifan terhadap penerapan setiap indikator keterampilan proses sains dan hasil belajar siswa. Jenis penelitian ini adalah *Research and Development* menggunakan desain *ADDIE* (*Analysis, Design, Development, Implementation, Evaluation*). Populasi dalam penelitian adalah seluruh siswa-siswi kelas XI IPA 3 semester I berjumlah 36 orang di sekolah SMA Negeri 1 Medan. Instrumen yang digunakan dalam penelitian adalah angket validasi ahli media, angket validasi ahli eksperimen, angket respon siswa, lembar observasi keterampilan proses sains dan instrumen hasil belajar siswa. Hasil penelitian oleh ahli media diperoleh skor rata-rata 88,6% dengan kategori sangat valid dan untuk penilaian ahli eksperimen skor rata-rata 94% dengan kategori sangat valid. Hasil kepraktisan e-modul yang ditinjau dari angket respon siswa diperoleh skor kepraktisan sebesar 85,5%, dengan kategori sangat praktis. Adapun aspek keefektifan diperoleh adanya peningkatan keterampilan proses sains siswa sebesar 83% dengan kategori sangat efektif dan peningkatan hasil belajar siswa diperoleh *n-gain* sebesar 0,70 dengan kriteria cukup efektif.

Kata kunci: e-modul eksperimen fisika, simulasi PhET, *ADDIE*.

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**DEVELOPMENT OF ASSISTED EXPERIMENTAL E-MODULES PHET
SIMULATION ON ELASTICITY MATTER AND HOOKE'S LAW OF
SKILL SCIENCE PROCESS AND STUDENT LEARNING OUTCOMES**

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ABSTRACT

This study aims to determine: 1) the validity of the PhET simulation assisted physics experiment e-module developed, 2) the practicality of the PhET simulation assisted physics experiment e-module developed, and 3) the effectiveness for the application of each indicator of science process skills and student learning outcomes. This type of research is Research and Development using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) model. The sample in the study was all students of class XI-MIPA 3 in semester I totaling 36 people at SMA Negeri 1 Medan. The instruments used in the research are media expert validation questionnaires, experimental expert validation questionnaires, practicality questionnaires, science process skills observation sheets, and pretest-posttest question instruments. The results of the study obtained aspects of validity developed from input by media experts obtained an average score of 88.6% with a very decent category and for the assessment of experimental experts an average score of 94% with a very decent category. The results of the practicality of e-modules by students obtained a practicality score of 85.5%, with a very practical category. The effectiveness aspect was obtained by improving students' science process skills in each learning activity and improving student learning outcomes obtained an n-gain of 0.70 with a high category.

Keywords: e-module physics experiments, PhET simulations, ADDIE.

