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The Development of Teaching Factory Module to increase The Interest in Entrepreneurship through Competency Based Training Model in Central Java State Vocational School

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Abstract

Vocational High School (SMK) is an educational institution at the secondary level which aims at preparing students to become competent and independent workforce by prioritizing abilities and skills in certain fields. The selection of appropriate learning media can increase interest in entrepreneurship significantly. The group taught using the developed module on SMAW arc welding showed significant difference compared to the group who did use the module. This study involved eleventh grade students at construction and property business focus in SMK Negeri Jawa Tengah in 2020/2021. This study aims to develop a module for the Shield Metal Arc Welding (SMAW) training by using teaching factory (TEFA) based on Competency - based Training (CBT). This training aims to increase the interest of students in entrepreneurship. The research used ADDIE research and development design. The ADDIE research design consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The unit of analysis of this study is the module for Shield Metal Arc Welding (SMAW) training. Instruments used in research consisted of (1) assessment sheet of the module for Shield Metal Arc Welding (SMAW) training; (2) questionnaire of the practicality of the module for Shield Metal Arc Welding (SMAW) training; and (3) a questionnaire to measure the entrepreneurial interest of eleventh grade students at Property and Construction Business expertise and Mechanical Engineering in SMK Negeri Jawa Tengah. The data analysis used in this study consisted of (1) categorical to determine the feasibility level of the module for Shield Metal Arc Welding (SMAW) training; (2) Guttman categorical to determine the level of practicality level of the module for Shield Metal Arc Welding (SMAW) training, by using the Kr and Ks coefficient; and (3) N-Gain and the t – test for the N-Gain, to determine the effectivity of the on the entrepreneurship interests of students. The test of feasibility, practicality, and the effectivity of the module for Shield Metal Arc Welding (SMAW) training involved lecturers as the media expert, the head of Mechanical Engineering and The Teaching Factory Guide as learning material experts. The tests showed that the learning module was feasible, very practical, and sufficiently effective and could significantly increase the entrepreneurship interests of the eleventh-grade students at SMK N Jateng.

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INTRODUCTION

Interest in entrepreneurship in Indonesia is still very low, especially for the vocational school graduates. According to Director of the Vocational School Development, the number of graduates of vocational who became entrepreneurs was only 2.5% of the total graduates in the year of 2017, 5% of the total graduates in the year of 2018. The education of the vocational school which focused on the vocational competence is practical, the graduates of the vocational school should be able to implement the knowledge and skills in the industry and to create the job field as an entrepreneur. Presidential Instruction No. 9 of 2016 states that students with 'blueprint' generation can create jobs, either for themselves or other people.

The Central Statistics Agency (BPS) recorded the Open Unemployment Rate (TPT) as of February 2019 at 5.01 % of the Indonesian labour force participation rate (Indonesia, S. 2019). The figure of open unemployment rate still has its own problem; the Vocational High School (SMK) graduates still dominated the unemployment figure that 8, 63 % of the total labour force participation rate. Only about 60-65 % of Vocational High School graduates are employed by the industry each year. To decrease the magnitude of potential open unemployment, the Vocational High School graduates are encouraged to become young entrepreneurs. Approximately 7 % of the number of graduates in 2019 is driven to become young entrepreneurs by The Ministry of Education and Culture.

Based on the data Director General for Vocational Education Development, in the year 2019, 80% of graduates of vocational school has not been able to create a job field. Through Presidential Regulation No. 41 Year 2015 on 2 Grand Design Development of Learning Model: the Teaching Factory and Technopark in vocational schools, by the Ministry of Education and Culture, Directorate General Primary and Secondary Education , and the Directorate of Vocational High School Development, on the development of Industrial Resources to increase entrepreneurial interest.

The survey conducted on 47 students of SMK N Jawa Tengah at Construction Business and Property department (BKP) and Mechanical Engineering (TP) on the plan they after graduating at school showed the results on table 1:

Table 1 Student Plans After Graduation

Student Plans After Graduation	total	Percentage (%)
Become an Employee	37	78.73
Entrepreneurship	2	4.25
Continuing Education	8	17.02
Total	47	100

Factors that affect the low entrepreneurial interest according to Wijaya (2019) include two factors: internal factor in the form of self-readiness and external factor in form of competence. In addition to those two factors, the sharp intuition on finding business opportunities is one of the main assets for entrepreneurship.

