

PENGEMBANGAN MODUL PRAKTIKUM BERBASIS *EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)* UNTUK MENINGKATKAN *GREEN SKILL* PENDIDIKAN VOKASI TEKNIK ELEKTRO

DISERTASI

**Diajukan untuk memenuhi sebagian syarat untuk memperoleh
Gelar Doktor Pendidikan Teknologi dan Kejuruan**



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HALAMAN PENGESAHAN DISERTASI

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ABSTRAK

UNESCO menyatakan bahwa siswa di sekolah harus memperoleh pengetahuan dan keterampilan yang dapat mempromosikan pembangunan berkelanjutan, serta mengubah orientasi nilai, perilaku, dan gaya hidup melalui pendekatan interdisipliner pada tahun 2030. UNEVOC juga menyampaikan bahwa lembaga pendidikan vokasi perlu turut serta dalam mempromosikan *green skills*. Namun demikian, sektor pendidikan di Indonesia sendiri khususnya dalam jenjang Sekolah Menengah Kejuruan (SMK) belum berkontribusi banyak dalam penerapan *Education for Sustainable Development* (ESD). Kegiatan praktikum dapat dijadikan sarana yang tepat untuk mengenalkan konsep pengembangan keberlanjutan dalam dunia pendidikan. Tujuan penelitian ini adalah menghasilkan desain konseptual modul praktikum yang memenuhi aspek ESD. Modul praktikum didesain dan dikembangkan menjadi modul praktikum berbasis ESD yang layak serta mampu memberikan transformasi hasil belajar pada siswa. Tidak hanya dalam aspek kognitif, psikomotorik, dan afektif saja, penguatan melalui modul praktikum berbasis ESD mampu membekali siswa dengan keterampilan *green skills*. Metodologi yang dipergunakan adalah *mixed method* antara kualitatif dan kuantitatif. Pengembangan modul praktikum dilakukan dengan menggunakan model *design, development, implementation, and evaluation* (ADDIE). Modul praktikum dikembangkan dengan prinsip-prinsip keberlanjutan, integrasi pengetahuan lintas disiplin, dan pengembangan keterampilan yang relevan dengan kebutuhan masa depan dalam konteks Pendidikan Teknik Elektro berdasarkan hasil wawancara dengan panel ahli. Hasil pengujian kegunaan modul praktikum pada siswa menunjukkan tingkat efektivitas, efisiensi, dan respon pengguna yang baik sekaligus mengungkapkan bahwa modul praktikum mudah digunakan dan dipahami. Pengolahan data penelitian pada tahap evaluasi menunjukkan hasil yang positif, modul dapat meningkatkan pemahaman konsep keberlanjutan, meningkatkan *green skills*, serta mampu mendorong pemikiran kritis dan inovatif dalam menyelesaikan masalah teknis dengan mempertimbangkan aspek lingkungan, sosial, dan ekonomi pada siswa. Modul praktikum ini sekaligus dapat memfasilitasi pembelajaran yang lebih interaktif dan berorientasi pada pemecahan masalah nyata.

Kata kunci: ESD, *Green skills*, Pembangunan berkelanjutan, Modul praktikum

ABSTRACT

UNESCO states that students in schools should acquire knowledge and skills to promote sustainable development and change value orientations, behaviors, and lifestyles through an interdisciplinary approach by 2030. UNEVOC also mentions that vocational education institutions need to participate in promoting green skills. However, the education sector in Indonesia, particularly at the vocational high school (SMK) level, has not contributed much to the implementation of education for sustainable development (ESD). Practical activities can be an appropriate means to introduce the concept of sustainable development in education. This research aims to develop a conceptual design for a practical module that meets ESD aspects. Subsequently, the practical module is designed and developed to become an ESD-based practical module that is feasible and capable of transforming student learning outcomes. This ESD-based practical module is expected to equip students with green skills not only in cognitive, psychomotor, and affective aspects but also in other areas. The methodology used is a mixed method between qualitative and quantitative. The development of the practical module is carried out using the design, development, implementation, and evaluation (ADDIE) model. The practical module is developed with sustainability principles, cross-disciplinary knowledge integration, and the development of skills relevant to future needs in the context of Electrical Engineering Education based on interviews with expert panels. The usability testing results of the practical module on students show good levels of effectiveness, efficiency, and user response while also revealing that the practical module is easy to use and understand. The evaluation results show positive outcomes, indicating that the module can enhance the understanding of sustainability concepts, improve green skills, and encourage critical and innovative thinking in solving technical problems by considering students' environmental, social, and economic aspects. This practical module can facilitate more interactive learning and problem-solving oriented towards real-world issues.

