

**DESAIN OPTICALGAMIFICATION (OG) UNTUK MENINGKATKAN
KETERAMPILAN BERPIKIR KRITIS DAN KREATIF MAHASISWA
CALON GURU FISIKA**

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DESAIN OPTICALGAMIFICATION (OG) UNTUK MENINGKATKAN KETERAMPILAN BERPIKIR KRITIS DAN KREATIF MAHASISWA CALON GURU FISIKA

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KETERAMPILAN BERPIKIR KRITIS DAN KREATIF MAHASISWA
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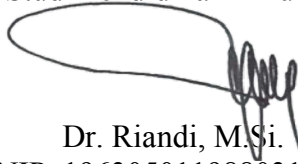
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PERNYATAAN

Dengan ini saya menyatakan bahwa disertasi dengan judul “*Desain OpticalGamification (OG) untuk Meningkatkan Keterampilan Berpikir Kritis dan Kreatif Mahasiswa Calon Guru Fisika*” ini beserta seluruh isinya adalah benar-benar karya saya sendiri, dan saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara yang tidak sesuai dengan etika keilmuan yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menanggung risiko/ sanksi yang dijatuhkan kepada saya apabila kemudian ditemukan adanya pelanggaran terhadap etika keilmuan dalam karya saya ini, atau ada klaim dari pihak lain terhadap keaslian karya saya ini.

Bandung, Juni 2020

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DESAIN OPTICALGAMIFICATION (OG) UNTUK MENINGKATKAN KETERAMPILAN BERPIKIR KRITIS DAN KREATIF MAHASISWA CALON GURU FISIKA

Abstrak

Penelitian ini bertujuan untuk merancang serta mengimplementasikan aplikasi gamifikasi berbasis *information and communication technology* (ICT) pada perkuliahan optik yang dapat meningkatkan keterampilan berpikir kritis dan berpikir kreatif mahasiswa calon guru fisika secara beriringan. Metode penelitian yang digunakan adalah *mixed methods* dengan desain *embedded experimental model*. Tahap uji coba dilakukan dengan menggunakan *time series design* yang melibatkan 34 mahasiswa pada salah satu universitas di Jakarta dan 20 mahasiswa pada salah satu universitas di Bandung. Tahap implementasi dilakukan dengan menggunakan *pre-test post-test nonequivalent multiple group design* yang melibatkan 48 mahasiswa pada salah satu universitas di Ternate (Lokasi I) dan 58 mahasiswa pada salah satu universitas di Bandung (Lokasi II). Data kuantitatif terkait penguasaan konsep, keterampilan berpikir kritis dan berpikir kreatif mahasiswa dikumpulkan melalui instrumen tes terintegrasi yang terdiri dari 46 item soal pilihan ganda, 4 item soal pilihan ganda beralasan dan 1 item soal uraian. Data keterlibatan serta perilaku belajar mahasiswa diperoleh dengan menganalisis basis data *log history* aplikasi OG. Data kualitatif terkait tanggapan mahasiswa dikumpulkan melalui angket. Melalui penelitian ini telah dihasilkan aplikasi gamifikasi berbasis ICT yang dinamakan dengan OpticalGamification (OG). Desain OG model serial didasarkan pada teori belajar bermakna, dimana model ini telah berhasil dalam menyajikan setiap level (sub topik) dan evaluasi dalam sesi-sesi yang dikerjakan secara berurutan. Desain OG model random didasarkan pada teori pembelajaran orang dewasa, dimana model ini telah berhasil memberikan kebebasan akses bagi mahasiswa pada setiap level (sub topik) dan evaluasi dalam sesi-sesi yang dapat dikerjakan secara acak sesuai dengan keinginan mahasiswa. Fitur-fitur pada OpticalGamification (OG) meliputi fitur profil, gamifikasi, forum, proyek, halaman prestasi dan *leaderboards*. Fitur gamifikasi dirancang dengan menerapkan model pembelajaran siklus belajar tipe empiris abduktif yang meliputi fase eksplorasi, fase pengenalan konsep dan fase aplikasi konsep. Hasil analisis menunjukkan bahwa tidak terdapat perbedaan yang signifikan dalam peningkatan penguasaan konsep dan keterampilan berpikir kritis antara mahasiswa pada grup serial dan grup random. Peningkatan keterampilan berpikir kreatif mahasiswa pada grup random secara signifikan lebih meningkat dibandingkan dengan grup serial khususnya untuk indikator *fluency* dan *flexibility*. Pola perilaku belajar mahasiswa pada grup random menunjukkan adanya urutan perilaku yang lebih beragam dibandingkan grup serial. Kedua model gamifikasi yang ditemukan dalam penelitian ini dapat digunakan sebagai alternatif solusi dalam merancang aplikasi gamifikasi untuk pembelajaran yang lebih efektif dan efisien dimasa mendatang.

