

# **Pengaruh Pembelajaran Berbasis STEM terhadap Literasi Teknologi dan Pengetahuan Bioetika Siswa pada Materi Pencemaran Lingkungan**

Vidia Damayanti

Departemen Pendidikan Biologi, FPMIPA, Universitas Pendidikan Indonesia

*vidiadamayanti@student.upi.edu*

## **ABSTRAK**

Dalam upaya menjawab kompleksnya tuntutan globalisasi di abad 21, Indonesia mencoba mengimplementasikan STEM dalam pendidikan. STEM merupakan pendekatan pembelajaran yang mengintegrasikan empat disiplin *Sains, Technology, Engineering, dan Mathematics*. Di Indonesia, pembelajaran berbasis STEM terus dikembangkan mengingat adanya aktivitas EDP yaitu *Pikir, Desain, Buat, dan Uji* yang diaplikasikan dalam pembelajaran terpadu berdasarkan penerapan pada kehidupan nyata guna meningkatkan literasi teknologi siswa. Selain itu, pembelajaran berbasis STEM juga mengembangkan pengetahuan etika siswa terhadap masalah yang timbul dari dampak sains dan teknologi melalui pengalaman EDP. Tujuan penelitian ini adalah mengkaji pengaruh pembelajaran biologi berbasis STEM terhadap literasi teknologi dan pengetahuan bioetika siswa. Penelitian ini menggunakan metode kuantitatif dan desain penelitian *nonequivalent control group design* dimana sampel terdiri dari 30 siswa STEM dan 30 siswa kelas non-STEM. Data penelitian dikumpulkan menggunakan tes literasi teknologi dengan keempat aspeknya yaitu *technology and society, design, products and systems* dan *characteristics, core concepts and Connections*, untuk mengukur literasi teknologi dan angket pengetahuan bioetika untuk mengukur pengetahuan bioetika. Hasil penelitian ini menunjukkan terdapat perbedaan yang signifikan pada literasi teknologi dan pengetahuan bioetika siswa setelah dilakukan pembelajaran biologi berbasis STEM. Perbedaan tersebut dikarenakan adanya integrasi aspek

**Vidia Damayanti, 2018**

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T dan E (*Technology Engineering*) dalam pembelajaran STEM. Pada literasi teknologi, masih terdapat aspek yang memiliki nilai rendah seperti *Products and Systems* dan *Characteristics, Core concepts and Connections*, hal ini dikarenakan penerapan pembelajaran STEM memerlukan waktu yang logis dan tenaga pengajar yang memiliki pengalaman membelajarkan STEM, serta belum terbiasanya siswa untuk mengerjakan soal tentang sistem dari produk teknologi, karakter teknologi serta belum terbiasa menghubungkan antar disiplin ilmu. Oleh karena itu, disimpulkan bahwa pembelajaran biologi berbasis STEM dapat meningkatkan literasi teknologi dan pengetahuan bioetika siswa namun harus dilakukan beberapa perbaikan pada aspek-aspek tertentu untuk implementasi secara menyeluruh.

Keywords: EDP, Pembelajaran STEM, Literasi Teknologi, Pengetahuan Bioetika

# **The Effect of STEM Based Learning towards Students' Technology Literation and Bioethics Knowledge on Environmental Pollution**

Vidia Damayanti

Departemen Pendidikan Biologi, FPMIPA, Universitas Pendidikan  
Indonesia

*vidiadamayanti@student.upi.edu*

## **ABSTRACT**

Indonesia has been implemented STEM in the development of education as an effort to answer the complexity of 21<sup>st</sup> century globalization. STEM defines as a learning approach which integrates four disciplines; Science, Technology, Engineering, and Mathematic. STEM based learning is being developed in Indonesia as the activity of EDP includes acknowledging, designing, making, and experimenting is also being developed. The development is applied in the coherent learning with reliable practices towards real life in order to increase students' literation towards technology. Beside, STEM based learning is also developing students' ethics knowledge regarding roaring issue from the effect of science and technology through EDP experiences. This study aims to investigate the effect of STEM based biology learning towards students' technology literation and bioethics knowledge. This study used quantitative method and non-equivalent control group design as research design where the sample were 30 students who used STEM in learning activity and 30 students without STEM in learning activity. Research data was collected through two items. First, technology literation test with four of aspects concluded; Technology and society, Design, Products and Systems dan Characteristics, Core concepts and Connections. It was used to measure technology literation. Second, bioethics knowledge questionnaire aimed to measure bioethics knowledge. The result of this study shows significance differences regarding students' technology literation and bioethics knowledge after

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STEM based learning was applied. The differences happened as T and E disciplines were integrated in STEM based learning. In terms of technology literacy, the low aspect was still there, as example, Products and Systems, Characteristics, Core concepts and Connections. It was caused by the application of STEM based learning needs a reliable time allocation and experienced teacher with STEM based learning. As an addition, students were not used to practice on question regarding system from the product of technology, character of technology, and also were unable to connect between knowledge. Hence, researcher concludes STEM based biology learning could possibly increase students' technology literacy and bioethics knowledge but many improvements should be developed in some of aspects to be implemented as a whole.

Keywords: EDP, STEM Learning, Technology Literation, Bioethics Knowledge.