



The 6th Asian Academic Society International Conference (AASIC)
 A Transformative Community:
 Asia in Dynamism, Innovation, and Globalization



THE IMPLEMENTATION OF ENGINEERING LEARNING CONCEPT FOR
 COMMUNITY SERVICE IN PLERED, INDONESIA

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ABSTRACT

The number of learning styles can influence behavior of their objects, which change the way of thinking, acting, and even communication ability. The suitable recognition leads to the improving experience students might have. One of them is Engineering Learning. It is a concept for students to get involved finding problems in society and create the solution with the idea of engineering. This learning will directly examine theoretical understanding of students, for then bringing together the effective way to be applied. Engineering Service Community (ESC) is an activity focused on community service with having Engineering Learning concept. Held by universities globally, ESC consists of students as objects of Engineering Learning notion and lecturers to supervise any decision taken. This year (2018), ESC is being conducted in Plered, West Java, Indonesia, which has been known for ceramic production. Lately, due to conventional way of processing, the industries in Plered are being challenged to overcome the decreasing quality of the commodity. This paper will review the implementation of Engineering Learning method to meet the needs of society in Plered and the application of students' conceptual framework.

Keywords: Engineering learning, community service.

1. INTRODUCTION

There are many ways for students to learn and learning methods have been developed in various styles. Students are classified to the number of scales they fit, to determine the way they process information. To name two of them; Walter Burke Barbe's VAK model which is based on sensory point of view and Grasha-Reichmann Learning Style Scale with the background from students' coping techniques. Even though learning style theories have been criticized by questioning their instruments and efficacy, many other methods still have been researched in order to understand the best way for students to undertake information and to conduct the right teaching style.

In undergraduate education, Chickering and Gamson proposed Seven Good Practice Principles, one of which is encouraging active learning. The notion of "active learning" was then popularized by Bonwell and Eison, as it is the main concept of constructivism (Piaget 1952; von Glaserfeld 1989; Vygotsky 1978, 1986). In constructivism, learning is a dynamic process, which procreates participation of the learner. Thus, learning activity with the idea of active learning must promote the essence of constructivism. And with the view of active learning, knowledge is seen as experience created by students during the activity. The term active in active learning semantically implies that students are active, which is, actively constructing their own knowledge not just passively receiving knowledge from other people.

Related to "active learning", Engineering Service Club (ESC)—a community service held by universities from Indonesia and South Korea—is applying Engineering Learning. Engineering learning is a learning concept where students actively involve in solving industries' challenges. ESC is not limited to engineering students only, but also economy and art fields' students. The program demands students with different major to be able to collaborate and implement their theoretical knowledge to manage real world problem. Culture and country background may also be a special knot for students. They are required to adapt well and communicate their idea in a way the other could understand.



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ESC has been conducted since 2014 and this year (2018), it took place at Plered, southern part of Purwakarta district, West Java, Indonesia. Plered's small and medium enterprises (SMEs) have been long known as ceramic industry and producing since 1904. The market is not only in Indonesia, but also being exported to various countries such as the United States of America, Taiwan, Netherland, South Korea, and else.

The industries themselves face various challenges; marketing, management, and technical production. ESC brought seventy students from four universities, which are Telkom University (Indonesia), Indonesia University of Education (Indonesia), Pusan Nation University (South Korea) and Pukyong National University (South Korea). The students were divided into eleven teams with different concentrations. Applying their conceptual understanding, each team was being assigned to finish their work in ten days, in hope of efficient and usable results for the workers in Plered.

2. METHODOLOGY

This service consists of three main elements; participants, managers, and supervisors. The participants (students) are subjects who give services to the environment. The managers get a function to help participants by giving suggestions in each step. And the last one is for evaluating every result in each stage. There are ten stages that they need to do.

1. Meeting Neighborhood

Meeting the local people or native makes this service meaningful. Having interactions with them is the best way to understand the mood of the village. Greeting them is the first thing that the students should do. Talking about their activity and looking around there can help to understand the atmosphere of their condition. Meeting neighborhood aims to avoid any conflict with the local people and let them know why the students/participants come.

