Desain Didaktis Berbasis *Education for Sustainable Development* (ESD) Melalui *Project-Based Learning* (PjBL) pada Topik *Edible Coating* Dalam Proses Pengawetan Makanan untuk Meningkatkan Berpikir Sistem Mahasiswa

TESIS

Diajukan untuk Memenuhi Sebagian Syarat Memperoleh Gelar Magister
Pendidikan Kimia

Oleh

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PROGRAM STUDI MAGISTER PENDIDIKAN KIMIA
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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2024

Desain Didaktis Berbasis *Education for Sustainable Development* (ESD) Melalui *Project-Based Learning* (PjBL) pada Topik *Edible Coating* Dalam Proses Pengawetan Makanan untuk Meningkatkan Berpikir Sistem Mahasiswa

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Sebuah Tesis yang diajukan untuk memenuhi salah satu syarat memperoleh gelar Magister Pendidikan (M. Pd.) di Fakultas Pendidikan Matematika dan Ilmu Pengetahuan Alam

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DESAIN DIDAKTIS BERBASIS *EDUCATION FOR SUSTAINABLE DEVELOPMENT* (ESD) MELALUI *PROJECT-BASED LEARNING* (PjBL) PADA TOPIK *EDIBLE COATING* DALAM PROSES PENGAWETAN MAKANAN UNTUK MENINGKATKAN BERPIKIR SISTEM MAHASISWA

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Dengan ini saya menyatakan bahwa tesis berjudul "Desain Didaktis Berbasis *Education for Sustainable Development* (ESD) Melalui *Project-Based Learning* (PjBL) Pada Topik *Edible Coating* Dalam proses pengawetan Makanan Untuk Meningkatkan Berpikir Sistem Mahasiswa" beserta seluruh isinya adalah benar-benar karya saya dengan bimbingan dua dosen yaitu Ibu Dr. Hernani, M.Si dan Bapak Dr.rer.nat Asep Supriatna, M.Si. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika ilmu yang berlaku dalam penulisan karya ilmiah. Atas pernyataan ini saya siap menanggung sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau adanya klaim pihak lain terhadap keaslian karya saya.

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ABSTRAK

Penelitian ini bertujuan menghasilkan desain didaktis PjBL berbasis ESD pada topik *edible coating* dalam proses pengawetan buah dan sayur untuk meningkatkan keterampilan berpikir sistem mahasiswa. Penelitian dengan tipe *Desain Exploratory Sequential Mixed Method* melibatkan 29 mahasiswa. Instrumen penelitian meliputi pedoman wawancara hambatan belajar, lembar analisis transkrip video pembelajaran, dan lembar soal tes esai. Hambatan belajar mahasiswa dikelompokkan menjadi lima tema. Desain didaktis terdiri dari situasi didaktis, respon mahasiswa, dan antisipasi didaktis. Situasi didaktis berisi isu terkait kerusakan buah dan sayur yang mudah rusak setelah panen dan pertanyaan agar mahasiswa menemukan solusi dalam menyelesaikan permasalahan. Respon mahasiswa merupakan prediksi jawaban terhadap situasi didaktis yang diberikan. Antisipasi pendidik berisi ide pokok materi untuk menguatkan jawaban mahasiswa dalam bentuk tabel, gambar, maupun penjelasan dalam kalimat. Berdasarkan hasil implementasi, indikator keterampilan berpikir sistem mahasiswa muncul pada setiap tahap pembelajaran. Pada tahap merancang, mahasiswa dapat mengidentifikasi, memahami hubungan seluruh komponen, dan merancang prosedur aplikasi *edible coating* pada buah-buahan dengan meninjau aspek sosial, lingkungan, dan ekonomi. Pada tahap melaksanakan, mahasiswa dapat mengidentifikasi penyebab fenomena dan kendala yang muncul, mencari solusi, dan melakukan penelitian ulang apabila tidak sesuai dengan hipotesis. Pada tahap mengkomunikasikan, mahasiswa dapat menyampaikan kesesuaian hasil percobaan dengan hipotesis, menarik kesimpulan, dan menganalisis tantangan dan peluang *edible coating* dalam mendukung kehidupan berkelanjutan. Keterampilan berpikir sistem meningkat dengan perolehan nilai N-Gain sebesar 0,71 yang termasuk dalam kategori tinggi dengan rata-rata nilai *post-test* sebesar 78. Saat *post-test* setiap indikator keterampilan berpikir sistem mahasiswa cenderung mencapai level *mastery.*

Kata Kunci: Desain Didaktis, PjBL, ESD, *Edible Coating,* Berpikir Sistem

ABSTRACT

This study aims to produce a didactic design of ESD-based PjBL on the topic of edible coating in the process of preserving fruits and vegetables to improve students' systems thinking skills. The study with the Exploratory Sequential Mixed Method Design type involved 29 students. The research instruments included interview guidelines for learning barriers, learning video transcript analysis sheets, and essay test question sheets. Students' learning barriers were grouped into five themes. The didactic design consisted of didactic situations, student responses, and didactic anticipations. The didactic situation contained issues related to damage to fruits and vegetables that are easily damaged after harvest and questions for students to find solutions to solve the problems. Student responses were predictions of answers to the didactic situations given. Educator anticipation contained the main ideas of the material to strengthen students' answers in the form of tables, pictures, or explanations in sentences. Based on the results of the implementation, indicators of students' systems thinking skills appeared at each stage of learning. At the design stage, students can identify, understand the relationship between all components, and design procedures for applying edible coating to fruits by reviewing social, environmental, and economic aspects. At the implementation stage, students can identify the causes of phenomena and obstacles that arise, find solutions, and conduct re-research if they do not match the hypothesis. At the communicating stage, students can convey the conformity of the experimental results with the hypothesis, draw conclusions, and analyze the challenges and opportunities of edible coating in supporting sustainable life. Systems thinking skills increased with an N-Gain score of 0.71 which is included in the high category with an average post-test score of 78. During the post-test, each indicator of students' systems thinking skills tended to reach the mastery level.

Key Words: Didactical Design, PjBL, ESD, *Edible Coating,* System Thinking

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