



# Enhancement Student Understanding Through the Development of Lab Module Based on Constructivistic

Wiharyanto Oktiawan<sup>1</sup>, Mochtar Hadiwidodo<sup>1</sup>, Purwono<sup>2</sup>

<sup>1</sup>Department of Environmental Engineering, Faculty of Engineering, Universitas Diponegoro  
Jl. Prof. H. Sudarto, SH., Tembalang, Semarang, Central Java  
<sup>2</sup>IAIN Surakarta, Kartasura, Indonesia

Email: [w.oktiawan@yahoo.com](mailto:w.oktiawan@yahoo.com)

**ABSTRACT** - Experimental focuses learning on developing the skills of student in the process of knowledge, discover and develop their own fact, concept, and values required. The way to make it is by doing modification to the practical guidance module had been given. Nowadays, practical guidance tend to emphasize on the explanation, so its use both practical and follow the path that has been presented. The practical guidance module should be modified based on constructivism. The module is an experimental guidance to environmental laboratory subject. The test material consists of water and wastewater sample with parameter of chemical oxygen demand (COD), total dissolved solid (TDS), and nitrate. The results showed progress in the cognitive aspects such students' ability to predict the concentration of COD sample. The greater COD concentration of wastewater make the color of mixture is blue-green. The student could communicate the calibration curves correctly. Hypothesis skills presented at TDS testing. The greater of the sediment, the greater the concentration of its. The same thing happened on COD testing, COD levels can be estimated earlier. The skills show an increasing such as the skill to ask questions, experiment planning skills, skills in using tools/materials, accuracy in data retrieval, seriousness and cooperation in conducting the experiment.

**Keywords:** Experimental Guidance, Constructivism, Environmental Laboratory, science process skills.

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## I. INTRODUCTION

Environmental Engineering Program is one that is under engineering faculty, University of Diponegoro. Environmental Engineering Program comes as a study program to apply thought and technique as well as management to maintain and protect the health and safety of humans and the environment as a whole. Environmental Engineering is a study program that seeks to solve the problems of environmental technological approach. The scope of the field of Environmental Engineering is the conservation of water resources, environmental management, environmental health management, efforts to control pollution, sewerage and effluent, control of pollution caused by waste water, gas and sludge (sludge) and water quality management, soil and atmosphere, as well as the control and management of environmental impacts.

Environmental engineering is described as thinking skills in solving engineering and environmental control issues regarding the provision of drinking water; the waste disposal and recycling system liquid, solid, and

gas; urban and rural drainage system and environmental sanitation; pollution control and water quality management, soil and air; as well as the control and management of environmental impacts.

One of the Faculty of Engineering's mission is to provide education that is superior (excellent) in the field of engineering and technology, so as to produce graduates with a competitive advantage. In order to realize this mission, one of the 'rungs' prepared to improve the quality of learning. In line with this, one of the study served to satisfy the competence of learners in Environmental Engineering Program is a practicum courses. One practicum courses that its existence is essential is the subject of laboratory environment. It is because of this course is the foundation course associated with other practicum courses are unit processes, the management of industrial waste, hazardous and toxic materials, ecotoxicology, monitoring air quality. Subjects practical lab environment contains a study of the methods of sampling and preservation of samples, analysis, physical and chemical water, soil and waste such as:

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