

**DEVELOPING SCIENCE-TECHNOLOGY-ENGINEERING-
MATHEMATICS (STEM)-BASED MODULE TO ENHANCE STUDENTS'
STEM LITERACY**

THESIS

Submitted as Requirement to Obtain Degree of *Magister Pendidikan* in Science
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**Developing Science Technology Engineering Mathematics
(STEM)-based Module to Enhance Student's STEM Literacy**

Oleh
Amaira Utami
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Sebuah Tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar
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STEM LITERACIES**

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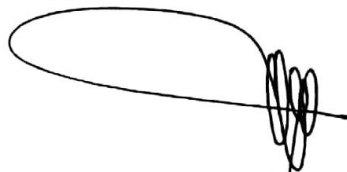
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ABSTRACT

This research examined the development of STEM based module to enhance student's STEM literacy on knowledge aspect, attitude towards STEM as well as to capture student's profile of STEM process and student's perception towards the implementation of STEM based module. Sample of this study consist of one class of 7th grader students at one secondary school in Bandung, Indonesia. The research methodology is DDR from Peffers, et al with stages; identify the problem, describe the objectives, design and develop product, test the product, evaluate testing result and communicate testing result. To check its effectiveness it was tried to 32 students that applied engineering design processes, mathematics, and science knowledge to design and create an earthquake proof building. The result showed that developed STEM based module is able to fulfil all characteristics of good module as well as good STEM based learning module criteria that is not found in any existing module. Moreover, this STEM-based module is effective to improve students' STEM literacy, it can be proven by students' result on their knowledge understanding improvement which resulted normalized gain ($\langle g \rangle$) score 0.45, student's attitude towards science is categorized as good with the average score of 76.67 and student's profile of STEM process is high on certain groups as they follow engineering design process step by step. All of the results are supported with positive response obtained from students towards the implementation of STEM-based module in all indicators. The final structure of STEM-based module shall have basic concept materials, exploring cases, define problem, propose solution, design solution, construct product, test product, re-design, and reflection.

Keywords: STEM based module, STEM literacy.

**PENGEMBANGAN MODUL BERBASIS SAINS TEKNOLOGI
ENGINEERING MATEMATIKA (STEM) UNTUK MENINGKATKAN
LITERASI STEM SISWA**

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan modul berbasis STEM untuk meningkatkan literasi STEM siswa pada aspek pengetahuan, sikap terhadap STEM serta untuk menangkap profil proses STEM siswa dan persepsi siswa terhadap penerapan modul berbasis STEM. Sampel penelitian ini terdiri dari satu kelas siswa kelas 7 di satu sekolah menengah di Bandung, Indonesia. Metodologi penelitian yang digunakan adalah DDR menurut Peffers, dkk dengan tahapan; mengidentifikasi masalah, menjelaskan tujuan, merancang dan mengembangkan produk, menguji produk, mengevaluasi hasil pengujian dan mengkomunikasikan hasil pengujian. Modul berbasis STEM diujikan kepada 32 siswa dengan menerapkan *engineering design process*, pengetahuan sains dan matematika untuk merancang dan membuat bangunan tahan gempa. Hasil penelitian menunjukkan bahwa modul berbasis STEM yang dikembangkan mampu memenuhi semua karakteristik modul yang baik serta kriteria modul pembelajaran berbasis STEM yang baik yang tidak ditemukan dalam modul yang sudah ada. Selain itu, modul berbasis STEM ini efektif untuk meningkatkan literasi STEM siswa, dibuktikan dengan hasil perhitungan nilai gain yang dinormalisasi ($\langle g \rangle$) 0.45 yang menunjukkan bahwa terdapat peningkatan yang menengah, sikap siswa terhadap sains dikategorikan memiliki sikap yang baik dengan skor rata-rata 76.67 dan profil proses STEM siswa pada kelompok tertentu yang melakukan kegiatan *engineering design process* sesuai. Semua hasil didukung dengan respon positif yang diperoleh dari siswa terhadap penerapan modul berbasis STEM di semua indikator. Struktur akhir modul berbasis STEM harus memiliki bahan konsep dasar, mengeksplorasi kasus, mendefinisikan masalah, mengusulkan solusi, solusi desain, membangun produk, produk uji, mendesain ulang, dan refleksi.

Kata Kunci: Modul berbasis STEM, Literasi STEM.

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