

ABSTRAK

ADE FIRMANSYAH: Pengembangan E-Modul Dasar-Dasar Alat Ukur Menggunakan Model Pembelajaran Project Based Learning (PjBL) di Kelas X SMK Swasta Pelita Tri Mandiri. **Skripsi. Fakultas Teknik, Universitas Negeri Medan, 2025.**

Penelitian ini bertujuan untuk menganalisis proses pengembangan, validitas, dan keefektifan E-Modul Dasar-Dasar Alat Ukur berbasis model pembelajaran *Project Based Learning* (PjBL) pada siswa kelas X SMK Swasta Pelita Tri Mandiri. Jenis penelitian yang digunakan adalah penelitian pengembangan (*Research and Development*) dengan mengadopsi model ADDIE (*Analysis, Design, Development, Implementation, Evaluation*). Prosedur pengembangan dimodifikasi dalam delapan tahap, yaitu: identifikasi potensi dan masalah, pengumpulan data, perancangan desain, validasi ahli, revisi, uji coba pengguna, revisi akhir, dan produk akhir berupa E-Modul siap pakai.

Validasi dilakukan oleh ahli materi dan ahli media. Hasil validasi dari ahli materi menunjukkan tingkat kelayakan sebesar 72,64% (kategori “Layak”), sedangkan validasi dari ahli media memperoleh skor 77,38% (kategori “Sangat Layak”). Uji coba kelayakan oleh 24 siswa menghasilkan penilaian rata-rata sebesar 78,34%, yang tergolong dalam kategori “Sangat Layak”. Pada aspek ketertarikan diperoleh persentase 77,95%, isi materi 75,15%, dan kebahasaan 81,94%.

Efektivitas E-Modul diukur melalui tes hasil belajar setelah proses pembelajaran. Rata-rata nilai siswa mencapai 83,25, dengan 89% siswa berhasil melampaui Kriteria Ketuntasan Minimal (KKM) sebesar 75. Hasil ini menunjukkan bahwa E-Modul mampu meningkatkan pemahaman siswa secara mandiri serta memberikan dampak positif terhadap hasil belajar.

Berdasarkan temuan tersebut, dapat disimpulkan bahwa E-Modul Dasar-Dasar Alat Ukur yang dikembangkan dengan pendekatan Project Based Learning sangat layak dan efektif digunakan dalam proses pembelajaran teknik kendaraan ringan. Penggunaan E-Modul ini direkomendasikan sebagai alternatif media pembelajaran yang mampu meningkatkan kualitas pendidikan kejuruan di SMK.

Kata Kunci: *E-Modul, Project Based Learning, hasil belajar, alat ukur, SMK.*

ABSTRACT

ADE FIRMANSYAH: Development of E-Modules on the Basics of Measuring Tools Using the Project Based Learning (PjBL) Learning Model in Class X of Pelita Tri Mandiri Private Vocational School. **Thesis. Faculty of Engineering, State University of Medan, 2025.**

This study aims to analyze the development process, validity, and effectiveness of the E-Module Basics of Measuring Tools based on the Project Based Learning (PjBL) learning model for class X students of Pelita Tri Mandiri Private Vocational School. The type of research used is development research (Research and Development) by adopting the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The development procedure was modified in eight stages, namely: identification of potential and problems, data collection, design, expert validation, revision, user trials, final revision, and the final product in the form of ready-to-use E-Modules.

Validation was carried out by material experts and media experts. The results of validation from material experts showed a feasibility level of 72.64% (category “Feasible”), while validation from media experts obtained a score of 77.38% (category “Very Feasible”). The feasibility trial by 24 students resulted in an average assessment of 78.34%, which is classified in the “Very Feasible” category. In the aspect of interest, the percentage obtained was 77.95%, material content 75.15%, and language 81.94%.

The effectiveness of the E-Module was measured through a learning outcome test after the learning process. The average student score reached 83.25, with 89% of students successfully exceeding the Minimum Completion Criteria (KKM) of 75. These results indicate that the E-Module is able to increase student understanding independently and have a positive impact on learning outcomes.

Based on these findings, it can be concluded that the E-Module Basic Measuring Tools developed with the Project Based Learning approach is very feasible and effective in the learning process of light vehicle engineering. The use of this E-Module is recommended as an alternative learning media that can improve the quality of vocational education in SMK.

Keywords: *E-Module, Project Based Learning, learning outcomes, measuring instruments, vocational school.*