

ABSTRACT

Agus Hari Sutrisno. 2026. Design of Artificial Intelligence-Driven Personalized Learning Integration Based on E-IM3 Model to Improve Numeracy Skills of Elementary School Students. Madiun: Master of Elementary Education Study Program, Graduate School PGRI University. Supervisor (I). Dr. Wasilatul Murtafiah, M.Pd. (II). Dr. Jeffry Handika, M.Pd.

Keywords: Artificial Intelligence, Personalized Learning, AI-DPL, e-IM3 Model, Numeracy, Elementary School.

This study aimed to develop an Artificial Intelligence-Driven Personalized Learning (AI-DPL) design integrated with the e-IM3 Model that is valid, practical, and potentially effective in improving elementary school students' numeracy skills. Numeracy is a core competency required for lifelong learning and active participation in the twenty-first century. However, numeracy instruction in elementary schools remains constrained by limited student-centered learning, insufficient personalization, and minimal integration of Artificial Intelligence (AI) with pedagogically grounded instructional models. This study employed a Research and Development (R&D) methodology using the Design-Based Research (DBR) approach, encompassing three phases: preliminary investigation, product development, and product evaluation. The preliminary phase included problem identification, needs analysis, literature review, and product specification. The development phase comprised prototype design, expert validation, and revision, while the evaluation phase involved limited trials, field testing, and final refinement. Data were collected through observations, interviews, questionnaires, and documentation. The findings indicate that the AI-DPL design was successfully developed by integrating constructivist theory, social constructivism, Cognitive Load Theory, Artificial Intelligence in Education (AIED), learner-centered learning, and adaptive learning principles within the e-IM3 instructional framework. Expert evaluations confirmed a very high level of content, instructional design, and media validity, while iterative revisions enhanced product quality. Field implementation demonstrated high practicality, reflected in positive teacher and student responses, ease of use, intuitive navigation, and efficient classroom implementation. The design also showed potential effectiveness in enhancing numeracy through adaptive diagnostic assessment, personalized learning pathways, learning analytics, automated feedback, and an intelligent tutoring system (Smart Tutor). The study contributes a pedagogically grounded AI-based instructional design framework that provides an innovative and scalable approach for improving elementary numeracy learning.

ABSTRAK

Agus Hari Sutrisno. 2026. Desain Integrasi Artificial Intelligence-Driven Personalized Learning Berbasis Model E-Im3 Untuk Meningkatkan Kemampuan Numerasi Siswa Sd. Tesis. Madiun: Program Studi Magister Pendidikan Dasar Sekolah Pascasarjana, Universitas PGRI Madiun. Pembimbing (I). Dr. Wasilatul Murtafiah, M.Pd. (II). Dr. Jeffry Handika, M.Pd.

Kata Kunci: Artificial Intelligence, Personalized Learning, AI-DPL, Model e-IM3, Numerasi, Sekolah Dasar,

Penelitian ini bertujuan menghasilkan desain integrasi *Artificial Intelligence-Driven Personalized Learning* (AI-DPL) berbasis Model e-IM3 yang valid secara teoritis dan pedagogis, praktis digunakan dalam pembelajaran, serta berpotensi efektif dalam meningkatkan kemampuan numerasi peserta didik sekolah dasar. Kemampuan numerasi merupakan kompetensi esensial untuk mendukung kemampuan berpikir kritis, pemecahan masalah, dan pengambilan keputusan pada abad ke-21. Namun, pembelajaran numerasi di sekolah dasar masih menghadapi berbagai kendala, seperti belum optimalnya penerapan pembelajaran yang berpusat pada peserta didik, terbatasnya personalisasi pembelajaran, serta belum terintegrasinya teknologi *Artificial Intelligence* (AI) dengan model pembelajaran yang memiliki landasan pedagogis yang kuat. Penelitian ini menggunakan metode *Research and Development* (R&D) dengan pendekatan *Design-Based Research* (DBR) yang meliputi tiga tahap, yaitu pendahuluan, pengembangan, dan pengujian produk. Tahap pendahuluan meliputi identifikasi masalah, analisis kebutuhan, kajian literatur, dan penyusunan spesifikasi produk. Tahap pengembangan mencakup perancangan produk, penyusunan prototipe, validasi ahli, dan revisi produk. Tahap pengujian dilakukan melalui uji coba terbatas, revisi, uji coba lapangan, dan penyempurnaan produk akhir. Data dikumpulkan melalui observasi, wawancara, angket, dan dokumentasi, kemudian dianalisis secara deskriptif kualitatif dan kuantitatif. Hasil penelitian menunjukkan bahwa desain AI-DPL berbasis Model e-IM3 berhasil dikembangkan melalui sintesis teori konstruktivisme, konstruktivisme sosial, *Cognitive Load Theory*, *Artificial Intelligence in Education* (AIED), serta prinsip *learner-centered* dan *adaptive learning*. Hasil validasi ahli menunjukkan produk berada pada kategori sangat valid, sedangkan hasil implementasi menunjukkan kategori sangat praktis berdasarkan kemudahan penggunaan, kualitas antarmuka, navigasi, dan respons positif pengguna. Desain AI-DPL juga menunjukkan efektivitas potensial dalam meningkatkan kemampuan numerasi melalui asesmen diagnostik adaptif, jalur belajar personal, *learning analytics*, umpan balik otomatis, dan Tutor Pintar berbasis AI. Penelitian ini menghasilkan prinsip desain pembelajaran adaptif berbasis AI yang valid, praktis, dan efektif sebagai inovasi pembelajaran numerasi di sekolah dasar.