Kata kunci: OpticalGamification (OG), OG Model Serial, OG Model Random, Keterampilan Berpikir Kritis, Keterampilan Berpikir Kreatif

THE DESIGN OF OPTICALGAMIFICATION (OG) TO IMPROVE PRE-SERVICE PHYSICS TEACHERS' CRITICAL AND CREATIVE THINKING SKILLS

Abstract

This research aims to design and implement an information and communication technology (ICT)-based gamification application in the optics course that can improve pre-service physics teachers' (PPTs) critical and creative thinking skills simultaneously. This research uses mixed methods with embedded experimental model design. Preliminary field testing of the OG with random models has involved 34 PPTs at a university in Jakarta, while the OG with serial models has involved 20 students at one of the universities in Bandung. The implementation phase was carried out using a pre-test post-test non-equivalent multiple group design involving 48 PPTs at one of the universities in Ternate (Location I) and 58 PPTs at one of the universities in Bandung (Location II). Quantitative data related to concept mastery, critical and creative thinking skills were collected through integrated test instruments consisting of 46 multiple-choice items, 4 reasoned multiple-choice items, and 1 essay item. Data related to student engagement and learning behavior were obtained by analyzing the OG application log history database. Qualitative data related to PPTs' responses was collected through a questionnaire. Through the settings for the variations in PPTs' access to the levels (sub-topics) and evaluations that are presented in this application, two OG application models are generated, namely: 1) serial models (based on the theory of meaningful learning); designed to facilitate PPTs who study sequentially, and 2) random models (based on the theory of andragogy); designed to facilitate PPTs who study randomly depends on their choices. Features on OpticalGamification (OG) include profile features, gamification, forums, projects, student achievements and leaderboards. The gamification feature has been designed by applying the empirical abductive learning cycle model. The results of this research indicates that there is no significant difference in the improvement of PPTs' concept mastery and critical thinking skills in the serial and random groups. The improvement of PPTs' creative thinking skills in the random group was significantly higher than that of PPTs in the serial group especially for indicators of fluency and flexibility. Freedom of PPTs' access in the OG with random models proved to be more able to facilitate diversity in PPTs' behavior when they engage in completing tasks on the levels (sub-topics) and the evaluations. PPTs' learning behavior patterns in the random groups more diverse than the serial group. Both of these models can be used as references in designing ICT-based gamification-applications for a more effective and efficient learning in the future.

Keywords: OpticalGamification (OG), OG with Serial Model, OG with Random Model, Critical Thinking Skills, Creative Thinking Skills

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Disertasi yang berjudul “*Desain OpticalGamification (OG) untuk Meningkatkan Keterampilan Berpikir Kritis dan Kreatif Mahasiswa Calon Guru Fisika*” disusun sebagai salah satu syarat untuk memperoleh gelar Doktor Pendidikan Ilmu Pengetahuan Alam. Selain itu, disertasi ini memberikan gambaran terkait peningkatan keterampilan berpikir kritis dan berpikir kreatif mahasiswa calon guru fisika yang dapat dikembangkan secara beriringan melalui penggunaan aplikasi OpticalGamification (OG) baik model serial maupun model random.

Penulis menyadari bahwa disertasi ini masih banyak kekurangannya. Oleh karena itu, penulis mengharapkan berbagai saran dan kritik sehingga dapat memperbaiki kekurangan-kekurangan yang ditemukan dalam disertasi ini. Akhir kata, penulis berharap semoga disertasi ini dapat bermanfaat bagi semua pihak.

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