

ABSTRAK

Linda Sulastrri Pane, NIM 4213121059 (2021), Pengembangan E-Modul Berbasis STEM (*Science, Technology, Engineering, and Mathematics*) terhadap Pemahaman Konsep Fisika Siswa pada Materi Usaha dan Energi

Penelitian ini dilaksanakan di SMA Swasta Imelda Medan dengan tujuan mengembangkan e-modul berbasis STEM (*Science, Technology, Engineering, and Mathematics*) pada materi usaha dan energi untuk meningkatkan pemahaman konsep siswa. Model pengembangan yang digunakan adalah ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). Pemahaman konsep siswa diukur melalui tes awal (*pretest*) dan tes akhir (*posttest*) sehingga dapat diketahui efektivitas e-modul yang dikembangkan. Hasil penelitian menunjukkan bahwa e-modul berbasis STEM pada materi usaha dan energi memiliki tingkat validasi yang sangat baik dengan rata-rata skor sebesar 85,5%, meliputi aspek isi, tampilan, bahasa, dan kegrafikan. Uji kepraktisan yang dilakukan *melalui one-to-one trial, small group trial, dan field trial* memperoleh rata-rata 90,3% dengan kategori sangat praktis, menunjukkan bahwa e-modul dapat digunakan dengan mudah dan sesuai dengan kebutuhan siswa. Selanjutnya, hasil uji efektivitas menunjukkan bahwa e-modul mampu meningkatkan pemahaman konsep siswa dengan skor N-gain rata-rata 0,79 yang berada pada kategori tinggi, serta ketuntasan belajar siswa telah tercapai. Dengan demikian, e-modul berbasis STEM pada materi usaha dan energi dinyatakan valid, praktis, dan efektif untuk digunakan dalam pembelajaran fisika, serta dapat menjadi alternatif bahan ajar yang mendukung peningkatan kualitas proses dan hasil belajar siswa.

Kata Kunci: E-Modul, STEM, ADDIE, Usaha dan Energi, Pemahaman Konsep

ABSTRACT

Linda Sulastri Pane, NIM 4213121059 (2021), Development of a STEM-Based E-Module (Science, Technology, Engineering, and Mathematics) to Enhance Students' Conceptual Understanding of Physics on Work and Energy Material

This research was conducted at SMA Swasta Imelda Medan with the aim of developing a STEM-based (Science, Technology, Engineering, and Mathematics) e-module on the topic of work and energy to improve students' conceptual understanding. The development model applied was ADDIE (Analysis, Design, Development, Implementation, Evaluation). Students' conceptual understanding was assessed through pretest and posttest in order to measure the effectiveness of the developed e-module. The results showed that the STEM-based e-module on work and energy obtained a very good validation score with an average of 85.5%, covering aspects of content, design, language, and graphics. The practicality test, which included one-to-one trial, small group trial, and field trial, reached an average score of 90.3% categorized as very practical, indicating that the e-module is easy to use and meets students' learning needs. Furthermore, the effectiveness test showed that the e-module successfully improved students' conceptual understanding, with an average N-gain score of 0.79 categorized as high, and all students achieved the minimum mastery criteria. In conclusion, the STEM-based e-module on work and energy is valid, practical, and effective to be implemented in physics learning, and it can serve as an alternative teaching material to support the improvement of both learning quality and students' learning outcomes.

Keywords: E-Module, STEM, ADDIE, Work and Energy, Conceptual Understanding