ABSTRAK

Pohan, Anggi Amanda. 2026. Implementasi PhET *Simulation* dan Eksperimen Rumah Tangga Siswa Pada Materi Larutan Elektrolit dan Non-Elektrolit. Skipsi. Tanjungpinang: Program Studi Pendidikan Kimia, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Maritim Raja Ali Haji. Pembimbing I: Wisnu Prammana Surya, S.Pd., M.Pd. Pembimbing II: Nina Adriani, B.Sc(Hons)., M.Sc., Ph.D.

Kata Kunci: Ekperimen Rumah Tangga, Hasil Belajar, Larutan Elektrolit dan Non-Elektrolit, PhET *Simulation* .

Keterbatasan sarana laboratorium dan dominasi metode ceramah di MAN Bintan berdampak rendahnya pemahaman siswa pada materi larutan elektrolit dan non-elektrolit, khususnya pada aspek submikroskopik. Penelitian ini bertujuan menguji signifikansi perbedaan hasil belajar kognitif siswa, mengukur peningkatan melalui uji N-Gain, serta menentukan ukuran efek perlakuan di dalam kelompok. Metode yang digunakan adalah pendekatan kuantitatif dengan desain *one-group Pretest-Posttest* pada 22 siswa kelas XI.1 MAN Bintan. Instrumen penelitian berupa tes esai, angket, dan pedoman wawancara, yang dianalisis menggunakan uji *Shapiro-Wilk*, *Paired Sample t-test*, N-Gain, dan *Cohen's d*. Hasil penelitian menunjukkan: (1) terdapat peningkatan hasil belajar kognitif siswa setelah pembelajaran menggunakan PhET *Simulation* dan eksperimen rumah tangga dengan perbedaan signifikan antara rata-rata *Pretest* (43,18) dan *Posttest* (78,41) (sig < 0,001); (2) nilai N-Gain sebesar 0,62 (62,01%) berada pada kategori sedang; dan (3) nilai *Cohen's d* sebesar 2,080 yang tergolong efek tinggi (*Strong Effect*) dalam kelompok tersebut. Kombinasi PhET *Simulation* untuk visualisasi submikroskopik dan eksperimen rumah tangga sebagai pembuktian makroskopik memfasilitasi peningkatan hasil belajar kognitif siswa dan menjadi alternatif solusi bagi sekolah dengan keterbatasan fasilitas laboratorium.

ABSTRACT

Pohan, Anggi Amanda. 2026. *Implementation of PhET Simulation and Home-Based Experiment on Students' Learning Outcomes in Electrolyte and Non-Electrolyte Solution Topic*. Undergraduate Thesis. Tanjungpinang: Chemistry Education Study Program, Faculty of Teacher Training and Education, Raja Ali Haji Maritime University. Supervisor I: Wisnu Prammana Surya, S.Pd., M.Pd. Supervisor II: Nina Adriani, B.Sc(Hons)., M.Sc., Ph.D.

Keywords: Electrolyte and Non-Electrolyte Solution, Home-Based Experiment, Learning Outcomes, PhET *Simulation*

The limited laboratory facilities and the dominance of the lecture method at MAN Bintan have an impact on students' low understanding of the material on electrolyte and non-electrolyte solutions, especially in the submicroscopic aspect. This study aims to test the significance of differences in students' cognitive learning outcomes, measure improvement using the N-Gain test, and determine the effect size of the treatment within the group. The method used was a quantitative approach with a one-group Pretest-Posttest design involving 22 students in class XI.1 at MAN Bintan. The research instruments consisted of an essay test, a questionnaire, and an interview guide, which were analyzed using the Shapiro-Wilk test, Paired Sample t-test, N-Gain, and *Cohen's d*. The results of the study indicate: (1) there was an increase in students' cognitive learning outcomes after instruction using PhET *Simulation* and household experiments, with a significant difference between the *Pretest* (43.18) and *Posttest* (78.41) means (sig < 0.001); (2) the N-Gain value of 0.62 (62.01%) falls into the moderate category; and (3) the *Cohen's d* value of 2.080 is classified as a high effect (Strong Effect) in this group. The combination of PhET *Simulation* for submicroscopic visualization and household experiments as macroscopic evidence facilitated improvements in students' cognitive learning outcomes and serves as an alternative solution for schools with limited laboratory facilities.