ABSTRAK

Penyesuaian pembelajaran terhadap keberagaman kebutuhan peserta didik serta integrasi teknologi yang adaptif merupakan aspek krusial dalam pembelajaran di era modern. Namun, modul ajar yang tersedia saat ini seringkali bersifat umum dan belum memanfaatkan teknologi secara interaktif. Penelitian ini bertujuan untuk: 1) mengembangkan modul ajar berdiferensiasi berbasis Pedagogi Reflektif (PPR) dengan memanfaatkan *Artificial Intelligence* pada materi sistem persamaan dan pertidaksamaan linear, 2) menganalisis bagaimana modul ajar dapat memfasilitasi diferensiasi gaya belajar dan tingkat kemampuan peseta didik. Jenis penelitian ini adalah *Research and Development* (R&D) dengan model pengembangan ADDIE (*Analysis, Design, Development, Implementation,* dan *Evaluation*). Subjek penelitian sebanyak 36 peserta didik kelas X SMA Negeri 8 Yogyakarta dengan objek penelitian berupa modul ajar berdiferensiasi berbasis pedagogi reflektif dengan pemanfaatan AI. Data dikumpulkan melalui observasi, wawancara, angket, serta tes.

Hasil penelitian menunjukkan bahwa 1) Modul ajar dikembangkan melalui lima tahapan ADDIE. Tahap analisis, dilaksanakan identifikasi kebutuhan peserta didik. Tahap desain, peneliti merancang modul ajar berdiferensiasi berbasis PPR dengan memanfaatkan AI. Tahap pengembangan, peneliti menghasilkan dan menyempurnakan modul berdasarkan validasi oleh dua validator dan revisi. Tahap implementasi dilakukan dalam lima pertemuan. Tahap evaluasi, peneliti menyelidiki kepraktisan, keefektifan, karakter 4C, serta penggunaan AI. Hasil penelitian menunjukkan modul ajar dinyatakan layak dengan tingkat kevalidan 87,4% (sangat valid), kepraktisan 85,08% (sangat praktis), dan keefektifan 56,5% (cukup efektif), 2) Modul ajar berdiferensiasi berbasis PPR dengan memanfaatkan AI terbukti mampu memfasilitasi diferensiasi gaya belajar (visual, auditori, kinestetik) dan tingkat kemampuan (tinggi, rendah) peserta didik. Serta pemanfaatan AI yang membantu peserta didik memahami konsep abstrak SPLTV dan SPtLDV lebih mendalam melalui pengalaman belajar yang reflektif dan adaptif.

Kata kunci: modul ajar berdiferensiasi, paradigma pedagogi reflektif, *artificial intelligence* (AI), SPLTV, SPtLDV

ABSTRACT

Adjusting learning to the diverse needs of students and integrating adaptive technology are crucial aspects of learning in the modern era. However, the teaching modules currently available are often general in nature and do not utilize technology interactively. This study aims to: 1) develop differentiated teaching modules based on Reflective Pedagogy Paradigm by utilizing Artificial Intelligence in linear equation and inequality system materials, 2) analyze how teaching modules can facilitate differentiation in learning styles and ability levels of students. This is a Research and Development (R&D) study using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). The study subjects consisted of 36 students in class XE-6 at SMA Negeri 8 Yogyakarta, with the research object being differentiates teaching modules based on reflective pedagogy utilizing AI. Data were collected through observation, interviews, questionnaires, and tests.

The results of the study show that 1) The teaching module was developed through five ADDIE stages. In the analysis stage, it was found that there was a need for an interactive teaching module that facilitated diversity because conventional methods caused student boredom. In the design stage, researchers designed a differentiated PPR-based teaching module using AI. In the development stage, researchers produced and refined the module based on validation by two validators and revisions. The implementation stage was carried out in five meetings. In the evaluation stage, researchers investigated the practicality, effectiveness, 4C characteristics, and use of AI. The results showed that the teaching module was declared feasible with a validity level of 87.4% (highly valid), practicality of 85.08% (highly practical), and effectiveness of 56.5% (quite effective). 2) PPR-based differentiated teaching modules utilizing AI have been proven to facilitate differentiation of learning styles (visual, auditory, kinesthetic) and ability levels (high, low) of students. The use of AI also helps students understand the abstract concepts of SPLTV and SPtLDV more deeply through reflective and adaptive learning experiences.

Keywords: *differentiated lesson plan, reflective pedagogy paradigm, artificial intelligence, SPLTV, SPtLDV*