# PENGEMBANGAN MEDIA INTERAKTIF *AUGMENTED REALITY PUZZLE BASED MARKER* PADA MATERI TOPOLOGI JARINGAN KOMPUTER

**Oleh**

**Ni Putu Sri Anggi Juliandani**

**Program Studi Pendidikan Teknik Informatika**

**Jurusan Teknik Informatika**

**Fakultas Teknik dan Kejuruan**

**Universitas Pendidikan Ganesha Singaraja**

**Email: sri.anggi@student.undiksha.ac.id**

## ABSTRAK

Penelitian ini dilakukan untuk mengembangkan media pembelajaran interaktif berbasis *Augmented Reality* (AR) dengan pendekatan *puzzle-based marker* pada materi topologi jaringan komputer serta menganalisis respon pengguna terhadap media yang dikembangkan. Model pengembangan yang digunakan adalah *Multimedia Development Life Cycle* (MDLC) yang meliputi tahapan *concept, design, material collecting, assembly, testing, dan distribution*. Penelitian melibatkan siswa kelas X TJKT di SMK Negeri 1 Sukawati sebagai subjek penelitian. Berdasarkan hasil pengujian, media pembelajaran yang dikembangkan memperoleh kategori sangat valid melalui penilaian ahli isi dan ahli media. Pengujian perorangan dan kelompok kecil juga menunjukkan hasil sangat valid dengan persentase sebesar 92,38% dan 92,67%. Hasil respon pengguna melalui *User Experience Questionnaire* (UEQ) menunjukkan seluruh dimensi berada pada kategori *Good* hingga *Excellent*. Selain itu, hasil uji capaian belajar memperlihatkan adanya peningkatan nilai rata-rata siswa dari 63,5 pada pretest menjadi 87 pada posttest dengan nilai *N-Gain* sebesar 0,661 yang termasuk kategori sedang. Media pembelajaran yang dikembangkan mampu menghadirkan pengalaman belajar yang lebih interaktif melalui kegiatan penyusunan puzzle topologi jaringan, proses pemindaian marker, serta fitur evaluasi kuis berbasis AR. Visualisasi objek tiga dimensi yang dipadukan dengan aktivitas puzzle juga memberikan pengalaman belajar yang lebih eksploratif dan kontekstual bagi siswa. Oleh karena itu, media pembelajaran berbasis *Augmented Reality* dengan pendekatan *puzzle-based marker* dinilai layak digunakan sebagai media visualisasi konseptual untuk membantu siswa memahami materi topologi jaringan komputer sebelum melakukan praktik jaringan secara langsung.

**Kata Kunci:** *Augmented Reality, puzzle-based marker*, topologi jaringan, media pembelajaran.

***Development of an Interactive Augmented Reality Puzzle-Based Marker Learning Media on Computer Network Topology***

***By***

***Ni Putu Sri Anggi Juliandani***

***Informatics Engineering Education Study Program***

***Department of Informatics Engineering***

***Faculty of Engineering and Vocational Studies***

***Ganesha Singaraja University of Education***

***Email**: sri.anggi@student.undiksha.ac.id*

## *ABSTRACT*

*This study was conducted to develop an interactive learning media based on Augmented Reality (AR) using a puzzle-based marker approach on computer network topology material and to analyze user responses toward the developed media. The development process applied the Multimedia Development Life Cycle (MDLC) model consisting of concept, design, material collecting, assembly, testing, and distribution stages. The subjects involved in this study were tenth-grade TJKT students at SMK Negeri 1 Sukawati. The results indicated that the developed learning media achieved a very valid category based on assessments from content and media experts. Individual and small group testing also showed very valid results with percentages of 92.38% and 92.67%, respectively. User responses measured using the User Experience Questionnaire (UEQ) demonstrated positive results across all dimensions, ranging from Good to Excellent categories. In addition, the learning outcome test revealed an increase in students' average scores from 63.5 in the pretest to 87 in the posttest, with an N-Gain score of 0.661 categorized as moderate. The developed media was able to provide a more interactive learning experience through network topology puzzle assembly activities, marker scanning processes, and AR-based quiz evaluation features. The integration of three-dimensional object visualization and puzzle activities also created a more exploratory and contextual learning experience for students. Therefore, the Augmented Reality learning media with a puzzle-based marker approach is considered feasible as a conceptual visualization medium to support students' understanding of computer network topology material before conducting actual network practice activities.*

***Keywords:*** *Augmented Reality, puzzle-based marker, network topology, learning media.*