PENGEMBANGAN *WORKBOOK* BERBASIS STEM *(SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS*) MENGGUNAKAN MULTIMODUS REPRESENTASI BERORIENTASI PADA PEMBEKALAN KETERAMPILAN BERPIKIR KREATIF SERTA KEMAMPUAN LITERASI TEKNOLOGI DAN REKAYASA SISWA SMK

TESIS

Diajukan untuk Memenuhi Sebagian dari
Syarat untuk Memperoleh Gelar Magister Pendidikan
Program Studi Pendidikan Fisika

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PROGRAM STUDI PENDIDIKAN FISIKA
SEKOLAH PASCASARJANA
UNIVERSITAS PENDIDIKAN INDONESIA
2019

PENGEMBANGAN *WORKBOOK* BERBASIS STEM *(SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS*) MENGGUNAKAN MULTIMODUS REPRESENTASI BERORIENTASI PADA PEMBEKALAN KETERAMPILAN BERPIKIR KREATIF SERTA KEMAMPUAN LITERASI TEKNOLOGI DAN REKAYASA SISWA SMK

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S.Pd UPI Bandung, 2016

Sebuah tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan (M.Pd) Sekolah Pascasarjana

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1707295

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PENGEMBANGAN *WORKBOOK* BERBASIS STEM *(SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS*) MENGGUNAKAN MULTIMODUS REPRESENTASI BERORIENTASI PADA PEMBEKALAN KEMAMPUAN BERPIKIR KREATIF SERTA KEMAMPUAN LITERASI TEKNOLOGI DAN REKAYASA SISWA SMK

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ABSTRAK

Penelitian ini bertujuan untuk mengembangkan *workbook* berbasis STEM dengan menggunakan multimodus representasi berorientasi pada pembekalan kemampuan berpikir kreatif serta kemampuan literasi teknologi dan rekayasa. Penelitian ini dilaksanakan di salah satu SMK di Kota Bandung dengan subjek penelitian yaitu sebanyak 56 siswa. Metode penelitian yang digunakan adalah model *research and development* (R&D). Keterampilan berpikir kreatif yang dikembangkan di dalam *workbook* mengacu pada kerangka berpikir menurut Torrance dan indikator kemampuan literasi teknologi dan rekayasa mengacu pada kerangka berpikir menurut NAEP. Hasil penelitian menunjukan bahwa uji kelayakan *workbook* yang diperoleh dari uji keterpahaman wacana dan uji kualitas mendapatkan presentasi sebesar 79,9% dengan kategori layak. Selain itu berdasarkan hasil uji coba lapangan diketahui bahwa *workbook* yang dikembangkan dapat meningkatkan keterampilan berpikir kreatif dengan nilai *gain* pada kegiatan 1 ke kegiatan 2 sebesar 38,89, serta kemampuan literasi teknologi dan rekayasa dengan nilai *N-gain* sebesar 0,43 termasuk dalam kategori sedang. Berdasarkan uji efektifitas diperoleh bahwa terdapat perbedaan peningkatan keterampilan berpikir kreatif, serta kemampuan literasi teknologi dan rekayasa siswa yang signifikan antara siswa yang menggunakan *workbook* berbasis STEM menggunakan multimodus representasi dibandingkan dengan *workbook* yang biasa digunakan di sekolah. Berdasarkan hasil perhitungan ukuran dampak diketahui bahwa penggunaan *workbook* memberi dampak dalam meningkatkan keterampilan berpikir kreatif dengan nilai d_{cohen}= 1,09 dengan kategori berdampak besar dan dan kemampuan literasi teknologi dan rekayasa dengan nilai d_{cohen} =1,06 dengan kategori berdampak besar. Persepsi siswa terhadap penggunaan *workbook* dalam pembelajaran fisika positif. Siswa sepakat bahwa kegiatan dalam *workbook* yang digunakan dapat melatihkan dan meningkatkan keterampilan berpikir kreatif serta kemampuan literasi teknologi dan rekayasa yang mereka miliki.

Kata Kunci : *Workbook* , STEM, Multimodus Representasi, Keterampilan Berepikir Kreatif, Kemampuan Literasi Teknologi dan Rekayasa.

DEVELOPING OF STEM-BASED WORKBOOKS USING MULTI MODAL REPRESENTATION ORIENTED TO THE PROVISION OF CREATIVE THINKING SKILLS AND TECHNOLOGY ENGINEERING LITERACY IN VOCATIONAL STUDENT

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ABSTRACT

This study aims to develop STEM-based workbooks using multimodal representation oriented to the provision of creative thinking skills and technology engineering literacy abilities. This research was conducted at one of the vocational Schools in Bandung with 56 research subjects. The research method used is a research and development (R&D) model. Creative thinking skills developed in workbooks refer to the framework of thinking according to Torrance and indicators of technology engineering literacy abilities refer to the framework of thinking according to NAEP. The results showed that the workbook feasibility test obtained from the discourse comprehension test and the quality test received a presentation of a reasonable category. In addition, based on the results of field trials it is known that the developed workbook can improve creative thinking skills with a gain value of 38.89, as well as technology engineering literacy abilities with an N-gain value of 0.43 included in the medium category. There was a significant difference in the improvement of creative thinking skills, as well as the significant technology engineering literacy abilities of students between students used STEM-based workbooks using multimodal representations compared to workbooks commonly used in schools. Based on the results of the calculation of the effect size it is known that the use of workbooks gives a different impact in improving creative thinking skills with a value of dcohen = 1.09 with a category of high impact and and the ability of technology engineering literacy with a value of dcohen = 1.06 with a category of high impact. Students' perceptions toward the use of workbooks in physics learning are positive. Students agree the activities on the workbook used can train and enhance their creative thinking skills and technology engineering literacy abilities.

Keywords: Workbook, STEM, Multimodus Representation, Creative Thinking Skills, Technology Engineering Literacy.

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