One of the subjects that could become a business opportunity taught in the Construction Business and Property (BKP) and Mechanical Engineering (TP) department is Shield Metal Arc Welding. The Shield Metal Arc Welding in Semarang city is only taught in another vocation school, SMK N 10 Semarang which has welding engineering major. The use of raw materials which can be recycled and the application model is always changing results in the mastery of basic competencies in welding as the main asset in increasing entrepreneurial interest and the sharpness to see the business opportunities as the basis of the starting the business.

SMK Negeri Jawa Tengah is one of the schools that has just started to implement the Teaching Factory learning model mainly on the Construction Business and Property (BKP) and Mechanical Engineering department (TP). The implementation of the competency – based training requires sufficient preparation, because the model requires students to learn the process of the production activities and also the implementation of the industrial culture -based

competency. The competency - based Training can be implemented successfully if the process is performed well as in the standard of industry to produce students' appropriate competence and opportunities for entrepreneurship which accommodate the needs of consumers (Boahin , P . 2019).

The graduates of vocational schools could change their orientations not only to prepare prospective employees who are ready to work in the industry, but also to prepare students to seek alternatives become entrepreneurs. Job vacancies are not available in proportional to the amount of job seekers, so that the entrepreneurship is quite promising for the future. The prosperity of a country can be measured from the number of entrepreneurs, the ratio of entrepreneurs in Indonesia is still low compared to neighbouring countries, such as Singapore, the number of entrepreneurs has reached 7% of the total 4 million population, and Malaysia has reached 5% of the total population, while in Indonesia in 1999 2018 only around 8.06 million people or 3.1% of the total population (Ministry of Cooperatives and Small and Medium Enterprise, 2018).

The efforts to increase the ratio of entrepreneurs in Indonesia are still low. The application of Teaching Factory targeted 80 % of Vocational School graduates could be employed in the industry, 7 % of entrepreneurs and 13 % pursue higher education (Directorate PSMK, 2019).

The implementation of Teaching Factory in the Construction Business and Property Department and Mechanical Engineering Department (TP) in SMK Negeri Jawa Tengah Central is not ideal, especially in attempts to produce graduates to become entrepreneurs. According to the data on the alumni tracking system in 2019 at SMK N Jawa Tengah, the 76% of Construction Business and Property graduates were employed by the industry, 7% pursued higher education, 2% become entrepreneurs, and 15% were unemployed. The 81% of graduates of Mechanical Engineering Department were employed by industry, 4% pursued higher education, 0% become an entrepreneur, and 15% were unemployed (Sutriadi, personal communication, October 2019). The manager of the Teaching Factory states that latest learning module engineering for SMAW (Shield Metal Arc Welding) did not exist concerning that equipment and materials that are used have been changed in line with time. Although there are 2 people who acts as Teaching Factory mentor with appropriate educational background and expertise, the teaching factory still have not been able to represent the number of students who wish to develop competencies in the field of Shield Metal Arc Welding. Therefore, the constraints on the implementation lead to the low entrepreneurial interest of students.

The objectives of this study are to analyze: (1) the feasibility, the practicality, the effectivity of the TEFA module that is applied using the CBT learning model to increase entrepreneurial interest in SMK N Jawa Tengah, Construction business and property department and Mechanical Engineering Department; and to develop TEFA module based on CBT competence of the Shield Metal Arc Welding.

METHODS

1. The Module Development Method

This research employed educational research and development design. The products of educational research and development can be an instructional model, instructional media, instructional equipment, books, modules, assessment, and curriculum and policies of the school. This study aims to develop a competency – based module (CBT) which focuses on the SMAW welding technique for eleventh – grade students at SMK N Jawa Tengah Java to increase their entrepreneurial interest. The media development design in this study was adapted from the ADDIE development model which consists of five development stages: Analysis, Design, Development, Implementation, Evaluation. Research development of education includes development process, validation of product, try out of the product, and evaluation of the

product. Through educational research and development, the researchers seek to develop a product that can be effectively used in training. The procedure of research is to adapt the model of development ADDIE by Dick and Carry (1996). The research procedure consisted of five phases: analysis, design, development, implementation, and evaluation. Researchers modified the model of development in accordance with the needs, place, and environment.

