PENGEMBANGAN BAHAN AJAR IPA TERINTEGRASI PROYEK STEM *(SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS)* UNTUK MENINGKATKAN LITERASI SAINS SISWA SEKOLAH DASAR

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ABSTRAK

Tujuan dari penelitian ini adalah menghasilkan bahan ajar IPA terintegrasi proyek STEM *(Science Technology, Engineering, and Mathematics)* pada materi rangkaian listrik dan mengetahui efektivitas bahan ajar dalam meningkatkan literasi sains siswa. Penelitian ini menggunakan metode eksperimen semu (*quasi exsperiment*) dalam bentuk *Nonequivalent pretest-posttest control group design*. Prosedur penelitian meliputi tahap analisis kebutuhan, desain produk, validasi dan evaluasi, dan uji coba. Validasi produk melibatkan ahli materi, penyajian, bahasa, dan grafika. Validasi kelayakan produk melibatkan guru yang mengajar mata pelajaran IPA. Uji keterbacaan siswa melalui uji coba perorangan, kelompok kecil, dan lapangan. Teknik pengumpulan data yang digunakanan adalah wawancara, observasi, dokumentasi, angket, dan tes. Subyek penelitian yaitu siswa kelas VI SDK 2 PENABUR Jakarta yang yang terbagi dalam dua sampel, yaitu kelas eksperimen dan kelas kontrol. Hasil validasi ahli menunjukkan aspek materi 97,7% dengan kategori sangat layak; aspek penyajian 97,7% dengan kategori sangat layak; aspek bahasa 85% dengan kategori sangat layak ; aspek grafika 80% dengan kategori layak. Hasil validasi kelayakan oleh guru IPA menunjukkan aspek materi 90% dengan kategori sangat layak; aspek penyajian 98,6% dengan kategori sangat layak; aspek bahasa 96,7% dengan kategori sangat layak. Hasil uji keterbacaan oleh siswa diperoleh rata-rata skor sebesar 87,7% dengan kategori sangat layak. Teknik pengolahan data melalui uji normalitas, homogenitas, N-gain, dan uji-t dua pihak. Berdasarkan hasil uji efektivitas, maka diketahui bahwa nilai n-*gain* kelas eksperimen sebesar 0,71 dengan kategori tinggi, sedangkan kelas kontrol sebesar 0,52 dengan kategori sedang. Literasi sains siswa mengalami peningkatan untuk setiap indikator. Berdasarkan penelitian yang telah dilakukan, dapat disimpulkan bahwa bahan ajar IPA terintegrasi proyek *STEM* efektif dalam meningkatkan literasi sains siswa. Sedangkan hasil uji *independent sample t-test* diketahui nilai Sig. (2-tailed) sebesar $0,000 < 0,05$, artinya ada perbedaan yang signifikan antara rata-rata hasil belajar siswa pada kelas yang menggunakan bahan ajar IPA terintegrasi proyek STEM dengan kelas yang tidak menggunakan bahan ajar IPA terintegrasi proyek STEM.

Kata kunci: STEM, pretest, postest, eksperimen semu, validasi ahli, literasi sains

DEVELOPMENT OF INTEGRATED STEM (SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS) PROJECTS FOR SCIENCE TEACHING MATERIALS TO INCREASE ELEMENTARY STUDENTS SCIENCE LITERACY

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ABSTRACT

The objective of this study was to produce integrated STEM (Science Technology, Engineering, and Mathematics) project for science teaching materials on electrical circuit material and find out the effectiveness of teaching materials in increasing students' scientific literacy. This study applied quasi-experimental method in the form of Nonequivalent pretest-posttest control group design. Research procedures included the phases of the needs analysis, product design, validation and evaluation, and testing. Product validation involved material, presentation, language and graphic experts. Product validation included teachers teaching science subjects. The readability test of students went through individual, small group, and field trials. Data collection techniques used were interviews, observation, documentation, questionnaires, and tests. The research subjects were 6th grade students of SDK 2 PENABUR Jakarta which were divided into two samples, namely the experimental class and the control class. The result of expert validation indicated that the material aspect was 97.7% with a very decent category; the presentation aspect was 97.7% with a very decent category; the language aspect was 85% with a very decent category; graphic aspect was 80% with a decent category. The validation results for the feasibility by the science teacher showed that the material aspect was 90% with a very decent category; the presentation aspect was 98.6% with a very decent category; and the language aspect was 96.7% with a very decent category. The readability test results by students obtained an average score of 87.7% with a very decent category. Data processing techniques were through normality, homogeneity, N-gain, and two-party t-test. Based on the results of the effectiveness test, it was known that the n-gain value of the experimental class was 0.71 with a high category, while the control class was 0.52 with a moderate category. Student's scientific literacy has increased for each indicator. Based on the research that had been done, it can be concluded that the integrated STEM projects for science teaching materials were effective in increasing students' scientific literacy. Meanwhile, the results of the independent sample t-test were known to be significant (2-tailed) of $0.000 < 0.05$, meaning that there was a significant difference of average student learning outcomes between those in classes that used integrated STEM projects for science teaching materials and those in classes that did not use integrated STEM projects for science teaching materials.

Keywords: STEM, pretest, posttest, quasi-experimental, expert validation, scientific literacy