Keywords: ESD, Green skills, Sustainable development, Practical module

DAFTAR ISI

HALAMAN JUDUL	i
HALAMAN HAK CIPTA	ii
HALAMAN PENGESAHAN	iii
PERNYATAAN KEASLIAN DISERTASI	iv
KATA PENGANTAR	v
UCAPAN TERIMAKASIH	vi
ABSTRAK	vii
ABSTRACT	viii
DAFTAR ISI	ix
DAFTAR GAMBAR	xii
DAFTAR TABEL	xiii
DAFTAR LAMPIRAN	xv
BAB I PENDAHULUAN	1
1.1 Latar Belakang	1
1.2 Rumusan Masalah	10
1.3 Tujuan Penelitian	10
1.4 Batasan Masalah	11
1.5 Signifikansi Penelitian	11
1.6 Struktur Organisasi Penulisan Disertasi	12
BAB II KAJIAN PUSTAKA	13
2.1 Sejarah dan Konsep Dasar ESD	13
2.2. Teori Perubahan Perilaku terhadap Kesadaran Lingkungan	16
2.3 Model Pendidikan Berbasis ESD	19
2.4 Penelitian Terdahulu Mengenai Penerapan ESD di SMK	22
2.5 Model Kurikulum Berbasis ESD di Pendidikan Vokasional	23
2.6 Pengembangan Modul Praktikum	26
2.6.1 Pembelajaran	26
2.6.1 Modul Praktikum	28
2.7 <i>Green Skills</i>	34
2.7.1 Sejarah dan Definisi <i>Green Skills</i>	34
2.7.2 Urgensi <i>Green Skills</i> dalam Sektor Pendidikan	35

2.7.3 Jenis – Jenis <i>Green Skills</i> di Sekolah	39
2.8 Hasil Belajar dan Perilaku Siswa Menurut Taksonomi Bloom	41
2.8.1 Pengertian Taksonomi.....	41
2.8.2 Klasifikasi Perilaku Belajar Siswa Menurut Taksonomi <i>Bloom</i>	42
BAB III METODE PENELITIAN.....	56
3.1 Desain Penelitian.....	56
3.2 Prosedur Penelitian.....	59
3.3 Informan Penelitian, Populasi, dan Sampel	63
3.4 Teknik Pengumpulan Data	64
3.4.1 Wawancara dengan Panel Ahli dan Validasi	64
3.4.2 Soal Evaluasi untuk Siswa	65
3.5 Instrumen Penelitian.....	66
3.5.1 Pedoman Wawancara dan Kuesioner Validasi Panel Ahli	67
3.5.2 Soal dan Instrumen Penilaian untuk Siswa	71
3.6 Teknik Analisis Instrumen	74
3.6.1 Uji Validitas	74
3.6.2 Uji Reliabilitas	75
3.7 Teknik Analisis Data.....	76
3.7.1 Pengolahan Data Hasil Kuesioner.....	76
3.7.2 Pengujian Instrumen Evaluasi Hasil Belajar Siswa	77
3.8 Penarikan Kesimpulan	81
BAB IV TEMUAN DAN PEMBAHASAN	82
4.1 Analisis dan Desain Konseptual Modul Praktikum Berbasis ESD.....	82
4.1.1 Sosial Budaya.....	83
4.1.2 Ekonomi	86
4.1.3 Lingkungan	87
4.1.4 <i>Green Skills</i>	88
4.2 Pengembangan Modul Praktikum Berbasis ESD.....	94
4.2.1 Hasil Wawancara Panel Ahli	94
4.2.2 Pengembangan Aspek <i>Green Skills</i> dalam Modul Praktikum	106
4.3 Implementasi Modul Praktikum Berbasis ESD dalam Kelas	110
4.3.1 Uji Validitas	110
4.3.2 Uji Reliabilitas	112
4.3.3 Pra-Analisis Data Penelitian	114