The stages include:

a) Analysis

The activities are carried out in this stage include needs analysis, needs analysis on the needs of the module, and the analysis of the entrepreneurial interest in SMAW in TEFA - based CBT in SMK Jawa Tengah.

b) Design

There are 4 steps on the stage of the design which included the preparation of a framework of the module, the collection and the selection of the reference, the design of the module, and the preparation of instrument response modules. Results of the draft that had been prepared in consultation with the Teaching Factory (TEFA) instructor, if the design has been approved then next step was performed, namely the realization of the design of the training that has been approved.

c) Development

At the stage of development, the module of SMAW training in TEFA based on CBT in SMK Jawa Tengah was developed, the stage aimed to investigate the feasibility of the prototype of the training module; secondly, after the module was developed using Competency Based Training model (CBT), it was subsequently submitted to the validator consisted of media expert, instructional expert, and responses users (students and teachers). Validator consisted of two lecturers for the media experts and 2 teachers as the instructional material expert which consisted of TEFA instructor at SMK N Jawa Tengah and a teacher at Mechanical Engineering Department at SMK N Jawa Tengah on the competence of Mechanical Welding; response from the user which consisted of the three teachers at the Mechanical Engineering Department at SMK N 1 Semarang, and eleventh – grade student at Mechanical Engineering at SMK N 1 Semarang; after the module was tested for its feasibility and the practicality, the revision of the module was performed based on the responses from the validator; The next step was the development of instrument to test the effectivity of the training module which adopted the options of effectivity questionnaire which has been proven for its validity.

d) Implementation

Pre - test on to the two groups of students was conducted. Furthermore, treatment in the experimental group in the form of the training module was given. The control group was not given the treatment. The last step was the administration of post - test

e) Evaluation

Two evaluations were conducted in this study: the formative and summative evaluation. The formative evaluation was conducted during the development stage, while the summative evaluation was aimed at evaluating the stage of implementation. The following is the flowchart of the product development:

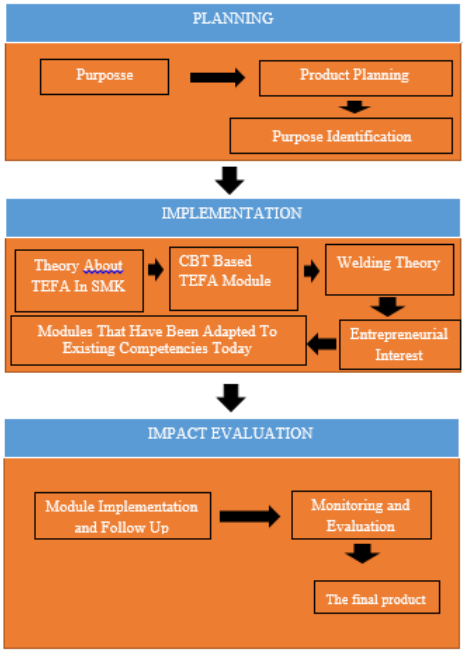

Figure 1. Product Development Flowchart

2. Data collection method and instrument validity and reliability

The unit of analysis in this research is SMAW training module. The data sources of this study were (a) instructional material experts: productive teachers of SMAW welding; (b) instructional media experts, especially those related to modules; (c) productive teachers involved in TEACHING FACTORY ; (d) students who were involved to test the practicality of module were the eleventh – grade students of the Mechanical Engineering Department at SMK N 1 Semarang ; and (e) the students involved in the effectivity tests were the eleventh – grade students of the Construction Business and Property (BKP) and Mechanical Engineering Department in SMK N Jawa Tengah, the increasing interest in entrepreneurship students in the field of welding arc manually types of SMAW .

Instruments used in research consisted of (a) assessment sheet for the training module; (b) practicality questionnaire of the training module; and (c) questionnaire on students' entrepreneurial interests in the field of manual arc welding at the SMAW type.

The collection of data in the study can be seen on the table 2 below:

Table 2. Data Collection Techniques

Type of Data	Method	Sources of Data
Feasibility test	Module Assessment Sheet	2 instructional media experts and 2 instructional material experts
Practicality Test	Questionnaire	Teachers and Students of XI at SMK N 1 Semarang
Effectivity instruments try out	Questionnaire	XI student of SMK N 1 Semarang
Effectivity test	Questionnaire	Students XI BKP and XI TP SMK N Jawa Tengah

a) Test on the Validity and Reliability of the Instrument

Determining the validity or and reliability of the research instrument requires try outs on the items of the instrument.

(1) The Validity and Reliability test on the Assessment Sheet for the Module

(a) Validity

Validity for the feasibility assessment sheet instrument with the Likert scale scoring used CVR as follows:

CVR = (2ne / n) -1

(Source: Tuherni, 2019)

Information:

CVR = content validity ratio,

Amount of ne = Number of validation experts who gave the scores (important / relevant)

n = Number of all experts

Based on the results of data analysis by Ahmad Fauzan, CVR score = 1, the data analysis by Muchammad Arif Mustafa, CVR = 1, and the data analysis by Joko Nur Fitriyanto, CVR = 1, This shows that the Instrument is valid.

