ABSTRAK

Manik, Mariani (2026). *Pengembangan Media Pembelajaran Matematika Berbasis AI (Artificial Intelligence) dengan Pendekatan Multimodal untuk Meningkatkan Keterlibatan dan Pemahaman Konsep Matematika Siswa SMP*. Tesis, Pendidikan Matematika, Program Pascasarjana, Universitas Pendidikan Ganesha.

Tesis ini telah disetujui dan diperiksa oleh Pembimbing I: Prof. Dr. Phil. I Gusti Putu Sudiarta, M.Si. dan Pembimbing II: Prof. Dr. I Nengah Suparta, M.Si.

Kata kunci: media pembelajaran matematika, *artificial intelligence*, pendekatan multimodal, keterlibatan siswa, pemahaman konsep

Penelitian ini bertujuan untuk mengembangkan media pembelajaran matematika berbasis AI *(Artificial Intelligence)* dengan pendekatan multimodal yang memiliki karakteristik valid, praktis, dan efektif dalam meningkatkan keterlibatan serta pemahaman konsep matematika siswa SMP. Penelitian ini dilatarbelakangi oleh rendahnya keterlibatan siswa dan keterbatasan pemahaman konsep matematika, khususnya pada materi Teorema Pythagoras, yang disebabkan oleh pembelajaran yang masih didominasi oleh penggunaan media yang kurang melibatkan siswa secara aktif dan belum memanfaatkan teknologi secara optimal. Penelitian ini menggunakan pendekatan *Design Research* atau penelitian pengembangan desain yang meliputi tiga fase utama, yaitu *Preliminary Research*, *Prototyping Phase*, dan *Assessment Phase*. Proses pengembangan dilakukan melalui tahapan analisis kebutuhan, perancangan media, pengembangan prototipe, validasi ahli, uji coba terbatas, uji lapangan I, dan uji lapangan II. Subjek penelitian adalah siswa kelas VIII SMP Negeri 3 Denpasar. Data dikumpulkan menggunakan lembar validasi ahli, angket kepraktisan, lembar observasi keterlibatan siswa, dokumentasi penggunaan media, serta tes pemahaman konsep matematika, dan dianalisis secara deskriptif kuantitatif dan kualitatif. Hasil penelitian menunjukkan bahwa media pembelajaran yang dikembangkan memenuhi kriteria valid berdasarkan penilaian ahli materi dan ahli media. Media juga dinyatakan praktis berdasarkan respon positif guru dan siswa terhadap kemudahan penggunaan serta keterlaksanaan media dalam pembelajaran. Dari aspek keefektifan, media pembelajaran terbukti mampu meningkatkan keterlibatan siswa yang meliputi keterlibatan perilaku, emosional, dan kognitif, serta meningkatkan pemahaman konsep matematika siswa secara bertahap dari uji coba terbatas hingga uji lapangan II. Berdasarkan hasil tersebut, dapat disimpulkan bahwa media pembelajaran matematika berbasis AI dengan pendekatan multimodal layak digunakan sebagai alternatif media pembelajaran yang inovatif dan efektif untuk meningkatkan keterlibatan dan pemahaman konsep matematika siswa SMP.

ABSTRACT

Manik, Mariani (2025). Development of AI (Artificial Intelligence)-Based Mathematics Learning Media with a Multimodal Approach to Enhance Student Engagement and Conceptual Understanding in Junior High School. Thesis, Mathematics Education, Postgraduate Program, Universitas Pendidikan Ganesha.

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Keywords: mathematics learning media, artificial intelligence, multimodal approach, student engagement, conceptual understanding

This study aims to develop AI (Artificial Intelligence) based mathematics learning media with a multimodal approach that meets the criteria of validity, practicality, and effectiveness in enhancing student engagement and conceptual understanding in junior high school. The study is motivated by the low level of student engagement and limited conceptual understanding of mathematics, particularly on the topic of the Pythagorean Theorem, which is caused by learning practices that are still dominated by the use of instructional media that do not actively engage students and have not optimally utilized technology. This research employed a Design Research approach or design-based research, which consists of three main phases: Preliminary Research, Prototyping Phase, and Assessment Phase. The development process involved needs analysis, media design, prototype development, expert validation, limited trials, field testing I, and field testing II. The research subjects were eighth-grade students of SMP Negeri 3 Denpasar. Data were collected through expert validation sheets, practicality questionnaires, student engagement observation sheets, documentation of media usage, and tests of mathematical conceptual understanding, and were analyzed using descriptive quantitative and qualitative methods. The results indicate that the developed learning media met the validity criteria based on evaluations by content and media experts. The media were also considered practical based on positive responses from teachers and students regarding ease of use and implementation in classroom learning. In terms of effectiveness, the learning media were proven to enhance student engagement, including behavioral, emotional, and cognitive engagement, as well as to improve students' conceptual understanding progressively from the limited trial stage to field testing II. Based on these findings, it can be concluded that AI-based mathematics learning media with a multimodal approach are feasible and recommended as an innovative and effective alternative for improving student engagement and conceptual understanding in junior high school mathematics learning.