2. Finding Local Issues

In the place they visit, there may be several problems which are well-defined and already have good solutions. The students are not suggested to identify them. It means they are encouraged to try to identify ill-defined and unstructured problems. All of them can be found by interviewing the local people. They might say something inconvenient based on their experience. The students need to collect all the data by writing the issues and capturing each problem that support to solve the problems. Discussing team and managers is the way to deal the most important problem to solve based on some criteria. They are urgencies, repetitions and complexities.

3. Concept Design

There are limited factors in this step such as cost, time, acceptable, resources, space and specialties. Through brainstorming, each member of the team tries to give three solving ideas of selected problem. Using the idea-selection table, they categorize similar ideas. The students/participants need to pick the best one. They will present the selected solving idea to the supervisors. The positive and negative aspects will be given the supervisors after evaluating their idea.

4. Improving Idea

Getting the pros and cons aspects after deriving new idea to the supervisors compels them to discuss about the contradiction. As a matter of fact, the new idea derived can solve the problem, but sometimes it brings out the new problem. They need to ensure that the idea will helpful to local people. The students/participants give an improved idea by writing key words being able to describe the solution without additional explanation using Plus Minus Interest (PMI) table.

5. Detail Design / Designing Product

This step is the beginning process to realize the idea. The first thing to do is designing and sketching of the product. Considering the scale of size, weight, and materials is highly important because it is reference to make a real product. Based on the design, the students can list



materials needed to buy. They also need to estimate the cost that will be spent. They can use internet for knowing the price of materials around the place. If the budget is over, they should change the initial design.

6. Manufacturing Product Design

Each team should measure the purchasing materials size. Checking and comparing with detail design and materials is next to do in this stage. It is used to ensure whether the materials needed can be obtained or not. They also need to make a list the tools needed. Sketching each part with the size and materials and drawing the assembly order of all parts are their own guidance for making product. This step is to reduce the production time without trial and error.

7. Purchasing Materials

The students/participants got their list of materials needed. They need to have strategy to purchase them by asking the location of material store because of the limited time. Some materials might not be available on the market. Alternative ways in short time are needed. They can discuss with the manager or other teams. Before making product, the participants need to check and make the purchased list.

8. Making Product

Every team is required to separate the roles and set up the time tables during the making product time. They make a product designed to solve the problem. Each team needs to consider the limited time. To avoid the incomplete product in the time provided, the team should have fully discussed and find the solution in every problem while making the product. Almost all engineering students do not care about appearance. However, the customer is going to be interested in and buy the product having the good appearance. That is the reason why the product must be made in the good looks as well as user-friendliness.

9. Final Check / Evaluation

The supervisors ought to check all products that they made. They decide whether every product is completed or uncompleted. They give some comments and advises for every team. The team which has failed cannot install the product. The failed team need to analyze why it can be happened.

10. Installing Product / Installation

Each team installs the product to where they found the problem. They also give the description why they made and how to use it. The important thing that they must do is to tell them how to maintain the product. The team lets them operate the product under their controlled. If the local people understand how to operate and maintain the product, the product is officially given to them.

3. RESULTS AND CONCLUSION

In the urge of implementing theoretical understanding to solve problem and building soft skill for students, Engineering Service Community (ESC) was created in 2014 by applying engineering learning method. This concept encourages students to engage and participate in formulating the efficient solution, so that their understanding meets the needs of industries. ESC 2018 was held in Plered, West Java, which is well known as the industry of ceramics for domestic and international market.

With seventy students from diverse major, culture, and country, they were divided into eleven teams and being given different tasks. There were teams to promote Plered ceramic--such as creating brochures and social media account; and teams to look up technical problem of the industry in order to maintain the production quality. ESC directly digs and trains students' potential ability by asking them to be pro-active during the program.



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