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The Teaching Factory-Based BMC Application Model for Improving Students' Creativity of Central Java Public Vocational High Schools in Semarang

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Abstract

This study aims to analyze the BMC application model, as well as the validity, practicality, and effectiveness of the Teaching Factory-based BMC Application Model for Improving Student Creativity at Central Java Public Vocational Schools in Semarang. The research was conducted using the Research and development (R&D) method with the 4D development model (define, design, develop, disseminate). The preliminary study stage in this study used open interview observations from the teacher's statements. The development stage of the BMC application model includes product design validated by experts, then implemented into learning tools that would be validated by practitioners as model users before being applied in the classroom to improve student creativity. The results of this study indicate that the Teaching Factory-Based BMC Application Model is valid according to the triangulation of sources through credibility, transferability, and dependability, conformability. Based on the practicality questionnaire and interview guidelines given by 105 students and 5 teachers, the results are "very practical". Based on the assessment of the effectiveness using the t-test with a significance level of 95%, the probability value/ P value of the paired t-test is 0.000 <0.05. Gain test with the average gain of 0.490 is in the medium category, meaning that students experience increased creativity after implementing the Teaching Factory-based BMC application model and is effectively used to improve student creativity.

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INTRODUCTION

Education Education is a conscious and planned effort to create a learning atmosphere and learning process so that education participants actively develop their potential to have religious-spiritual strength, self-control, personality, intelligence, noble character, and skills needed by him, the community, the nation, and the State. Community and government strive for quality education in human resources (HR).

Vocational education or SMK (Vocational School) is education that prepares skilled Human Resources (HR) and prioritizes the development of students' abilities to perform certain types and skills as well as the development of professional attitudes. The high number of graduates who are still not working when seen from the learning process is due to the mismatch between what is being studied in school and the needs that exist in the Business World/ Industrial World. Schools are not yet fully capable of completing facilities and equipment following the Business/ Industrial World. In line with Wibowo's study (2008) as quoted by Widiyanto (2010: 104), there are three things that cause mismatches between SMK and the business world or the industrial world. The three things are: First, not all SMKs produce graduates who are adaptive to the working world. This is due to the absence of proper and modern workshop facilities or work laboratories, as well as building strong cooperation with the working world; Second, from the aspect of teaching staff, many SMK teachers are left behind in updating their expertise to suit the times. As a result, a lot of education in SMK are carried out carelessly, so that the end only produces graduates without adequate competence; Third, the programs offered by SMK are not yet effective and efficient. This problem can be seen from the quality of graduates who have not been able to answer the challenges of the industrial world.

Vocational education must be able to keep up with the development of the business and industrial world. On the other hand, the industry continues to move very fast. The SMK curriculum is made so that students are ready to immediately work in the working world. The curriculum content in SMK is structured as well as possible to suit the needs of the existing world of work. This is done so that students do not experience significant difficulties when entering the world of work. With a study period of about three or four years, SMK graduates are expected to be able to work in accordance with their expertise. One of the materials at the SMK level is Creative Products and Entrepreneurship subjects. Creative Product and Entrepreneurship Learning is very identical with life skill learning. As for the character or soft skills, Hartanto, Rusdarti, & Abdurrahman (2019) stated that vocational education must continue to strive in building students' characters, for example by bringing in personality experts or utilizing collaboration with industry to present the personnel department in related companies so that they can convey directly to students about how the need of workforce actually, especially related to the required character.

The materials provided are related to training the skills needed for life and responding to the demands of the industrial goods or services needed by the global market. The research results of Mahfud & Pardjono (2012) on entrepreneurship subjects are able to improve mental and soul that is always active or creative empowered, creating, working, and modest and trying to increase income in business activities. Entrepreneurship education aims to shape human beings as a whole (holistically), as people who have character, understanding, and skills as entrepreneurs.

The increase of creativity in Vocational Schools is evidenced by a large number of goods and services created and produced by students in each department and the academic values (knowledge and skills) is very good with the assessment criteria exceeding the KKM, namely 60 for productive and 65 for normative and adaptive scores. One of the efforts to improve creativity in Vocational Shool students of Engineering expertise program in creative product and entrepreneurship subjects where the basic competence is designing prototypes. Prototype design in a design drawing that the engineering department wants to produce is a competency standard that requires creative ideas to apply it in an image with a clear source of ideas. The importance of creativity is stated in the national education system No. 20 of 2003, which is essentially through righteous, noble, capable,

creative, and independent education. Komarudin (2011) said that "creativity is usually defined as the ability to create a new product. The creation does not need all the products to be new, it may be a combination, whereas the elements have already existed.

