

Development of Life-Based Teaching Material on Welding Fields to form Entrepreneurial Characters

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Abstract— Graduates of the Mechanical Engineering Education Study Program are expected to work as educational staff, instructors, and able to work in the industry. However, in fact, many graduates want to do entrepreneurship in the field of mechanical engineering. So, it is necessary to make changes through the development of life-based subject teaching material in the field of welding. This study aims to develop, provide, and test the feasibility of entrepreneurship textbooks in the field of welding. Based on expert validation and feasibility test from the user, it is concluded that life-based teaching materials in the field of welding is feasible and can be used in the learning activities at the Department of Mechanical Engineering, Universitas Negeri Malang, East Java, Indonesia. Then students can implement the knowledge to make an iron craft and market/sell it to the community.

Keywords: *Teaching material development, Life-based, Welding, Teaching material testing*

I. INTRODUCTION

As an educational institution that prioritizes excellence and becomes a reference, then to face the development of time, Undergraduate Program of Mechanical Engineering Education Faculty of Engineering Universitas Negeri Malang always clean up and prepare themselves to improve performance. Based on the vision and mission, the hope is that the graduates of the study program can perform as teachers of SMK (Sekolah Menengah Atas/Vocational High School), SMA (Sekolah Menengah Atas/High School)/MAK (Madrasah Aliyah Kejuruan/Vocational Islamic High School), and instructors in various work-training centers, and able to do work in the field of manufacturing industry.

However, the reality that occurs in the field, between job seekers with available jobs is imbalanced. Many graduates of the Mechanical Engineering Education Study Program are job seekers rather than creating their own jobs. It is shown that the mental attitude of the graduates of the Mechanical Engineering Education Study Program is still more desirous as a job seeker in the company/industry than as the job creator or entrepreneurship. Although, the actual graduates of Mechanical Engineering Education can create

jobs for themselves as well as for others in the field of manufacturing technology.

Entrepreneurship means a person who dares to do a good job for himself or others; an entrepreneur is a person who is capable of managing economically useful (effective and efficient) resources and high productivity levels [1-3]. According to Machfoedz, an entrepreneur is an innovator capable of turning opportunities into an idea that can be sold, can provide added value through effort, time, cost, and proficiency with the aim of making a profit [4].

Entrepreneurship is not easy as many people imagine, entrepreneurship requires particular personality traits that make it successful in trying. The characteristics of an entrepreneur's personality according to Cahyono and Argene can be described as follows [1,3]: (1) knowing the desired target goal, (2) having a good memory, (3) calm in reaction, (4) optimistic, (5) diplomatic in speech, (6) thorough in making decisions, (7) being friendly and polite, (8) being firm, and (8) knowledgeable.

The lack of success in this business that may be a shadow that is in the minds of students graduated from the Department of Mechanical Engineering Faculty of Engineering, Universitas Negeri Malang, so they choose the path as a job seeker than creating jobs for themselves and employment for others.

The solution offered to overcome these employment problems so that the students have the entrepreneurial spirit and character is to change the learning pattern of the course "Entrepreneurship" which during this learning is only conducted in theory in the classroom, into work-based learning and life-based learning. The pattern used is to combine entrepreneurial courses that have been an only theory, designed to be work-oriented learning and life-oriented courses by collaborating several practical courses, such as the practical work of bench and welding practicum. The collaboration of this course will give birth to a new course as a substitute for the entrepreneurial course that has been going on, to be a life based entrepreneurial course in the field of welding.

Life-based learning is the process of acquiring knowledge and skills to understand the essence of life, to solve life's problems, to live a balanced and harmonious life

[5]. Life-based learning explores the concept that learning from life is real learning. The existence of humans in the midst of society is a must. The real school for man is his life or his own life experience. Campuses and schools are part of the whole. Real education is the whole process that a person undergoes throughout his lifetime.

The purpose of Life-based learning is [6]: balancing work and learning; conduct research; acquire new skills quickly; apply the skills and knowledge possessed to new problems, and use high-level thinking; find solutions and interpret them in a new context; maintain a balance between productivity and creativity; collaborate in a face-to-face and virtual environment (other media); learning leads to self-motivated, self-directed and views learning as part of daily work; as well as lecturers and students growing together in learning.

Outcomes from Life Based Learning are expected to [6,7]: (1) increase productivity; (2) produce an adaptive and responsive labor; (3) produce learners who are capable, confident, and committed; (4) provide opportunities to innovate, grow and adapt to the environment; (5) cultivate sustainable learning practices, including learning to learn and providing tangible evidence in life; and (6) produce motivated and satisfying learners.