4.4 Evaluasi Penggunaan Modul Praktikum Berbasis ESD.....	119
4.4.1 Hasil Belajar Siswa pada Kelas Kontrol dan Eksperimen	119
4.4.2 Respon Siswa terhadap Modul Praktikum Berbasis ESD.....	137
BAB V SIMPULAN, IMPLIKASI DAN REKOMENDASI	139
5.1 Simpulan	139
5.2 Implikasi	140
5.3 Rekomendasi	141
DAFTAR PUSTAKA	143
LAMPIRAN.....	1

DAFTAR GAMBAR

Gambar 1. 1 Hasil Pemetaan Klasterisasi Kata Kunci Riset ESD di Pendidikan Vokasi.....	7
Gambar 1. 2 Hasil Pemetaan Kata Kunci Riset ESD di Pendidikan Vokasi Berdasarkan Tahun Kemunculan	8
Gambar 1. 3 Hasil Belajar dengan Elemen SD.....	9
Gambar 2. 1 Posisi ESD pada Target 4.7 SDGs	13
Gambar 2. 2 Keterkaitan Tiga Pilar ESD (Siraj-Blatchford & Pramling Samuelsson, 2016)	16
Gambar 2. 3 Domain Kognitif Taksonomi Bloom	43
Gambar 2. 4 Perubahan Taksonomi Bloom Cognitive Domaian (Krathwohl, 2001)	46
Gambar 2. 5 Taksonomi Bloom Ranah Afektif.....	52
Gambar 2. 6 Taksonomi Bloom Ranah Psikomotorik	53
Gambar 3. 1 Diagram Konsep Dasar Model ADDIE	56
Gambar 3. 2 Diagram Alir Prosedur Penelitian dengan Model ADDIE.....	59
Gambar 3. 3 Format dan Fitur Dasar Teknik Panel Ahli	65
Gambar 4. 1 (a) Penggunaan Safety Goggle, dan (b) Safety Glove dalam Praktikum Serat Optik	85
Gambar 4. 2 Bagian Isi Modul yang Menunjukkan Instruksi Keselamatan dalam Praktikum Penyambungan Serat Optik	86
Gambar 4. 3 Bagian Modul yang Menunjukkan Bagian Ekonomi dalam Praktikum Penyambungan Serat Optik	87
Gambar 4. 4 Bagian Modul yang Menunjukkan Bagian Lingkungan dalam Praktikum Penyambungan Fiber Optik	88
Gambar 4. 5 Bagan Desain Konseptual Pengembangan Modul Praktikum Penyambungan Fiber Optik Berbasis ESD	93
Gambar 4. 6 Hasil Uji Reliabilitas Test pada Software SPSS	114
Gambar 4. 7 Uji Homogenitas Pre-test pada Software SPSS	116
Gambar 4. 8 Uji Homogenitas Post-test pada Software SPSS.....	116
Gambar 4. 9 Hasil Uji Group Statistic	117
Gambar 4. 10 Hasil Uji Paired Sample T Test.....	117

