

## ABSTRACT

**Yuni Fitria. 2021:** Development of Electronic Learning Materials Energy and Momentum Integrated STEM with Flip Pdf Professional to Improve High School Students Learning Outcomes. Thesis. Padang: Physics Education of Study Program, Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Negeri Padang.

Industrial revolution 4.0 makes a big contribution to life. The era of the industrial revolution 4.0 demands human resources who can compete in the global economy. STEM education plays an important role in increasing students' creativity so they can compete in the future. However, the reality in the field that activities that support student creativity in learning have not gone well, the learning materials used were still limited and have not integrated STEM optimally, and student learning outcomes were still in the sufficient category. The solution to overcome these problems was to develop electronic learning materials that integrate STEM to improve student learning outcomes. This study aims to determine the validity, practicality, and effectiveness of the use of electronic physics learning materials.

The type of research conducted was Research and Development (R&D). The object of this research was electronic physics learning materials on energy and momentum materials that were tested limited to one grade X. The data source of this research was a team of validators including physics lecturers of FMIPA and students of grade X MIPA SMAN 1 Gunuang Omeh as users of electronic learning materials. The data collection instruments used were validation sheets, practicality sheets, effectiveness sheets in the form of written tests, attitude observation sheets, and performance appraisals. The data analysis technique used was a descriptive analysis of validation product and practicality, normality test analysis, homogeneity test, and correlation test for aspects of attitudes, knowledge, and skills.

Based on the data analysis, three research results were presented. First, the average value of the validity of the STEM integrated electronic learning materials was 84.36 which was in very good criteria. Second, the average value of the practicality of using STEM integrated electronic learning materials was 85.79 which was in very good criteria. Third, the use of learning materials was effective for improving the learning outcomes of high school students in grade X. So from this study it can be concluded that the learning materials for physics learning materials on energy and momentum were valid, practical, and effective in physics to improve student learning outcomes for grade X high school students.

Keywords: Electronic teaching materials, STEM, energy, momentum, and learning outcomes.