

## ABSTRAK

### PENGEMBANGAN PERANGKAT PEMBELAJARAN MATERI SISTEM KOORDINASI BERBANTUAN *AUGMENTED REALITY* UNTUK MENINGKATKAN KETERAMPILAN BERPIKIR SISTEM

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Penelitian ini bertujuan untuk menghasilkan perangkat pembelajaran materi sistem koordinasi berbantuan *augmented reality*, dan mendeskripsikan kepraktisan perangkat pembelajaran dalam meningkatkan keterampilan berpikir sistem, serta mendeskripsikan keefektifan perangkat pembelajaran berbantuan *augmented reality* yang dikembangkan. Desain penelitian dan pengembangan (*Research and Development*) dilakukan dengan mengacu pada model pengembangan 4-D yang terdiri dari empat tahap yaitu, *define*, *design*, *develop* dan *disseminate*. Sampel penelitian adalah siswa SMP Quran Darul Ikhlas kelas IX yang terdiri atas 15 siswa dalam uji skala kecil dan 32 siswa dalam uji skala besar, dengan menggunakan teknik *purposive sampling*. Desain uji coba yang digunakan yakni *The Matching Only Pretest-Posttest Non-Equivalent Control Group Design*. Instrumen yang digunakan meliputi kuesioner analisis kebutuhan, kuesioner validitas, kuesioner kepraktisan, lembar observasi keterlaksanaan pembelajaran, dan tes *pretest-posttest* keterampilan berpikir sistem. Teknik analisis data pada penelitian ini menggunakan uji *independent sample t-test* yang dianalisis menggunakan *software* SPSS versi 25.0. Hasil penelitian menunjukkan bahwa perangkat pembelajaran dinyatakan sangat valid ditinjau dari aspek isi sebesar 89,5%, aspek konstruksi sebesar 94,8% dan aspek kemenarikan sebesar 97,2%; perangkat pembelajaran berbantuan *augmented reality* praktis digunakan untuk meningkatkan keterampilan berpikir sistem ditinjau dari keterlaksanaan pembelajaran sebesar 92,5%, respon penilaian produk menunjukkan bahwa sebagian besar peserta didik memberikan penilaian sangat positif dengan persentase sebesar 97,22%, sedangkan pendidik sebesar 95,7%.; perangkat pembelajaran efektif meningkatkan keterampilan berpikir sistem dengan nilai *N-Gain* tinggi yaitu 0,79 dan *effect size* besar yaitu 1,95. Berdasarkan hasil tersebut, perangkat pembelajaran berbantuan *augmented reality* yang dikembangkan efektif dalam meningkatkan keterampilan berpikir sistem.

Kata kunci: Perangkat pembelajaran, *augmented reality*, keterampilan berpikir sistem.

## **ABSTRACT**

### **DEVELOPMENT OF AUGMENTED REALITY ASSISTED LEARNING MATERIALS ON THE COORDINATION SYSTEM TO ENHANCE SYSTEM THINKING SKILLS**

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This study aims to develop learning materials on the coordination system assisted by augmented reality and to describe the practicality of the learning materials in improving systems thinking skills, as well as to describe the effectiveness of the developed augmented reality assisted learning materials. The research and development design was conducted based on the 4-D development model, which consists of four stages: define, design, develop, and disseminate. The research sample consisted of ninth grade students of SMP Quran Darul Ikhlas, comprising 15 students in the small-scale trial and 32 students in the large-scale trial, selected using purposive sampling techniques. The experimental design employed was the Matching-Only Pretest–Posttest Non-Equivalent Control Group Design. The instruments used included a needs analysis questionnaire, validity questionnaire, practicality questionnaire, learning implementation observation sheets, and pretest–posttest tests of systems thinking skills. Data analysis techniques in this study used the independent samples t-test, which was analyzed using SPSS software version 25.0. The results showed that the learning materials were categorized as highly valid, with content validity of 89.5%, construct validity of 94.8%, and attractiveness validity of 97.2%. The augmented reality–assisted learning materials were practical for improving systems thinking skills, as indicated by a learning implementation score of 92.5%. Product assessment responses showed that the majority of students gave very positive evaluations with a percentage of 97.22%, while teachers' responses reached 95.7%. Furthermore, the learning materials were effective in improving systems thinking skills, as indicated by a high N-Gain value of 0.79 and a large effect size of 1.95. Based on these results, the developed augmented reality assisted learning materials are effective in enhancing systems thinking skills.

**Keywords:** Learning materials, augmented reality, systems thinking skills.