MENINGKATKAN *TECHNOLOGY ENGINEERING LITERACY* (TEL) DAN MOTIVASI BELAJAR SISWA DENGAN MENGGUNAKAN STEM – *PROJECT BASED LEARNING* (PjBL) PADA TOPIK PESAWAT SEDERHANA

TESIS

Diajukan untuk memenuhi sebagian syarat untuk memperoleh
gelar Magister Pendidikan Program Studi Pendidikan IPA

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PROGRAM STUDI PENDIDIKAN IPA
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Sebuah tesis yang diajukan untuk memenuji salah satu syarat memperoleh gelar Magister Pendidikan (M.Pd) pada Program Studi Pendidikan Ilmu Pengetahuan Alam

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PERNYATAAN

Dengan ini saya menyatakan bahwa tesis dengan judul *"Meningkatkan Technology Engineering Literacy (TEL) dan Motivasi Belajar Siswa Menggunakan STEM – Project Based Learning Pada Topik Pesawat Sederhana"* ini beserta seluruh isinya adalah benar-benar karya saya sendiri. Saya tidak melakukan penjiplakan atau pengutipan dengan cara-cara tidak sesuai dengan etika ilmu yang berlaku dalam masyarakat keilmuan. Atas pernyataan ini, saya siap menerima resiko atau sanksi apabila dikemudian hari ditemukan adanya pelanggaran etika keilmuan atau ada klaim dari pihak terhadap keaslian karya saya ini.

Bandung, Agustus 2024

Yang Membuat Pernyataan

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ABSTRAK

Tantangan utama dalam pendidikan IPA adalah mengintegrasikan sains dan teknologi dalam pembelajaran agar siswa memiliki *technology engineering and literacy* (TEL) serta motivasi belajar yang memadai untuk menghadapi tuntutan abad ke-21. Penelitian ini bertujuan untuk menganalisis pengaruh STEM-PjBL terhadap TEL dan motivasi belajar siswa pada topik pesawat sederhana. Desain *quasi-experimental* digunakan dengan dua kelas, kelas eksperimen menggunakan STEM-PjBL dan kelas kontrol menggunakan PjBL, masing-masing terdiri dari 25 siswa kelas VIII. Data diperoleh melalui pretest, posttest, dan angket motivasi belajar, dianalisis menggunakan uji t, *Mann-Whitney U*, dan perhitungan *effect size* (*Cohen's d*). Hasil menunjukkan bahwa STEM-PjBL terdapat perbedaan pada kelas eksperimen dan kelas kontrol dengan perbedaan signifikan secara statistik ($p = 0.017$), rata-rata skor TEL (62.0) kelas eksperimen lebih tinggi daripada kelas kontrol (49.0). N-gain di kelas eksperimen menunjukkan peningkatan TEL dalam kategori "sedang" (N-gain = 0.37), sedangkan kelas kontrol berada dalam kategori "rendah" (N-gain = 0.11), dengan *effect size Cohen's d* sebesar 0.59, menunjukkan pengaruh sedang menuju tinggi. Motivasi belajar siswa pada kelas eksperimen dan kontrol tidak terdapat perbedaan yang signifikan secara satatistik ($p = 0.237$), namun meningkat signifikan di kelas eksperimen dan kontrol dalam kategori “rendah” (N-gain = 0.21) dan (N-gain = 0.13) dengan *effect size Cohen's d* sebesar 0.35, menunjukkan pengaruh sedang menuju tinggi. Korelasi antara TEL dan motivasi belajar menunjukkan hubungan yang sangat kuat dengan korelasi 1.000 dan signifikansi 0.000. Kesimpulannya, STEM-PjBL efektif berpengaruh terhadap TEL dan motivasi belajar, terutama dalam pemahaman prinsip teknologi, meskipun diperlukan perbaikan lebih lanjut pada aspek pengembangan solusi dan pencapaian sasaran kinerja.

Kata Kunci: STEM-PjBL, *Technology Engineering Literacy*, Motivasi Belajar, Pesawat Sederhana

IMPROVING TECHNOLOGY ENGINEERING LITERACY (TEL) AND STUDENTS' MOTIVATION USING STEM – PROJECT BASED LEARNING (PjBL) ON SIMPLE MACHINES

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ABSTRACT

The main challenge in science education is integrating science and technology into learning so that students possess technology engineering and literacy (TEL) and sufficient motivation to meet the demands of the 21st century. This study aims to analyze the effect of STEM-PjBL on TEL and student motivation regarding the topic of simple machines. A quasi-experimental design was employed with two classes: an experimental class using STEM-PjBL and a control class using PjBL, each consisting of 25 eighth-grade students. Data were collected through pretests, posttests, and motivation questionnaires, and analyzed using t-tests, Mann-Whitney U tests, and effect size calculations (Cohen's d). The results indicate a significant statistical difference between the experimental and control classes ($p = 0.017$), with the experimental class having a higher average TEL score (62.0) compared to the control class (49.0). The N-gain in the experimental class showed a moderate increase in TEL (N-gain = 0.37), while the control class showed a low increase (N-gain = 0.11), with a Cohen's d effect size of 0.59, indicating a moderate to high effect. Although there was no significant statistical difference in student motivation ($p = 0.237$), there was a significant increase in the experimental class, categorized as "low" (N-gain = 0.21), while the control class remained in the "low" category (N-gain = 0.13), with a Cohen's d effect size of 0.35, indicating a moderate to high effect. The correlation between TEL and student motivation was very strong, with a correlation of 1.000 and significance of 0.000. In conclusion, the STEM-PjBL approach is effective in improving TEL and student motivation, particularly in understanding technology principles, although further improvements are needed in solution development and performance goal achievement.

Keywords: STEM-PjBL, *Technology Engineering Literacy*, Learning Motivation, Simple Plane

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