

ABSTRAK

PENGEMBANGAN BUKU TEKS PERADABAN ENERGI LISTRIK BERBASIS *PROJECT BASED LEARNING* UNTUK MENINGKATKAN KARAKTER KETERBUKAAN WAWASAN ANAK

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Krisis karakter yang ditandai meningkatnya intoleransi dan melemahnya empati menegaskan perlunya pendidikan karakter berbasis keterbukaan wawasan sejak dini. Keterampilan ini meliputi kemampuan berpikir adaptif, menghargai keragaman, menerima ide baru, serta mengambil keputusan rasional. Penelitian ini mengembangkan buku teks berbasis *Project Based Learning* (PjBL) tentang energi listrik untuk meningkatkan keterbukaan wawasan anak. Metode yang digunakan adalah *Research and Development* dengan model ADDIE. Subjek penelitian meliputi sepuluh pendidik pada tahap analisis kebutuhan, lima pakar dan lima praktisi sebagai validator, dua kelompok siswa usia 10–12 tahun sebagai kelas kontrol dan eksperimen, serta orang tua dari kelompok eksperimen sebagai responden pendukung. Implementasi dilakukan melalui lima proyek energi listrik: kipas angin mini, rangkaian lampu lalu lintas paralel, listrik buah, balap kaleng listrik statis, dan motor homopolar.

Hasil penelitian menunjukkan bahwa, 1) pengembangan buku teks berlangsung sistematis sesuai model ADDIE dan menghasilkan produk yang layak digunakan. 2) Penilaian validator terhadap kualitas buku memberikan skor rerata 3,82 (kategori “Sangat Baik”) dengan rekomendasi “Tidak Perlu Revisi”. 3) penerapan buku teks memberikan pengaruh positif dan signifikan terhadap peningkatan karakter keterbukaan wawasan anak ($p < 0,05$), dengan nilai *effect size* $r = 0,4851$ (kategori besar) dan tingkat efektivitas (*N-gain*) 0,3319 (kategori menengah). Analisis *z-score* menunjukkan perbedaan jelas antara kelompok kontrol (-1,90 hingga 0,45) dan kelompok eksperimen (-0,40 hingga 2,33), yang mengindikasikan efektivitas pembelajaran berbasis proyek dalam meningkatkan keterbukaan wawasan anak. Konsistensi antarpemilai tergolong tinggi dengan *Krippendorff's* $\alpha = 0,687$. Temuan ini menunjukkan bahwa buku teks berbasis PjBL efektif dalam mengembangkan karakter keterbukaan wawasan anak.

Kata-kata kunci: *Project Based Learning*, karakter keterbukaan wawasan, buku teks, peradaban energi listrik.

ABSTRACT**DEVELOPING A TEXTBOOK ON THE CIVILIZATION OF ELECTRICAL ENERGY BASED ON PROJECT-BASED LEARNING TO ENHANCE CHILDREN'S OPEN-MINDEDNESS CHARACTER**

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The character crisis, marked by rising intolerance and diminishing empathy, underscores the urgent need for character education grounded in intellectual openness from an early age. This competency encompasses adaptive thinking skills, appreciation of diversity, acceptance of novel ideas, and rational decision-making. The present study developed a Project-Based Learning (PjBL)-based textbook on electrical energy to enhance children's intellectual openness character. The research employed a Research and Development (R&D) approach using the ADDIE model. Research participants included ten educators during the needs-analysis phase, five experts and five practitioners as validators, two groups of students aged 10–12 years serving as control and experimental classes, and parents of the experimental group as supporting respondents. Implementation was carried out through five electrical-energy projects: a mini electric fan, a parallel traffic-light circuit, fruit-generated electricity, static-electric can racing, and a homopolar motor.

The results revealed that (1) the textbook development proceeded systematically according to the ADDIE model and produced a feasible product; (2) validators' assessment of the textbook's quality yielded a mean score of 3.82 (categorized as "Very Good") with the recommendation "No Revision Required"; and (3) the implementation of the textbook exerted a positive and significant effect on improving children's intellectual openness character ($p < 0.05$), with an effect size of $r = 0.4851$ (large category) and an effectiveness level (N -gain) of 0,3319 (medium category). The z -score analysis shows a clear difference between the control group (-1.90 to 0.45) and the experimental group (-0.40 to 2.33), indicating the effectiveness of project-based learning in increasing children's open-mindedness. Inter-rater consistency was classified as high, with Krippendorff's $\alpha = 0.687$. These results demonstrate that the Project Based Learning (PjBL) based textbook is effective in developing children's intellectual openness character.

Keywords: Project-Based Learning, open-mindedness character, textbook, civilization of electrical energy.