ABSTRACT

This quasy experiment study aims to analyze interdisciplinary thinking skill of upper secondary students on STEM-based instruction about plant reproduction. Participants of the study were 37 tenth graders from an international school who administered three-tier, multiple choice, and essay tests. Interdisciplinary thinking skill is explained in three components which are disciplinary grounding, advancement through integration, and critical awareness. Collecting data was conducted in six meetings with *one group pretest postest design*. In addition, students' questionnaire was also distributed, collected, and analysed. Biology grounding was analysed through three-tier test, mathematics grounding was analysed through multiple choice test, while advancement through integration and critical awareness were analysed through students' argument in essay questions. Modified Toulmin Argumentation Pattern was used to identify the component of argumentation, which consist of claim, data, warrant, backing, qualifier, and rebuttal. The result showed that STEM-based instruction enhanced students' interdisciplinary thinking skill in all components in the category 'middle' n-gain. All components of interdisciplinary thinking skill have a significant different among students after STEM-based instruction implemented. It indicates that students are in the early level of interdisciplinary thinking skill. Pearson correlation analysis shows that there is possitive significant correlation between biology grounding with students' argumentation. The regression test shows that 13% of students' argumentation is influenced by biology grounding. The result of students' argumentation analysis showed that there is an increased tendencies of students' argumentation from pretest to posttest. Students' arguments (40,54%) are in level 2 which consist of claim and data, while (40,01%) students' arguments are in level 3 that comprises of claim, data and warrant. The finding of this research indicated that STEM-based learning can improve students' thinking and communication skills.

Keywords: argumentation analysis, interdisciplinary thinking skill, STEM-based instruction

ABSTRAK

Penelitian quasi eksperimen ini bertujuan untuk menganalisis keterampilan berpikir interdisiplin siswa SMA melalui pembelajaran berbasis STEM pada materi reproduksi tumbuhan. Subjek penelitian ini adalah 37 siswa sekolah internasional yang diuji dengan soal *three-tier*, pilihan ganda, dan esai. Keterampilan berpikir interdisiplin terdiri dari tiga komponen yaitu *disciplinary grounding*, *advancement through integration*, dan *critical awareness*. Pengumpulan data dilaksanakan selama enam pertemuan dengan desain penelitian *one group pretest postest design*. Selain itu, angket siswa pun didistribusikan, dikumpulkan, dan dianalisis. Pemahaman Biologi siswa diperoleh melalui analisis soal *three-tier*, pemahaman matematika siswa diperoleh melalui soal pilihan ganda, sementara keterampilan mengintegrasikan pengetahuan dianalisis melalui analisis argumentasi siswa pada soal esai. Modifikasi Pola Argumentasi Toulmin dijadikan sebagai pedoman dalam analisis argumentasi siswa, yang terdiri dari *claim*, *data*, *warrant*, *backing*, *qualifier*, dan *rebuttal*. Hasil penelitian menunjukkan bahwa pembelajaran berbasis STEM dapat meningkatkan setiap komponen keterampilan berpikir interdisiplin siswa yang ditunjukkan dengan perolehan n-gain kategori 'sedang' dan secara umum kategori n-gain 'tinggi'. Secara statistika hasil penelitian menunjukkan bahwa terdapat perbedaan signifikan antara pretes dan pascates. Hasil uji korelasi Pearson menunjukkan bahwa terdapat korelasi positif antara pemahaman biologi dengan keterampilan berargumentasi siswa. Kemudian, hasil uji regresi menunjukkan bahwa 13% argumentasi siswa dipengaruhi oleh pemahaman biologinya. Hasil analisis argumentasi siswa menunjukkan bahwa level argumentasi siswa meningkat dari pretes ke pascates. Secara umum, argumentasi siswa berada pada level 2 (40,54%) dan level 3 (40,01%). Penemuan tersebut mengindikasikan bahwa pembelajaran berbasis STEM dapat meningkatkan keterampilan berpikir dan berkomunikasi.

Kata Kunci: analisis argumentasi, keterampilan berpikir interdisiplin, pmbelajaran berbasis STEM