(b) Reliability

The formula of the coefficient of Cohen's Kappa is

$$\kappa = \frac{\sum_{i=1}^{I} \pi_{ii} - \sum_{i=1}^{I} \pi_{i+}\pi_{+i}}{1 - \sum_{i=1}^{I} \pi_{i+}\pi_{+i}}.$$

Where: $\sum_{i=1}^{I} \rho_y$=The total principal diagonal proportion of the observed frequency

$\sum_{i=1}^{I} \rho_i + \rho_{+i}$= The total siagonal proportion of the observed frequency

Table 3. The Interpretation of Kappa Statistical Value

Kappa	Interpretation
< 0	Poor agreement
0.0 – 0.20	Slight agreement
0.21 – 0.40	Fair agreement
0.41 – 0.60	Moderate agreement
0.61 – 0.80	Substantial agreement
0.81 – 1.00	Almost perfect agreement

Source: Landis, JR, Koch, GG (1977).

Based on the results of data analysis conducted by Ahmad Fauzan, kappa score = 0.300, data analysis conducted by Muchammad Arif Mustofa, kappa score = 0.265, and data analysis conducted by Joko Nur Fitriyanto, the kappa score = 0.250, this shows that the instrument is reliable, with a fair agreement.

(2) Test the Validity and Reliability of the Instrument for Practicality of the Module

(a) Validity

The validity of the type of answer is in the form of interval / ratio scale scoring, the formula for calculating the biserial point correlation coefficient is as follows.

$$rpbi = \frac{Mp - Mq}{St}\sqrt{pq}$$

(Source: Brown, 1988)

Information:

rpbi= point biserial correlation coefficient;

Mp= the number of respondents who answered correctly;

Mq= the number of respondents who answered incorrectly;

St= standard deviation for all items;

p= the proportion of respondents who answered correctly;

q= the proportion of respondents who answered correctly.

Based on the results of data analysis conducted by Akbar Iskandar, the score of rpbi = 1, the data analysis carried out by Adlia Alfi riani rpbi = 0.99, and data analysis by Ellbert Hutabri rpbi = 0.99, this shows that the feasibility instrument sheet of the module used is valid or valid.

(b) Reliabilitas

The formula that is used as follows:

$$KR_{20} = \left(\frac{n}{n-1}\right)\left(\frac{St^2 - \sum pq}{St^2}\right)$$

(Source: Matondang, 2009)

Information:

KR_{20} = reliability tests as a whole;

p = proportion of subjects who answered correctly;

q = proportion of subjects who answered incorrectly;

Σpq = the sum of the product of p and q;

n = the amount of the items;

St^2 = Standard deviation of the test (standard deviation is the root of the variance).

While the formula of variance were used to calculate reliability is as follows:

$$St^2 = \frac{\sum x^2 - \frac{(\sum x)^2}{N}}{N}$$

Information:

St 2 =Variance is always written in quadratic form , because the standard deviation is squared;

(Σ x)2=Quadratic sum scores were obtained by the students;

Σx2=Number of squares scores were obtained by the students;

N=The number of test subjects.

Based on the results of the analysis of the data conducted on Akbar Iskandar, score KR 20 = 0.639, analysis of the data conducted Adlia Alfi riani KR 20 = 0.726, and the analysis of data that do Ellbert Hutabri KR 20 = 0.800 , It is show that the validation sheet for the expert media is reliable, with high criteria .

(3) Test Validity and Reliability for the effectivity Instruments on the Module

(a) Validity

To find out the validity of the response items, the formula is used:

$$r_{count} = \frac{N\sum XY - (\sum X)(\sum Y)}{\sqrt{\left(N\sum X^2 - (\sum X)^2\right)\left(N\sum Y^2 - (\sum Y)^2\right)}}$$

(Source: Arikunto, 2016)

Information:

R statistics: The correlation coefficient between X and Y;

N : Number of subjects / participants of students who studied;

∑X : Total score for each response item;

ΣY : Number of responses total;

ΣX2:The number of squares response item response;

∑Y2:Sum of the squares of the total responses.

Furthermore, score r statistics was compared r critical. The response is considered valid when r statistics is higher than r critical with the level of significance of 5% and r statistics is lesser than r critical the item is said to be not valid.