Strategies for life-based learning need to be elevated to expand the learning perspective, which has the potential to open more opportunities for learners; Legitimizing life experience as a learning resource, and acknowledge all those who in turn have the potential to leverage individual talents in a better and smarter way. Thus, learning strategies use various forms including formal, informal, incidental, in groups, or through individual efforts [8].

The purpose of this research is to produce a prototype of life-based entrepreneurship subject of in the field of welding to form the character of entrepreneurship spirit for students of Mechanical Engineering Department, Faculty of Engineering, Universitas Negeri Malang.

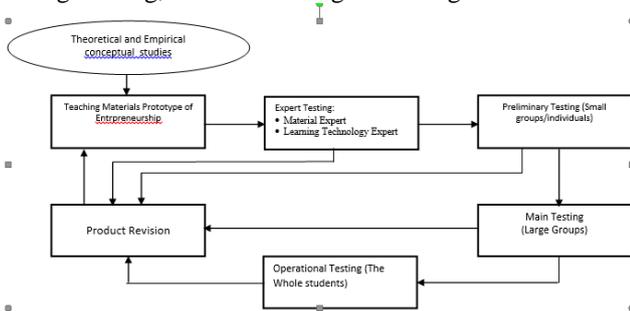


Figure 1. Product development design of life-based entrepreneurship course of welding field [9].

II. RESEARCH METHOD

This research includes development research, which is developing entrepreneurship course which is only done in theory in class, developed into work and production based learning in the field of welding, so that there will be a model of learning that gives experience to students to learn to work, so that after graduation they already have working experience as a provision to be able to support himself. The research and development model used in this activity is the Borg and Gall development model.

Borg and Gall's research and development procedures use ten steps. The ten steps are operationalized into actions related to the research and development activities of the subjects of entrepreneurship courses as follows [9]: (1) determining the need for entrepreneurship courses, (2) identifying entrepreneurship courses problems, (3) studying various models of entrepreneurship courses, (4) developing prototype (6) revision of product development (revision 1), (7) field trial, (8) revision of product development (2nd revision), (9) product development results in the form of life-based teaching materials in welding field, and (10) dissemination and implementation.

Product development design of life-based entrepreneurship course of welding field can be seen in Figure 1. Data analysis techniques used in analyzing quantitative data in the form of assessment questionnaire scores for material experts and learning technology experts, as well as product testing of small groups and large groups by calculating the percentage of answers. The formula for processing per item data

$$P = \frac{x}{xi} \times 100\%$$

explanation:

P = Percentage

100% = Constant

x = Respondent answer in one item

xi = The number of ideal scores in one item

While as the basis for decision making to revise the product of teaching material of entrepreneurship course, used criteria of qualification assessment shown in Table 1 [16].

Table 1. Criteria Validity Percentage Analysis

| Percentage Level | Criteria | Explanation |
|------------------|-------------|------------------|
| 76% - 100% | Valid | No Revision |
| 56% - 75% | quite valid | No Revision |
| 40% - 55% | Less Valid | Partial Revision |
| <40% | Not Valid | Total Revision |

III. RESEARCH RESULT AND DISCUSSION

A. Analysis of Material Expert Validation Results

Aspects assessed by two material experts consist of 4 aspects, namely: (1) aspects of content and objectives, (2) aspects of motivation, (3) aspects of questions quality, and (4) technical aspects. The validation results of the two material experts are shown as in Table 2.

Table 2. Material Expert Validation Result

| Validation Aspect | Percentage | Validation Result |
|--|------------|--------------------|
| Feasibility of contents and objectives | 87,50% | Valid, no revision |
| Feasibility of motivation | 78,12% | Valid, no revision |
| Feasibility of questions quality | 90,62% | Valid, no revision |
| Feasibility of Technical aspect | 95,00% | Valid, no revision |

B. Analysis of Learning Technology Expert Validation Results

Aspects assessed by two learning technology experts. The validation results of the two material experts are shown as in Table 3.

Table 3. Learning Technology Expert Validation Result

| Validation Aspect | Percentage | Validation Result |
|--|------------|--------------------|
| Feasibility of contents and objectives | 85,42% | Valid, no revision |
| Feasibility of motivation | 81,25% | Valid, no revision |
| Feasibility of questions quality | 93,75% | Valid, no revision |
| Feasibility of Technical aspect | 89,58% | Valid, no revision |

C. Analysis of Small Group Testing Results

Small group testing (preliminary) conducted on small groups of students in the Mechanical Engineering Department Faculty of Engineering, Universitas Negeri Malang as many as ten people. Based on the data analysis, small group testing results are shown as in Table 4.

