ABSTRAK

Elisabeth Anggelika Nahampun, NIM 4203141009 (2024). Efektivitas Model Pembelajaran *Project Based Learning* (PjBL) Berbasis *Science, Technology, Engineering and Mathematics* (STEM) Terhadap Hasil Belajar Biologi Siswa Materi Sistem Pernapasan Kelas XI MIPA SMA Negeri 1 Tarutung T.P. 2023/2024.

Penelitian ini bertujuan untuk mengetahui efektivitas model pembelajaran PjBL-STEM terhadap hasil belajar biologi materi sistem pernapasan pada kelas XI MIPA SMA Negeri 1 Tarutung Tahun Pelajaran 2023/2024. Penelitian ini menggunakan quasi eksperimen dengan desain *Pre-test* and *Post-test Control Group Design*. Pengambilan sampel dilakukan dengan teknik *Simple Random Sampling*. Sampel pada penelitian ini terdiri dari 2 kelas, yakni kelas XI MIPA 1 (Kelas Eksperimen) dengan model pembelajaran PjBL-STEM dan XI MIPA 2 (Kelas Kontrol) dengan model pembelajaran konvensional. Pengumpulan data dengan tes dan observasi. Data rata-rata *pre-test* dan *post-test* hasil belajar pada kelas eksperimen masing masing adalah 45,83 dan 86,11 dan pada kelas kontrol 43,88 dan 79,86. Data dianalisis dengan menggunakan *Independent Sample t-test* menggunakan SPSS Versi 25. Berdasarkan uji hipotesis, diperoleh bahwa model pembelajaran PjBL-STEM efektif terhadap hasil belajar biologi materi sistem pernapasan pada kelas XI MIPA SMA Negeri 1 Tarutung T.P. 2023/2024. Pada kelas eksperimen, ketuntasan belajar siswa tuntas, tingkat penguasaan siswa terpenuhi dan ketercapaian indikator pembelajaran tercapai dengan nilai N-*Gain* kelas eksperimen sebesar 0,75 dengan kategori tinggi. Dan pada kelas kontrol ketuntasan belajar siswa belum tuntas, tingkat penguasaan materi terpenuhi dan ketercapaian indikator pembelajaran tercapai dengan nilai *N-gain* kelas kontrol sebesar 0,61 dengan kategori sedang. Dapat disimpulkan bahwa model pembelajaran PjBL-STEM efektif dalam meningkatkan hasil belajar materi sistem pernapasan pada kelas XI MIPA SMA Negeri 1 Tarutung T.P. 2023/2024.

Kata Kunci: *PjBL, STEM, Hasil Belajar*

ABSTRACT

Elisabeth Anggelika Nahampun, NIM 4203141009 (2024). The Effectiveness of STEM-Based Project Based Learning (PjBL) Learning Model (Science, Technology, Engineering And Mathematics) Against Student Biology Learning Outcomes for Respiratory System Materials for Class XI MIPA SMA Negeri 1 Tarutung Academic Year 2023/2024.

This study aims to determine the effectiveness of the PjBL-STEM learning model on the learning outcomes of respiratory system biology material in the 11th grade science class at SMA Negeri 1 Tarutung in the academic year 2023/2024. The study employed a quasi-experimental Pre-test and Post-test Control Group Design. Sampling was conducted using Simple Random Sampling technique. The sample consisted of two classes: XI MIPA 1 (Experimental Class) with the PjBLSTEM learning model, and XI MIPA 2 (Control Class) with conventional learning model. Data collection involved tests and observation. The average pre-test and post-test scores in the experimental class were 45.83 and 86.11 respectively, while in the control class they were 43.88 and 79.86. Data were analyzed using Independent Sample t-test with SPSS Version 25. Based on hypothesis testing, it was found that the PjBL-STEM learning model is effective in improving learning outcomes on the respiratory system biology material in the 11th grade science class at SMA Negeri 1 Tarutung in the academic year 2023/2024. In the experimental class, student learning completeness was achieved, the level of mastery was fulfilled, and learning indicators were achieved with an N-gain value of 0.75, categorized as high. In contrast, in the control class, student learning completeness was not achieved, although the level of material mastery was fulfilled, and learning indicators were achieved with an N-gain value of 0.61, categorized as moderate. In conclusion, the PjBL-STEM learning model is effective in improving learning outcomes on the respiratory system biology material in the 11th grade science class at SMA Negeri 1 Tarutung in the academic year 2023/2024.

Keywords: *PjBL, STEM, Learning Outcomes*