The results of the analysis test of the validity of the instrument effectiveness of 35 items of the responses obtained by the amount of items that is valid as many as 31 items and the number of items that are not valid as much as 4 items. For the calculation of the validity of item response test of effectiveness can be in the view section attachment. The results of the recap of the validity analysis of the effectiveness test response items can be seen in table 4 as follows:

Table 4. Recap on the Validity Test of the Instrument

Criteria	Number of Item	Number
Valid	1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35	31
Invalid	5, 12, 21, 33	4

(b) Reliability

The formula that is used as follows:

$$r_{11} = \frac{k}{k-1}\left\{\frac{V_t - \sum pq}{V_t}\right\}$$

(Source: Arikunto, 2016)

Description:

r11 : reliability;

k : number of questions;

Vt : total variance;

p : proportion of subjects who answered correctly on one item (1 / N);

q : the proportion of subjects who received a score of 0 / (q = 1-p).

The reliability test criteria is when the r statistics is compared with the r critical. If r statistics is higher than the r critical, then the items were reliable.

Table 5. Recap of Instrument Reliability Test

Cronbach's Alpha	No of Items
0.935	35

From the analysis of the response items of the effectivity of the test instrument, it was found that the reliability of the response items was 0.935> r critical = 0.3388, it can be concluded that the response items were reliable with very high criteria. For the calculation of the reliability of item response test of effectiveness can be on view in the attachment.

b) Normality and Homogeneity test

1) The normality test uses Chi square (χ^2) as follows:

$$X^2 = \sum_{i=1}^{k} \frac{(Oi - Ei)^2}{Ei}$$

Information:

χ^2 = Chi- squared;

Oi = Observation Frequency;

Ei = Frequency Expected;

k = Number of Classes.

The normality test is a test to determine whether a data distribution is normal by looking at the probability value of χ^2>0,05.

2) The homogeneity test using Levene test is as follows:

Ho : $\sigma 1 = \sigma 2 = \ldots\ldots = \sigma k,$

Ho : $\sigma i \neq \sigma j$ For at least one pair (I, j)

The Levene formula is as follows :

$$W = \frac{(n-k)}{(k-1)} \frac{\sum_{i=1}^{k} n_i (\bar{Z}_{i.} - \bar{Z}_{..})^2}{\sum_{i=1}^{k}\sum_{j=1}^{n_i} (Z_{ij} - \bar{Z}_{i.})^2}$$

The data are homogeneous by significance score as follows.

(a) the significance score (p) ≥ 0.05 indicates that the data group comes from a population that has the same variance (homogeneous).

(b) the significance score (p) of <0.05 indicates each group of data come from populations with variances were different (not homogeneous).

3) Data Analysis Method

a) The Effectivity of the Module

Calculate the overall average score and each aspect using the formula:

$$\bar{x} = \frac{\sum X}{n}$$

(Sources: Sukardjo, 2014)

Information:

$\bar{x}$ = Average score;

∑X = Total score;

N = Number of Indicators.

Table 6. Score Conversion Criteria

No	Formula	Range	Category
51	$\overline{xi}$ + 1.8 S < $\overline{x}$ ≤ $\overline{xi}$ + 3 S	4.21 – 5.00	Very feasible
42	$\overline{xi}$ + 0.6 S < $\overline{x}$ ≤ $\overline{xi}$ + 1.8 S	3.41 – 4.20	feasible
33	$\overline{xi}$ – 0.6 S < $\overline{x}$ ≤ $\overline{xi}$ + 0.6 S	2.61 – 3.40	Less feasible
34	$\overline{xi}$ – 1.8 S < $\overline{x}$ ≤ $\overline{xi}$ – 0.6 S	1.81 – 2.60	Not feasible
35	$\overline{xi}$ – 3 S < $\overline{x}$ ≤ $\overline{xi}$ – 1.8 S	0 – 1.80	Really not feasible

b) Practicality of the Module

Data from the analysis on the module practicality, further the coefficient of reproducibility (Kr) and coefficient of scalability (Ks) to determine the practicality of any aspect with the following formula:

Kr = 1- e/n

Information:

Cr = reproducibility coefficient

e = Number of errors = 0

n = Number of questions x number respondent = 10 x 2 = 20

Once Kr is known, the scalability coefficient (Ks) is calculated using the following formula:

Ks = 1- e/k

Information

Ks = Scalability coefficient

e = Number of errors = 0

k = Number of expected errors or c (n-Tn) and c are the probability of getting the correct answer. Because the answer is "Yes" "No" c = 0.5

Qualitatively interpret the average questionnaire score (%) of the overall module practicality test and each aspect using the following criteria:

Table 7. Data Practicality Test

No	Practicality (%)	Classification
1	75 - 100	Very practical
2	50 - 75	practical
3	25 - 50	Less practical
4	0 - 25	not practical

c) Effectivity of the Learning Module

The data were then tested for normality, after showing that the data are distributed normally, the next step is to test for its the homogeneity, then the N-Gain of the data is used to determine the Effectivity of the learning modules, and the last step is to test N-Gain using the independent T test to determine significant whether or not the average N Gain at the experimental and control group.