Observations conducted on November 1, 2019 (attached) to the results of the product prototype design drawings indicates that students show less creative behavior in expressing innovative ideas in the thoughts of these participants and lack in integrating the concept of the image with the reality of the needs that exist in the field. This indicates that the creativity of students needs to be improved better than before. It is emphasized in the next observation made on November 21, 2019 by the teacher of creative product and entrepreneurship (productive) subject "that there are weaknesses in students' activeness in designing, innovating and developing product quality orders for goods and services due to the lack of students in capturing existing market opportunities and the lack of professional staff in each department. Supported by a study conducted by Hartanto, Widodo, Kardoyo (2016) stated that Important aspects in the concept of the Teaching Factory implemented should be market-oriented curriculums, didactical learning process (education and training), supporting facilities, professional human resources, effective organizational management, and supporting internal and external environment. Moreover, students are required to design and make products. They must be able to know the superior products that exist in their environment so that they can develop these products to be more creative and adapted to the current conditions.

Innovative learning technology and productive practice are concepts of educational methods that are oriented towards the management of students in learning so that following with the needs of the industrial world. Adequate school facilities and infrastructure that support students to be more motivated to learn entrepreneurship are more effective. This is in line with the research conducted by Rini (2019) which states that; (1) teaching factory-based learning planning uses curriculum analysis 2013, basic competencies and potentials adapted to industrial needs, (2) implementing teaching factory-based learning which consists of the improvement of human resource aspects, partnerships, facilities and infrastructure, products and marketing (marketing) go according to plan; (3) and evaluation of teaching factory-based teaching finds out that the implementation process is running smoothly. Meanwhile, in Vocational Schools it is less than optimal due to the lack of teacher creativity in integrating TEFA-based learning models which causes the lack of students' confidence in developing prototype design idea creativities of goods or services in accordance with the wishes of the community that will be offered in the trade market.

Business Model Canvas (BMC) is interpreting logic and providing data and other evidence that show how a business is called as well as providing value to customers David J. Teece (2010). The business model describes and portrays how the business will be run starting from product planning and development, production processes, marketing, and product distribution to consumers. Designing TEFA development with BMC can be seen clearly in all business activities from planning, production, and delivery of consumer goods in 1 page (canvas). BMC can be the basis for planning and developing TEFA sustainably by evaluating each element of the canvas business model to improve the quality of TEFA implementation sustainably.

Creative product and entrepreneurship subjects combined with BMC are expected to foster the values of "local wisdom and the identity of a national product" by utilizing the environment and problems of the fulfillment of community needs exist as sources of learning so that growing spirit of independence, innovative, skilled, entrepreneurial spirit and at the same time the willingness to preserve the potential and value of local wisdom. The objective of the Creative Product and entrepreneurship Subjects is to develop creativity through creating, designing, modifying (changing), and reconstructing as well as appreciating local wisdom technology. The works are produced by hand and having elements of creativity. To achieve this objective, practice is needed to understand aesthetics (beauty) as the basis for work to create, produce, and maintain existing and find novelty value. Creative product and entrepreneurship subjects are closely related

to vocational education, in which creative product and entrepreneur material by combining four aspects consisting of craft, engineering, processing and cultivation are included in skills or vocational. In line with Fitrihana's study (2017) states that through the development of a Teaching Factory-based BMC, it is able to foster creative people in the fashion sector who develop creative products/ businesses in the fashion sector.

Based on the background, this study aims to analyze the BMC application model, analyze the validity of the model, analyze the practicality of the model, and the effectiveness of the Teaching Factory-Based BMC Application Model for Improving Student Creativity at Public Vocational Schools of Central Java in Semarang.

METHODS

The method used in this study was development or Research and Development (R & D) by using quantitative and qualitative descriptive approaches. This research was conducted at the Central Java Public Vocational School in Semarang. The implementation time was in the odd semester of the school year 2020/2021 for Class XI Students majoring in BKP, TEI, TITL, TP, and TKRO.

The steps taken in making a product. The 4D Development Model in R & D research according to Sugiono (2018: 396) consists of Define stage, Design stage, Develop stage, and Disseminate. (1) Research on existing products by observing potentials and problems; (2) Literature study, data and information collection; (3) Teaching Factory-based BMC learning model design; (4) Model design validation; (5) Revision or improvement of the design of the Teaching Factory-based BMC learning development; (6) Limited trial of the BMC learning development model; (7) Revision of the BMC learning development; (8) Trial of the use of BMC learning development; (9) Product Revision or improvement of BMC learning; (10) Field test in general. Based on the research and development stages, the researchers took up the development model for the Teaching Factory-based BMC model application and then obtained a hypothetical learning model.

The instrument tests in this study were validity and reliability test, which serves to show the validity of an instrument. It is said to be valid if it can reveal the variable data examined properly, while reliability indicates that the instrument is quite reliable as a means of collecting data because the instrument is good. Meanwhile, the data collection technique at the review and evaluation stage used Focus Group Discussion (FGD) forum. The FDG in this study was intended as a joint meeting of various interested parties and are responsible for the teaching factory-based BMC application model to discuss, analyze, and provide assessments regarding the development of the teaching factory-based BMC application model.

