

ABSTRAK

Mila Fajariah : Integrasi Pembelajaran PjBL-STREAM dalam Proyek Pembuatan *Sano Whey Kefir Juice* (SWKJ) untuk Meningkatkan Keterampilan Berpikir Kritis dan Literasi Halal Siswa SMK pada Materi Farmakognosi

Pembelajaran Farmakognosi di Sekolah Menengah Kejuruan (SMK) masih menghadapi tantangan dalam menghubungkan konsep bahan alam dengan penerapan teknologi, proses produksi, dan prinsip kehalalan produk. Penelitian ini bertujuan untuk menganalisis pengaruh integrasi pembelajaran *Science, Technology, Religion, Engineering, Arts, and Mathematics-Project Based Learning (PjBL-STREAM)* melalui proyek pembuatan *Sano Whey Kefir Juice (SWKJ)* terhadap keterampilan berpikir kritis dan literasi halal peserta didik pada materi Farmakognosi. Penelitian ini menggunakan metode *quasi experiment* dengan *desain Non-Equivalent Control Group Design*. Subjek penelitian terdiri atas 68 peserta didik kelas XI SMK Kesehatan Bhakti Kencana Limbangan Garut yang terbagi menjadi kelas eksperimen dan kelas kontrol. Data dikumpulkan menggunakan instrumen tes keterampilan berpikir kritis dan literasi halal yang telah melalui uji validitas dan reliabilitas. Analisis data menggunakan nilai *N-Gain* dan *Independent Sample t-Test*. Hasil penelitian menunjukkan bahwa keterlaksanaan pembelajaran PjBL-STREAM berada pada kategori sangat baik. Keterampilan berpikir kritis kelas eksperimen mengalami peningkatan dengan nilai *N-Gain* sebesar 0,83 kategori tinggi dan terdapat perbedaan signifikan dibandingkan kelas kontrol ($p < 0,05$). Literasi halal peserta didik mengalami peningkatan dengan nilai *N-Gain* sebesar 0,69 kategori sedang dan menunjukkan perbedaan signifikan antara kelas eksperimen dan kontrol ($p < 0,05$). Karakteristik produk (SWKJ) berdasarkan pengujian menunjukkan nilai TPC/ALT sebesar $2,53 \times 10^3$ CFU/g, viskositas 17,40 cP, aktivitas antioksidan IC50 sebesar 890,60 ppm, dan pH 3,29–3,32. Berdasarkan hasil penelitian dapat disimpulkan bahwa integrasi PjBL-STREAM melalui proyek pembuatan *Sano Whey Kefir Juice (SWKJ)* efektif meningkatkan keterampilan berpikir kritis dan literasi halal peserta didik pada materi Farmakognosi.

Kata kunci: PjBL -STREAM, Farmakognosi, *Sano Whey Kefir Juice (SWKJ)*, keterampilan berpikir kritis, literasi halal.

ABSTRACT

Mila Fajariah : Integrating PjBL-STREAM Learning into the Sano Whey Kefir Juice (SWKJ) Production Project to Enhance Vocational High School Students' Critical Thinking Skills and Halal Literacy in Pharmacognosy

Pharmacognosy instruction in Vocational High Schools (SMK) faces challenges in linking concepts regarding natural materials with the application of technology, production processes, and product halal principles. This study aimed to analyze the impact of integrating Science, Technology, Religion, Engineering, Arts, and Mathematics-Project Based Learning (PjBL-STREAM) specifically through a Sano Whey Kefir Juice (SWKJ) production project on students' critical thinking skills and halal literacy within the Pharmacognosy curriculum. A quasi-experimental method with a Non-Equivalent Control Group Design was employed. The study subjects comprised 68 Grade XI students from SMK Kesehatan Bhakti Kencana Limbangan Garut, divided into experimental and control groups. Data were collected using validated and reliable instruments for assessing critical thinking skills and *halal* literacy. Data analysis utilized N-Gain scores and the Independent Sample t-Test. The results indicated that the implementation of PjBL-STREAM learning fell into the "very good" category. The experimental group demonstrated an improvement in critical thinking skills with an N-Gain score of 0.83 (high category), showing a significant difference compared to the control group ($p < 0.05$). Students' halal literacy also improved, with an N-Gain score of 0.69 (medium category), revealing a significant difference between the experimental and control groups ($p < 0.05$). Product characteristics (SWKJ) based on testing showed a TPC/ALT value of 2.53×10^3 CFU/g, viscosity of 17.40 cP, antioxidant activity (IC₅₀) of 890.60 ppm, and a pH range of 3.29–3.32. In conclusion, the integration of PjBL-STREAM through the SWKJ production project effectively enhances students' critical thinking skills and halal literacy in Pharmacognosy learning.

Keywords: PjBL -STREAM, Pharmacognosy, *Sano Whey Kefir Juice* (SWKJ), critical thinking skills, halal literacy.