The calculation of the normalized gain score (N-Gain) can be stated in the following formula:

$$\text{N} - \text{Gain} = \frac{Post\ Test\ Scor\ - Pre\ Test\ Scor}{Ideal\ Scor\ - Pre\ Test\ Scor}$$

As for the category of the grouping the N-Gain score can be determined by N-Gain score in the form of (%) as follows:

Table 8. Category N-Gain score

S kor N-Gain	Category
g> 0.7	High
0.3 ≤ g ≤ 0.7	Average
g ≤ 0.3	Low

Category acquisition N-Gain score (%) will be interpreted into several categories as follows:

Table 9. N-Gain Score interpretation

Percentage (%)	Interpretation	group
<40	not Effective	1
40-55	Less Effective	2
56-75	Sufficeiently Effective	3
> 76	Effective	4

Independent T test is as follows :

$$t_{count} = \frac{X1 - X2}{\sqrt{\frac{(n1-1)si2+(n2-1)si2}{n1+n2-2}\left(\frac{1}{n1}+\frac{1}{n2}\right)}}$$

Information:
Xi: is the average score / s core group i
Ni: is the number of respondents in group i
si2: is the Variance score for group i

If the t statistic > t critical then there is a difference on the means of the two groups. It indicated the learning modules could increase the interest in entrepreneurship, and vice versa.

RESULTS AND DISCUSSION

1. Module Development

a) Results of the Analysis

The analysis is a stage of collecting information that can be used as material to develop the product. The product of this research is a learning module on TEFA -based CBT. The analysis consisted of: (1) Needs Analysis, before analysing the textbooks used in the field, researchers conducted an analysis of the problems of the students in understanding the competence, the needs of the students on the media developed in this study, the selection of the topics used in the content of the media, and analysis of basic competence (KD) and achievement indicator; (2) Analysis of Needs for Learning Module, based on the results of observations, students in understanding the competence of manual arc welding with SMAW are caused by several factors: (a) the less attractive instructional media for the attention of students, (b) instructional media that can help students to become active during learning process and learn to be independent , (c) the instructional media that can be used anywhere and anytime without the help of others, (d) instructional media which is more practical that can be used by students; (3) Analysis of Interest in entrepreneurship, the result of the observation on the interests of entrepreneurship, researchers concluded several characteristics of students in the mastery of competencies in SMAW welding.

b) Design

The design stage was carried out to to design the instructional module media. (1) the Framework of the instructional module, module that will be developed consisted of three parts of main that is part of the introduction, contents and conclusion. The introduction section contains a cover , introduction, Core Competence, Basic Competence, map of concepts , and a list of contents. Section contents lists of modules of training. The end section contains about exercise and a list of references; (2) Collection and Selection of Reference, this part selected the references as the materials of writing the instructional module; (3) Design Module, design of the module includes: (a) Cover, (b) Introduction , (c) List of Contents , (d) List of Figures and Tables , (e) Map Position Module , (f) List The terms , (g) Core Competencies and Basic Competencies for Welding Types of SMAW , (h) Module Core Parts , (i) references , (j) List of Machinery and Materials; (4) Drafting Instruments on Module feedback, the instrument of responses for the training module, which is in the form of the questionnaire for the expert media validator, questionnaire for the expert materials validator and questionnaire response of users (students and teachers). This instrument adopted a questionnaire from BSNP that has been proven to be valid, then the questionnaires were adjusted to the discussion from the SMAW training module. The scoring of this instrument is a questionnaire with a Likert scale.

