

ABSTRAK

PENGEMBANGAN MODUL AJAR INTERAKTIF BERBASIS *DEEP LEARNING* TERINTEGRASI STEM-PBL UNTUK MENINGKATKAN LITERASI SAINS DAN KOMUNIKASI ILMIAH PADA MATERI SISTEM ORGAN MANUSIA DI KELAS V SD

Oleh

WINDA OKTAVIANA

Penelitian ini bertujuan mengembangkan modul ajar interaktif berbasis *deep learning* yang terintegrasi dengan pendekatan *STEM* dan model *Problem Based Learning (PBL)* untuk meningkatkan literasi sains dan komunikasi ilmiah peserta didik pada materi Sistem Organ Pencernaan Manusia kelas V SD. Masalah penelitian berangkat dari rendahnya literasi sains dan komunikasi ilmiah siswa Indonesia, dominannya penggunaan modul ajar konvensional yang minim visualisasi dan aktivitas interaktif, serta belum tersedianya modul ajar interaktif berbasis *deep learning* terintegrasi *STEM-PBL* yang secara khusus dirancang untuk materi sistem organ manusia di sekolah dasar. Penelitian menggunakan metode campuran (*mixed method*) dengan pendekatan *Research and Development (R&D)* berlandaskan *Design and Development Research (DDR)* melalui tahapan *analysis, design development, implementation* dan *evaluation*. Produk yang dikembangkan berupa modul ajar interaktif IPAS yang mengintegrasikan prinsip *mindfulness, meaningfulness, dan joyfulness* dalam sintaks pembelajaran *STEM-PBL (stimulation, exploration, discovery, application, communication, dan reflection)*. Hasil validasi oleh ahli materi, media, dan bahasa menunjukkan tingkat kevalidan sebesar 85,83% dengan kategori sangat valid, sedangkan uji kepraktisan yang mencakup keterlaksanaan, keterbacaan, dan kemenarikan pembelajaran mencapai 89% dengan kategori sangat praktis. Efektivitas modul ajar tercermin dari peningkatan literasi sains dan komunikasi ilmiah yang ditunjukkan oleh nilai *N-gain* pada kategori

sedang hingga tinggi dan hasil uji *ANCOVA* dengan nilai signifikansi $0,000 < 0,05$, sehingga terdapat perbedaan peningkatan yang signifikan antara kelas yang menggunakan modul ajar interaktif berbasis *deep learning* terintegrasi *STEM-PBL* dan kelas yang menggunakan modul ajar konvensional.

Kata Kunci: Modul Ajar Interaktif, *Deep Learning*, STEM, *Problem-Based Learning* (PBL), Literasi Sains, Komunikasi Ilmiah

ABSTRACT

DEVELOPMENT OF AN INTERACTIVE TEACHING MODULE BASED ON DEEP LEARNING INTEGRATED WITH STEM-PBL TO IMPROVE SCIENCE LITERACY AND SCIENTIFIC COMMUNICATION ON HUMAN ORGAN SYSTEM MATERIAL FOR GRADE V ELEMENTARY SCHOOL

By

WINDA OKTAVIANA

This study aims to develop an interactive teaching module based on deep learning integrated with the STEM approach and the Problem Based Learning (PBL) model to improve students' scientific literacy and scientific communication on the topic of the human digestive system in fifth-grade elementary school. The study is grounded in the low level of Indonesian students' scientific literacy and scientific communication, the dominant use of conventional teaching modules with limited visualization and interactive activities, and the unavailability of an interactive teaching module based on deep learning integrated with STEM-PBL specifically designed for the human organ system topic in elementary schools. The research employed a mixed-method design with a Research and Development (R&D) approach based on Design and Development Research (DDR), which consisted of the stages of analysis, design development, and implementation and evaluation. The product developed was an interactive IPAS (science) teaching module that integrates the principles of mindfulness, meaningfulness, and joyfulness within the STEM-PBL learning syntax (stimulation, exploration, discovery, application, communication, and reflection). Validation results from material, media, and language experts showed a validity level of 85.83%, which is categorized as very valid, while practicality testing, covering implementation, readability, and attractiveness of learning, reached 89%, which is categorized as very practical. The effectiveness of the teaching module is reflected in the improvement of students' scientific literacy and scientific communication, as indicated by N-gain values in the medium to high category and by the ANCOVA test result with a significance value of $0.000 < 0.05$, demonstrating a significant difference in improvement between

the class using the interactive teaching module based on deep learning integrated with STEM–PBL and the class using a conventional teaching module.

Keywords: *Interactive Teaching Module, Deep Learning, STEM, Problem-Based Learning (PBL), Science Literacy, Scientific Communication*