RESULT AND DISCUSSION

The results of this study describe the development of the application model and the impact of the application model development on students from the validity, effectiveness, and practicality of the model.

The Development of the Teaching Factory-Based BMC Application Model

The teaching factory-based BMC application model prioritizes learning that produces goods and services products that have sale value by using students' creative ideas in packaging creative goods or service innovation products needed by the market and consumers. Furthermore, the introduction and implementation of BMC are carried out. The method is by forming product working groups guided by the teacher, then each formed group receives orders from consumers in accordance with the job sheet of each department.

The research team provides socialization regarding BMC and how BMC works for students. The best way to apply BMC is by printing a large BMC poster then sticking it on the wall. Then mapping the idea on the available posters into 9 sections or 9 blocks. This is known as the Business Model Canvas (BMC) in Figure 1 below:

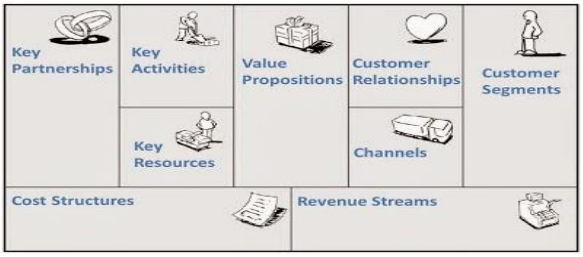

Figure 1. Canvas Model Business *Osterwalder (2010)*

The competencies achieved by students in learning are regarding teaching factory-based BMC and creativity in making creative and innovative prototype product designs that have sale values according to the market and consumer needs. Elements of creativity are: 1)Fluency of Thinking, 2)Flexibility, 3)Elaboration, 4)Originality. Meanwhile, the elements of BMC are customer segments, value proposition, channels, revenue streams, key resources, customer relationships, key activities, key partnership, and cost structure. The pre-test result of the Teaching Factory-based BMC model is 72.85, while the post-test result of the application of the Teaching Factory-based BMC model is 86.16. Thus, it can be seen that there is an improvement in student creativity in the application of the Teaching Factory-based BMC model before and after the model applied. To determine the effectiveness level of the model that has been applied in this study, it can be calculated with the Gain Index as follows: $Gain\ Index = \frac{(post-test\ score - pre-test\ score)}{(maximum\ score - pre-test\ score)} = \frac{(86.16-72.85)}{(100-72.85)} = 0.490$