c) Development

Stage is aimed to investigate the feasibility of the training module. The development stage consisted of: (1) Development of Training Module for TEFA based on CBT to increase the interest in entrepreneurship, the development of the instructional module which adopted Teaching Factory (TEFA) based Competency Based Training (CBT), the model focuses on the mastery of competencies, SMAW competencies. It is expected that the mastery of SMAW competency, to see the wide opportunities on the market, it can increase the interest of students to become an entrepreneur and decrease the high unemployment rate due to the

lack of industrial employment; (2) Validation of Media Experts, Instructional Material Experts and User Validation (Teachers and Students), this step was carried out to determine the feasibility and practicality of the modules. The feasibility test of the training module was conducted by lecturers as the media experts and teachers as the instructional material experts to obtain suggestions and criticism from validators of the products. The results of the validation showed that the training module is feasible; (3) Revision on the Training Module, after the validation, the training module was then revised based on the criticisms and suggestions; (4) Development of the Instrument to Test the Effectivity on the training Module, the development of scoring for the instrument, will be based on the prerequisite points of a feasible modules of training. In addition, a participant response questionnaire was also developed. Questionnaire responses of participants that was adapted to the requirements a feasible training module of by adopting the existing effectivity questionnaire.

d) Implementation (Application)

The implementation phase was performed if the results of the feasibility test and practicality test have met the criteria of feasible and practical. The implementation phase of the training module involved 24 eleventh – grade students from the Construction Business and Property as the experimental group. They were given treatment in the form of the training module. On the other hand, 24 students from the Mechanical Engineering Department were involved in the control group. They were not given the treatment. (1) Pre Test was administered on both groups, to determine the initial state of the students before given treatment in the form of training module. Pre-test was administered at the beginning of the study by the teacher of each department that can be accessible to students in online via google form. The pre-test consisted of 35 items of responses. It was calculated that an item of responses can be completed in1 minute, then the time required to complete the Effectivity test was 35 minutes. Questionnaire from students was directly entered as responses; (2) The conditioning phase of the study was meant to condition of respondents after given a pre-test. Conditioning of the respondents was the use of the training modules on the eleventh – grade students at Construction Business and Property department as a group experiment, while the eleventh – grade students at Mechanical Engineering Department as a control group was not given the treatment; (3) Post – test was administered on both groups. The last phase was the effectivity test for the training module by administering the post – test. The post-test response questionnaire was given after the pre-test. Pre-test was given once on both groups. The items were similar on both tests, the aim was to compare the results between the experimental group which was given the training module with the control group which was not given the training module.

e) Evaluation

The last phase in this research and development is the stage of the evaluation, the stage was aimed at revising the system to process the data from the previous stages. Evaluation was carried out after the fourth stage of the ADDIE model was implemented. (1) The Formative evaluation evaluated in the development stage which aimed at developing of the training module, validation, revision, and development of an instrument for Effectivity test. The formative evaluation was aimed to ensure the expected purpose of the module was achieved and to carry out revision on the training module; (2) The summative evaluation aimed to determine the effectivity of the training module. The summative evaluation leads to a decision on the statement of achievement of the SMAW training module to increase entrepreneurial interest. It can also be used to determine the continuation of the study, the study was stopped or continued, the adoption and subsequent step.

2. Module Feasibility

Assessment sheet for the feasibility of the training module in this research adopted the questionnaire from BSNP which has been proven for its validity. Therefore, the validity

test for the questionnaire was not conducted again.

Table 10. Data on Assessment Sheet for the Module Feasibility

Criteria	Average	Category
Content Feasibility Aspects	4.25	Very feasible
Presentation Feasibility Aspects	4.20	feasible
Criteria	Average	Category
Aspect of Language feasibility	4.39	Very feasible
Aspects of Contextual Assessment	4.28	feasible
Aspects of Graphic Feasibility	4.36	Very feasible
Average	4.29	Very feasible

Table 10 showed that the average score of the feasibility test was 4.29 with the criteria of very feasible. Therefore, the training module training was considered valid and very feasible. Based on the results of the validation, it can be concluded that the training module was valid with minor revision and it can be used as instructional material for teaching the technique of welding.

3. Module Practicality

This stage was carried out to determine the practicality of the training module. The practicality test of the training module was performed by involving the teachers and students. The results of the practicality test can be seen the following table:

Table 11. Data Analysis score Kr and Ks

Validator	Indicator	Score Kr	Score Ks
Teacher	Interest Material Language Content Competence	0.9	1.0
Students	Interest Theory Language Content Competence	0.9	1.0
Average Score		0.9	1.0

The coefficient of reproducibility or Kr = 0.9 indicates that the SMAW training module is very practical to use as it has met exceeded coefficient of reproducibility = 0.9. It is emphasized by the test of scalability, the coefficient of scalability or Ks = 1, the numbers have also already met the requirement that at above 0.60.

