PENGARUH PEMBELAJARAN BERBASIS PROYEK FITOREMEDIASI TERHADAP KOMPETENSI BERPIKIR SISTEM DAN KETERAMPILAN RISET PESERTA DIDIK SEBAGAI UPAYA PENCAPAIAN SDG KE-6

TESIS

diajukan untuk memenuhi sebagian syarat untuk memperoleh gelar
Magister Pendidikan pada Program Studi Pendidikan Biologi

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PROGRAM STUDI MAGISTER PENDIDIKAN BIOLOGI
FAKULTAS PENDIDIKAN MATEMATIKA DAN ILMU PENGETAHUAN ALAM
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LEMBAR HAK CIPTA

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ABSTRAK

Pengaruh Pembelajaran Berbasis Proyek Fitoremediasi terhadap Kompetensi Berpikir Sistem dan Keterampilan Riset Peserta Didik sebagai Upaya Pencapaian SDG ke-6

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Dalam menghadapi problematika lingkungan yang kompleks dalam konteks pembangunan berkelanjutan, kompetensi berpikir sistem dan keterampilan riset penting dimiliki oleh peserta didik. Pembelajaran berbasis proyek fitoremediasi dapat diimplementasikan untuk melatihkan kompetensi berpikir sistem dan keterampilan riset peserta didik. Penelitian ini bertujuan untuk mengevaluasi pengaruh pembelajaran berbasis proyek fitoremediasi pada materi perubahan lingkungan dengan memanfaatkan realitas lokal Kota Semarang berupa pencemaran limbah cair kopi terhadap kompetensi berpikir sistem dan keterampilan riset peserta didik. Penelitian ini juga sebagai bentuk upaya pencapaian SDG ke-6 *Clean Water and Sanitation*, khususnya target 6.3 dalam upaya meningkatkan kualitas air dengan mengurangi polusi melalui fitoremediasi. Penelitian ini menggunakan metode kuasi eksperimen dengan *non-eqivalent control group design*. Sampel penelitian terdiri dari 61 peserta didik kelas X yang dipilih melalui teknik *convenience sampling*, terdiri atas kelas eksperimen yang menerima pembelajaran berbasis proyek fitoremediasi dan kelas kontrol yang mengikuti pembelajaran yang biasa dilakukan di sekolah yaitu *Problem-Based Learning*. Data dikumpulkan melalui tes *open-ended question* untuk mengevaluasi kompetensi berpikir sistem dan tes respon terbatas untuk mengevaluasi keterampilan riset peserta didik. Berdasarkan hasil uji *Mann-Whitney U* diperoleh nilai signifikansi sebesar 0,00 ($p<0,05$), yang menunjukkan terdapat perbedaan signifikan antara kompetensi berpikir sistem kelas eksperimen dan kelas kontrol. Sementara itu hasil *Independent Sample t-test* terhadap keterampilan riset peserta didik menunjukkan nilai signifikansi sebesar 0,00 ($p<0,05$), yang menunjukkan adanya perbedaan signifikan antara kelas eksperimen dan kelas kontrol. Dengan demikian pembelajaran berbasis proyek fitoremediasi berpengaruh dalam melatihkan kompetensi berpikir sistem dan keterampilan riset peserta didik.

Kata Kunci: Keterampilan Riset, Kompetensi Berpikir Sistem, Pembelajaran Berbasis Proyek Fitoremediasi, Perubahan Lingkungan, SDG 6.

ABSTRACT

The Effect of Phytoremediation Project-Based Learning on Students' System Thinking Competence and Research Skills as an Effort to Achieve SDG 6

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In addressing complex environmental issues within the context of sustainable development, system thinking competence and research skills are essential for students. Phytoremediation Project-Based Learning can be utilized to foster these competencies. This study aims to evaluate the effect of phytoremediation Project-Based Learning on the topic of environmental change, utilizing the local context of coffee wastewater pollution in Semarang City, on students' systems thinking competence and research skills. The study also contributes to the achievement of SDG 6 Clean Water and Sanitation, particularly target 6.3, which focuses on improving water quality by reducing pollution through phytoremediation. This research employed a quasi-experimental method with a non-equivalent control group design. The sample consisted of 61 tenth-grade students selected through convenience sampling, divided into an experimental group that received phytoremediation Project-Based Learning and a control group that followed conventional classroom instruction, namely *Problem-Based Learning*. Data were collected using open-ended tests to assess system thinking competence and restricted-response tests to assess research skills. The Mann–Whitney U test revealed a significance value of 0.00 ($p<0.05$), indicating a significant difference in system thinking competence between the experimental and control groups. Meanwhile the results of the Independent Sample t-test on students' research skills showed a significance value of 0.00 ($p<0.05$), indicating a significant difference between the two groups. Therefore, phytoremediation Project-Based Learning has a significant effect on fostering students' system thinking competence and research skills.

Keywords: Phytoremediation Project-Based Learning, Research Skills, SDG 6, System Thinking Competence, Environmental change.

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