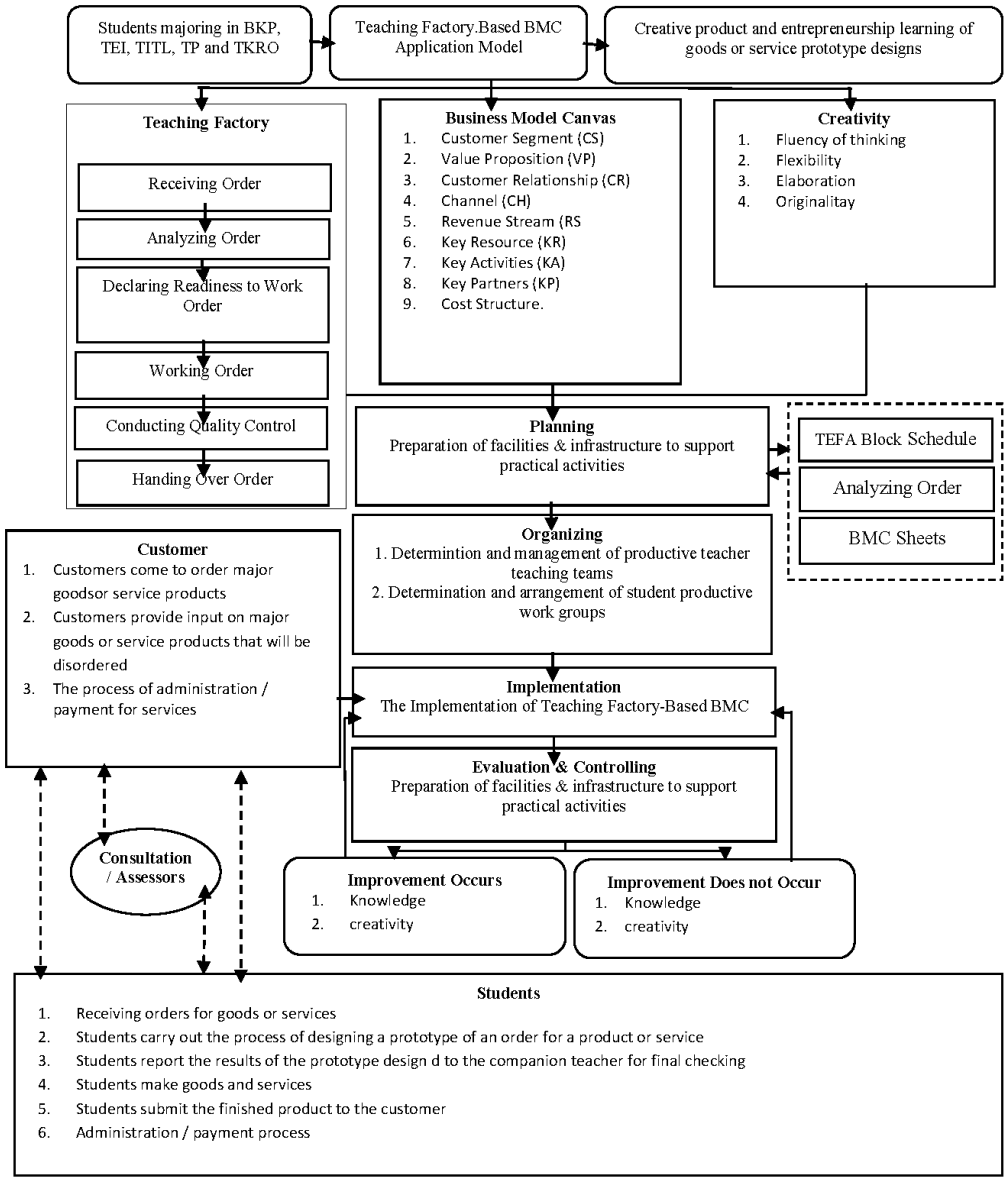

Figure 2. Teaching Factor-Based BMC Development

The Impact of Model Development on Students

The effectiveness of the model development can be seen from the difference in significance of the creativity results before and after being given the Teaching Factory-based BMC Application Model as in table 1 below.:

Table 1. Results of T-test Pre-test and Post-test Teaching Factory Based BMC Application

Paired Samples Test								
	Paired Differences							
				95% Cofidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair Pre Test-1 Post test	13.314	3.017	0.294	-13.898	-12.730	-45.221	104	0.000

The result of the data analysis shows that the t value for the statistical test is -45.221 with a significance level = 0.000 ($p < 0.05$) which means that there is a difference between the average pre-test score and post-test scores accepted.

The criteria used to interpret Gain values are: Gain $\geq$ 0.7 means high; 0.3 $\leq$ 0.7 means moderate; and Gain <0.3 means low (Hake, 1999: 1; Melzer in Sulistiyono, 2014). Based on the pre-test results, it is found the average value of creativity improvement in the application.

Based on the Gain (G) criteria table, the effectiveness of the Teaching Factory-based BMC model application to improve students' creativity of Central Java Public Vocational School in Semarang is in the Gain value range of 0.3 $\leq$ 0.7; meaning that the gain index value of 0.490 is in the medium category. Therefore, the result of the calculation above indicates that the application of the Teaching Factory-based BMC model developed is effective for improving the creativity of students of Central Java Public Vocational School in Semarang with moderate effectiveness.

Based on the practicality questionnaire and interview guidelines given by 105 students and 5 teachers, the results are "very practical", which is BMC is able to help teachers' difficulties in conceptualizing goods and services that would be directed to students, could be a balancer in the distribution of the factory teaching block system applied in SMK. Besides, the concept of BMC that has been studied and applied by teachers can add value to the production of goods or services that will be produced. The teachers and teachers feel helped by the existence of the teaching factory-based BMC application model. This is since with the existence of the concept of 9 blocks of business analysis contained in 1 sheet of canvas paper in market opportunity determination, product distribution, product marketing, customer analysis, funding of the production process for goods or services, and DUDI cooperation to be maximized. This indicates that the teaching factory-based BMC application model is practically used in the learning process of BMC.

CONCLUSIONS

The results of this study are, first, in the application of the teaching factory-based BMC, it can train students' creativity in creative product and entrepreneurship subjects of prototype design drawings of goods and services so that the produced products vary due to the combination of the teaching factory block system and Nine business analysis blog sheet in taking orders.

Second, the validity level of the application of the teaching factory-based BMC model to improve the creativity of students of Central Java Public Vocational School in Semarang is proven valid. This is proven through a process of experts' assessment, advice, and input.

Third, it is proven to be practically used. This is based on the results of the students' and teachers' responses examined on a limited scale, and the overall student and teacher response scores are in the very practical criteria. Thus, the implementation of the teaching factory-based BMC model to improve the creativity of students of Central Java Public Vocational School in Semarang is practical to use and can be implemented in practical learning in schools.

Fourth, based on the mean difference test or t-test which is significant between the pre-test and post-test results and the calculation of the increase in the test indicate students' creativity improvement..

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