Table 12. Categorial of Practicality Test by Teachers and Students

Response Indicators	Average	Category
Interest	84.80%	Very Practical
Theory	90.77%	Very Practical
Language	93.14%	Very Practical
Competence	93.14%	Very Practical
Average	90.46%	Very Practical

c. The Effectivity of the Module

The results of the pre-test and post-test data on the normality test for the experimental and control groups are as follows:

Table 13. Normality Test

Group		Sig. Kolmogorov-Smirnova	Sig. Shapiro-Wilk
Pre Test	Exsperiment	0.200	0.954
	control	0.200	0.423
Post Test	Exsperiment	0.200	0.884
	control	0.150	0.504

Based on Table 13, the normality test shows the Sig. > 0.05, it can be concluded that the data are normally distributed.

The results of the homogeneity test of the experimental and the control group are in Table 14.

Table 14. Homogeneity Test

Group		Levene Statistic	Sig.
Pre Test	Based on Mean	0.536	0.468
	Based on Median	0.492	0.487
	Based on Median and with adjusted df	0.492	0.487
	Based on trimmed mean	0.587	0.447
Post Test	Based on Mean	0.013	0.910
	Based on Median	0.011	0.918
	Based on Median and with adjusted df	0.011	0.918
	Based on trimmed mean	0.011	0.916

Table 14 on the homogeneity test based on the mean of the Pre – Test shows significance = 0, 468 which means data> 0.05, so it can be concluded the data are homogeneous. In addition, the score at the based on the mean post-test shows significance = 0, 910 which means the data < 0.05, so it can be concluded that the data are homogeneous.

The results of N Gain test with SPSS 23.0 are shown on Table 15.

Table 15. N-Gain test

Data	Experiment Group	Data	Control Group
	N-Gain *Score* (%)		N -Gain *Score* (%)
Average	56.3948	Average	17,2719
Minimum	36.90	minimum	67.39
maximum	88.06	Maximum	3 0.95

The results of N Gain scores show that N Gain scores for the experimental group = 56.3948 or 56 % with minimum N-gain score = 37 % and maximum N-gain score = 88 %. As for the control group is -17.2719 or -17 % with minimum score = -67.39 % and maximum N-gain score = 30.95 %.

The results of the T Test Pre Test and Post Test for the experimental and control groups are as follows:

Table 16 . T-Test Results for N-Gain Data

Data	Levene Statistic	T test	Significance Level
N- Gain_ Percentage	0.078	13.029	0.000

Table 16 shows the significance (Sig) on Levene's Test for Equality of Variances = 0.078> 0.05 then it can be concluded that the variance of N-Gain (%) for experimental group and control group is the same or homogeneous.

Table 16 shows the T statistics = 13.029 with T critical at (df = 45; = 5%) was 2.014. Because T statistics is higher than T critical, it can be concluded there is no difference between the experimental and control group before given the treatment.

Results of the of independent samples T test on N-Gain score on the table showed that the data N-Gain_Persen has Sig (2-tailed) 0, 000 (much smaller than the level of significance 0.05), meaning that the data N -Gain_Persen in this research data is distributed fairly effectively and significantly.

CONCLUSION

Based on the results of research and the discussion, it can be concluded (1) the research and development on the Shield Metal Arc Welding (SMAW) training module (SMAW) using a model of Teaching Factory (TEFA) based Competency Based Training (CBT) with the development model of ADDIE was performed in several stages. (a) the stage of the needs analysis consisted of the three phases: the needs analysis, the needs analysis of the module and the analysis of interests of entrepreneurs ; (b) the stage design includes preparation on the framework of the module, the collection and the selection of reference, the design of the module, and preparation of instrument response for the modules ; (c) the stage of development includes the development of SMAW training module, validation on the media expert, content expert, and validation of users (teachers and students), revision based on the input from the validators, and the development of instruments to test effectivity of the module ; (d) the stage of implementation includes the Pre Test on experimental and control group, conditioning with the administration of the training module in the experimental group, and Post Test on both groups; (e) the evaluation phase includes formative evaluation which evaluates in the development section and summative evaluation which evaluates in the implementation section The final product of this development research is The Shield Metal Arc Welding (SMAW) training module using the CBT -based TEFA learning model. (2) The Shield Metal Arc Welding (SMAW) training module using the CBT -based TEFA learning model was proven as very feasible to be used to support the learning process. It is based on the responses given by expert media of the lecturers, the instructional material experts, and from users (teachers and students). The effectivity test revealed that the Shield Metal Arc Welding (SMAW) training module using the CBT -based TEFA learning model is very feasible, very practical, fairly effective and significant to be used for increasing interest in entrepreneurship of students of the Construction Business and Property and Mechanical engineering Department at SMK N Jawa Tengah.

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