

**PENGEMBANGAN E-MODUL MATEMATIKA BISNIS BERBASIS
MASALAH MENINGTEGRASIKAN *VIRTUAL REALITY* BERBANTUAN
AI UNTUK MENINGKATKAN KETERAMPILAN BERPIKIR KRITIS
DAN KREATIF MAHASISWA**

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ABSTRAK

Mahasiswa Program Studi Bisnis Digital masih mengalami kesulitan dalam mengembangkan keterampilan berpikir kritis dan kreatif pada mata kuliah Matematika Bisnis. Penelitian ini bertujuan mengembangkan e-modul Matematika Bisnis berbasis masalah yang mengintegrasikan *Virtual Reality* berbantuan *Artificial Intelligence* untuk meningkatkan keterampilan tersebut. Penelitian menggunakan model pengembangan Plomp yang meliputi tahap *preliminary research*, *development*, dan *assessment*. Hasil penelitian menunjukkan e-modul memenuhi kualitas valid, praktis, dan efektif dengan enam karakteristik utama: (1) pembelajaran berbasis situasi autentik melalui VR, (2) integrasi AI melalui karakter virtual interaktif, (3) fitur evaluasi mandiri berbasis pemecahan masalah, (4) fasilitasi berbagi ide kreatif, (5) kolaborasi mahasiswa, serta (6) eksplorasi permasalahan bisnis sejenis. Hasil wawancara menunjukkan e-modul membantu mahasiswa menganalisis masalah secara sistematis, mengevaluasi alternatif solusi secara logis, dan menghasilkan ide bisnis kreatif. Temuan ini diperkuat oleh peningkatan rata-rata skor berpikir kritis dari 88,38 menjadi 93,42 dan berpikir kreatif dari 88,28 menjadi 92,86.

Kata-kata kunci: *E-modul Matematika Bisnis, Virtual Reality (VR), Artificial Intelligence (AI), Berpikir kritis, Berpikir kreatif, Model Plomp*

DEVELOPMENT OF A PROBLEM-BASED BUSINESS MATHEMATICS E-MODULE INTEGRATING VIRTUAL REALITY ASSISTED BY AI TO ENHANCE STUDENTS' CRITICAL AND CREATIVE THINKING SKILLS

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ABSTRACT

Students in the Digital Business Study Program still experience difficulties in developing critical and creative thinking skills in the Business Mathematics course. This study aims to develop a problem-based Business Mathematics e-module that integrates Virtual Reality supported by Artificial Intelligence to improve these skills. The study employed the development model proposed by Tjeerd Plomp, which consists of the preliminary research, development, and assessment stages. The results show that the developed e-module meets the qualities of being valid, practical, and effective, with six main characteristics: (1) learning based on authentic situations through VR, (2) AI integration through interactive virtual characters, (3) self-assessment features based on problem solving, (4) facilitation of sharing creative ideas, (5) student collaboration, and (6) exploration of similar business problems. Interview results indicate that the e-module helps students analyze problems systematically, evaluate alternative solutions logically, and generate creative business ideas. These findings are supported by an increase in the average scores of critical thinking from 88.38 to 93.42 and creative thinking from 88.28 to 92.86.

Keywords: *Business Mathematics E-module, Virtual Reality (VR), Artificial Intelligence (AI), Critical thinking, Creative thinking, Plomp model*