Table 4. small group testing result

| Validation Aspect | Percentage | Validation Result |
|--|------------|--------------------|
| Feasibility of contents and objectives | 86,78% | Valid, no revision |
| Feasibility of motivation | 91,25% | Valid, no revision |
| Feasibility of questions quality | 90,62% | Valid, no revision |
| Feasibility of Technical aspect | 87,00% | Valid, no revision |

D. Analysis of Main Testing Results

Main testing conducted on large groups of students in the Mechanical Engineering Department Faculty of Engineering, Universitas Negeri Malang as many as 30 people. Based on the data analysis, small group testing results are shown as in Table 5.

Table 5 large group testing result

| Validation Aspect | Percentage | Validation Result |
|--|------------|--------------------|
| Feasibility of contents and objectives | 90,95% | Valid, no revision |
| Feasibility of motivation | 93,33% | Valid, no revision |
| Feasibility of questions quality | 92,71% | Valid, no revision |
| Feasibility of Technical aspect | 89,33% | Valid, no revision |

IV. TEACHING MATERIAL PRODUCT REVISION

The revision of product development of life based entrepreneurship teaching materials in the field of welding is done by repairing or refining the things that are deemed to be lacking in data validation result, either from the material experts or from the learning technology expert of as well as from the students of small group testing result or large group testing results.

The revision was done to make the teaching materials feasible to be utilized in the learning process among the students of Mechanical Engineering Department of Engineering Faculty of the Universitas Negeri Malang to be better.

V. RESEARCH RESULT

Technological education capable of preparing highly competitive and high-end-competitive labor, technology education (vocational) has a capability called emulation capability in technology [10]. By using teaching materials with a high degree of validity, it is expected to provide the transformation of development and behavioral changes that include the intellectual dimension in the cognitive domain, the motor dimension in the skill domain, and the dimension of responsibility in the affective domain. If this change can occur to students of Mechanical Engineering Program, it can be said that there is an improvement in the quality of the learning process, which in turn will increase the quality of graduates.

Recent research results conclude that the use of work-based learning approaches in education has a positive influence in achievement, motivation, and continuation of education [11].

Teaching learning process should be able to increase accuracy in describing something, increase interaction, improve unique ability possessed, and able to increase motivation in the learning process [12]. It is in line with the opinion of Darmadi who argues that the main purpose of research and development is not to formulate or test the theory but to develop effective results for use in school learning [13].

Research and evaluation studies on work-based learning show a correlation between outputs and graduate outcomes with learning structures that schools and industry provide the workplace experience. When program objectives, workplace-based curriculums, and experiences are designed and applied with adequate staff support and are properly evaluated, the program will have a positive impact [11].

With the development of life-based entrepreneurship teaching materials on welding field that has been declared valid and can be used in learning activities will provide the following benefits: (1) help educators implement the curriculum, (2) a guidance in determining teaching methods, (3) for students to repeat lessons or learn new lessons, (4) give similarities to teaching materials and standards, and (5) provide continuity of classes in successive classes, even if educators experience a change [14].

The development of teaching materials in the field of welding will help the effectiveness of a self-learning system, face-to-face learning system, or in a combination learning system. Teaching materials should be able to provide convenience to learners and teachers both in the learning process independently, face to face, or learning with a combination system [15]. Teaching materials that are developed and fulfil the validity must be able to improve learning outcomes, interactions in learning, and motivation and cost affordability.

Future Research

After this teaching materials in the field of welding is implemented, tested and declared as valid to use, the next research that will be done is entrepreneurship practice activity in the field of welding. The Student makes welding craft with the iron material, such as: flower vase, chair, table, and other house accessories that will be marketed or sold in the community. The other alternatives, the student can receive an order from the community such as: receive orders such as an iron gate, trellis, canopy, and etc. The learning process still supervised by the entrepreneur lecturer. Here, the students learn from the life based entrepreneurship subject in the field of welding.

VI. CONCLUSION

A. Conclusion

This teaching material has met the validity criteria after validated by the material experts, learning technology experts and tested to students as users of teaching materials. This indicates that teaching materials based on life in the field of welding can be declared feasible to be used and can be produced in large quantities to be distributed to the users, i.e., mechanical engineering students at Faculty of Engineering, Universitas Negeri Malang. Also, this resource can also be used in other polytechnics, institutes, and universities in the same study program; even can be used among the vocational training centers and Vocational High School. By using this teaching material, hopefully, the learning outcome will be improved, and in turn, the quality of graduate can be increased.

B. Suggestions

For students, It is expected that this teaching material can be used as well as possible in the learning process. Also, students are also required to learn from other sources to enrich the existing treasures of science.

For the lecturer of mechanical engineering, this developed course teaching materials is expected to be used as a guide in teaching entrepreneurship courses in the Department of Mechanical Engineering Faculty of Engineering,

For the mechanical engineering department, the result of this teaching material development is expected to be used in the Mechanical Engineering department, to improve the quality of learning and student achievement.

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