PENGEMBANGAN *GAME SIMULASI SMART FARMING* BUDIDAYA KEDELAI BERBASIS *VIRTUAL REALITY*

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ABSTRAK

Penelitian ini bertujuan untuk merancang dan mengembangkan *game simulasi smart farming* budidaya kedelai berbasis *Virtual Reality* sebagai media pembelajaran interaktif, serta mengetahui tingkat kelayakan dan respon pengguna terhadap aplikasi yang dikembangkan. Metode penelitian yang digunakan adalah *Research and Development* (*R&D*) dengan model pengembangan *Multimedia Development Life Cycle* (*MDLC*) yang meliputi tahap *concept*, *design*, *obtaining content material*, *assembly*, *testing*, dan *distribution*. Pengumpulan data dilakukan melalui observasi, wawancara, dan studi pustaka. Pengujian sistem dilakukan menggunakan black box *testing*, uji validitas ahli isi dan media, serta uji respon pengguna menggunakan *Game Experience Questionnaire (GEQ)* dengan melibatkan 50 responden. Hasil penelitian menunjukkan bahwa (1) game *VR* berhasil dikembangkan dengan fitur *smart farming* berupa penyiraman otomatis, pemupukan otomatis, dan penyemprotan hama otomatis serta dilengkapi menu orientasi, pelatihan, dan praktikum; (2) hasil pengujian *black box* menunjukkan seluruh fungsi sistem berjalan dengan baik sesuai skenario tanpa ditemukan kesalahan fungsional; (3) hasil uji validitas ahli isi yang dilakukan oleh dua orang ahli yaitu dosen pertanian dan praktisi dari dinas pertanian memperoleh koefisien validitas sebesar 1.00 dengan kategori sangat valid, sedangkan hasil uji validitas ahli media yang dilakukan oleh dua dosen bidang TI juga memperoleh nilai sebesar 1.00 dengan kategori sangat valid; (4) hasil uji respon pengguna menggunakan *GEQ* menunjukkan nilai rata-rata pada masing-masing komponen yaitu *competence* sebesar 2.88, *sensory and imaginative immersion* sebesar 2.9, *flow* sebesar 2.37, *challenge* sebesar 2.74, *tension/annoyance* sebesar 1.33, *positive affect* sebesar 3.21, *negative affect* sebesar 0.43, *positive experience* sebesar 3.07, *negative experience* sebesar 0.30, *tiredness* sebesar 0.44, dan *returning to reality* sebesar 0.95. Berdasarkan hasil tersebut, dapat disimpulkan bahwa aplikasi *game simulasi smart farming* budidaya kedelai berbasis *Virtual Reality* yang dikembangkan mampu memberikan pengalaman pengguna yang baik, ditunjukkan oleh tingginya nilai komponen positif, serta rendahnya nilai komponen negatif, sehingga aplikasi ini layak digunakan sebagai media pembelajaran interaktif dalam meningkatkan pemahaman dan minat generasi muda terhadap budidaya kedelai berbasis teknologi *smart farming*.

Kata-Kata Kunci: *Virtual Reality*, *smart farming*, *game simulasi*, budidaya kedelai, edamame, *MDLC*, *GEQ*, media pembelajaran.

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ABSTRACT

This study aimed to design and develop a Virtual Reality-based smart farming soybean cultivation simulation game as an interactive learning medium and to determine the feasibility level and user responses toward the developed application. The research employed the Research and Development (R&D) method using the Multimedia Development Life Cycle (MDLC) model, which consists of the stages of concept, design, obtaining content material, assembly, testing, and distribution. Data were collected through observation, interviews, and literature studies. System testing was conducted using black-box testing, content and media expert validity assessments, and user response testing using the Game Experience Questionnaire (GEQ) involving 50 respondents. The results of the study indicate that: (1) the VR game was successfully developed with smart farming features, including automatic irrigation, automatic fertilization, and automatic pest control spraying, and was equipped with orientation, training, and practicum menus; (2) black-box testing results showed that all system functions operated properly according to the test scenarios without any functional errors; (3) the content validity assessment conducted by two experts, namely an agriculture lecturer and a practitioner from the agricultural department, obtained a validity coefficient of 1.00, categorized as highly valid, while the media validity assessment conducted by two Information Technology lecturers also obtained a score of 1.00, categorized as highly valid; (4) the user response test using the GEQ yielded average scores for each component as follows: competence (2.88), sensory and imaginative immersion (2.90), flow (2.37), challenge (2.74), tension/annoyance (1.33), positive affect (3.21), negative affect (0.43), positive experience (3.07), negative experience (0.30), tiredness (0.44), and returning to reality (0.95). Based on these findings, it can be concluded that the developed Virtual Reality-based smart farming soybean cultivation simulation game provides a positive user experience, as indicated by the high scores of positive components and the low scores of negative components. Therefore, the application is considered suitable for use as an interactive learning medium to enhance the understanding and interest of younger generations in soybean cultivation based on smart farming technology.

Keywords Key: Virtual Reality, smart farming, simulation game, soybean cultivation, edamame, MDLC, GEQ, learning media.