DAFTAR TABEL

Tabel 2. 1 Kompetensi Inti SMK pada Kurikulum 2013 Revisi.....	24
Tabel 2. 2 Capaian Pembelajaran SMK pada Kurikulum Merdeka	25
Tabel 2. 3 Pemetaan Kompetensi Dasar Penyambungan Kebel Fiber Optik pada Silabus Mata Pelajaran Media Transmisi Program Keahlian TEDK ...	26
Tabel 3. 1 Instrumen Penelitian yang Digunakan	66
Tabel 3. 2 Kisi-Kisi Pedoman Wawancara untuk Panel Ahli	68
Tabel 3. 3 Kisi-Kisi Kuesioner Validasi Aspek Materi untuk Panel Ahli	68
Tabel 3. 4 Kisi-Kisi Kuesioner Validasi Aspek Media untuk Panel Ahli.....	69
Tabel 3. 5 Kisi-Kisi Kuesioner Validasi Aspek ESD untuk Panel Ahli	70
Tabel 3. 6 Kisi-Kisi Soal Pre-test, mid-test, dan Post-test untuk Penilaian Kognitif	72
Tabel 3. 7 Kisi-kisi Instrumen Observasi untuk Aspek Psikomotor.....	72
Tabel 3. 8 Kisi-kisi Instrumen Observasi untuk Aspek Afektif.....	73
Tabel 3. 9 Kisi-kisi Instrumen Respon Siswa terhadap Penggunaan Modul Praktikum	74
Tabel 3. 10 Klasifikasi Kategori Batasan Koefisien Korelasi.....	75
Tabel 3. 11 Penilaian Skala Likert	76
Tabel 3. 12 Kategori Persentase Kelayakan.....	77
Tabel 3. 13 Kategorisasi Skor N-Gain	80
Tabel 3. 14 Kategorisasi Presentase N-Gain.....	80
Tabel 4. 1 Pemetaan Aspek Green Skills pada Modul Praktikum Serat Optik.....	90
Tabel 4. 2 Butir Soal Pedoman Wawancara Panel Ahli.....	94
Tabel 4. 3 Pengembangan Bentuk Soal dan Indikator Penilaian di Modul	103
Tabel 4. 4 Statistika Hasil Validasi Panel Ahli dengan Instrumen dari BSNP ...	105
Tabel 4. 5 Indikator Aspek Kesadaran Lingkungan pada Green Skills	106
Tabel 4. 6 Indikator Kemampuan Berkoordinasi pada Green Skills	108
Tabel 4. 7 Indikator Aspek Berpikir Analitis pada Green Skills	109
Tabel 4. 8 Hasil Uji Validitas Item Soal	111
Tabel 4. 9 Hasil Uji Reliabilitas Tes	112

Tabel 4. 10 Jumlah dan Demografi Siswa pada Kelas Kontrol dan Kelas Eksperimen.....	114
Tabel 4. 11 Hasil Uji Normalitas pada Kelas Kontrol dan Eksperimen	115
Tabel 4. 12 Hasil Perhitungan Uji N-Gain.....	118
Tabel 4. 13 Aspek Penilaian Kriteria pada Ranah Kognitif.....	120
Tabel 4. 14 Nilai Rata-rata Kemampuan Kognitif Siswa	121
Tabel 4. 15 Aspek Penilaian Kriteria pada Ranah Psikomotorik.....	125
Tabel 4. 16 Nilai Rata-rata Kemampuan Psikomotorik Siswa	127
Tabel 4. 17 Aspek Penilaian pada Kriteria Ranah Afektif.....	131
Tabel 4. 18 Nilai Rata-rata Kemampuan Afektif Siswa	132
Tabel 4. 19 Rekapitulasi Statistika Hasil Peningkatan Hasil Belajar Siswa	136

DAFTAR LAMPIRAN

Lampiran 1 Lembar Validasi Ahli Berdasarkan Materi.....	1
Lampiran 2 Lembar Validasi Ahli Berdasarkan Aspek Media.....	5
Lampiran 3 Lembar Validasi Ahli Berdasarkan ESD.....	9
Lampiran 4 Hasil Lembar Validasi dari Panel Ahli 1	11
Lampiran 5 Lembar Validasi Panel Ahli 2	21
Lampiran 6 Lembar Validasi Panel Ahli 3	31
Lampiran 7 Soal Pre-Test, Mid-Test, dan Post-Test.....	41
Lampiran 8 Hasil Uji Validitas Soal pada Software SPSS	59
Lampiran 9 Uji Reliabilitas Butir Soal	61
Lampiran 10 Hasil Nilai Kognitif Pre Test, Mid Test dan Post Test.....	62
Lampiran 11 Hasil Uji N-Gain.....	63
Lampiran 12 Lembar Observasi dan Rubrik Penilaian Psikomotorik	64
Lampiran 13 Lembar Observasi dan Rubrik Penilaian Afektif	68
Lampiran 14 Hasil Penilaian Lembar Observasi Psikomotorik pada Mid-Test ..	73
Lampiran 15 Hasil Penilaian Lembar Observasi Afektif pada Mid-Test	74
Lampiran 16 Hasil Penilaian Lembar Observasi Psikomotorik pada Post-Test ...	75
Lampiran 17 Hasil Penilaian Lembar Observasi Afektif pada Post-Test	76

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