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Development of Basic Competency Jobsheet to Cut A Rectangular Thread Using A Lathe for Vocational Senior High School

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Abstrak

This study implemented the use of basic competency job-sheet to lathe for a rectangular thread for students of vocational high school. The numerous numbers of students who asked questions indicated that learning has been ineffective. Pretest results proved that the competency in the use of lathe with a rectangular thread did not meet KKM value. This study's objective therefore was to understand validity, reliability, effectiveness and practicality of the jobsheet for vocational senior high school students. This study used a Research and Development method with 4Da study model approach comprising of Define, Design, Develop, and Disseminate. However, this study only used 3D, specifically, Define, Design and Develop. The Kappa Coefficient of the VCR raw material was used to gain validity and reliability of the jobsheet content. Two group pretest-posttest designs were used to test effectiveness of the jobsheet, and students' response to questionnaires were used to understand their responses. The results of study indicate that validity of the jobsheet content is derived from 2 raters which indicate CVI value with a valid category. Reliability of the jobsheet content showed this was the most substantial category. The results of effectiveness given illustrates that the increasing mean of the posttest values where found effective, while that of students' responses given to an experimental class was in the very feasible category. The conclusion of this study therefore is valid, reliable, effective and practical development and can be usable for practice learning to lathe the rectangular thread.

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INTRODUCTION

The increasing number of vocational senior high schools (SMK) has proven the government's intention to make it a major pillar in supporting the economy. Data was obtained from Coach Directorate of Vocational Senior High School (2018) which indicated that, the number of SMKs is 14,148 schools distributed to 33 provinces with a total of 4,867,630 students. However, the focus of this number was still placed on careers with a much higher unemployment rate. According to Suhariyanto in *finance.detik.com*, the unemployment rate of vocational students in February 2018 reached 8.92%, thereby making it the unit with highest unemployment rate.

According to Setiawati (2015:36), this number was due to the government's inability to meet the demand for job opportunities. Furthermore, Rustandi (2013:540) suggested that some educational problems in Indonesia were caused by teachers' readiness, learning sources, infrastructures and facilities. Teachers play a vital role in enhancing educational standards by preparing effective and efficient learning equipment (Chauhan and Sharma, 2015:123). Some learning equipment types are (1) RPP, (2) LKS or the *jobsheet*, (3) student's book, etc. (Santi et.al, 2015:85).

In addition to the observation results in SMK Negeri 4 (State vocational senior high school 4), the learning condition using the rectangular thread indicated that (1) students still asked teachers questions during the learning process despite been given thorough explanation before practicing, (2) explanation and demonstration proved that practical learning activity took longer learning time to schedule, (3) incomplete *jobsheet* structure, (4) the working drawing technique was not useful for students with respect to the industrial world, (5) only 11% of them met practice KKM to use a lathe with the rectangular thread.

Studies on *jobsheet* development have been previously conducted, and some weaknesses discovered. For instance, according to Jumargo et.al (2011:57), *jobsheet* of working drawing shape make students careless during practical classes. A study on advanced *jobsheet* was completed with working steps; however, it was only words but not followed by figures.

According Putro (2016:1), students should be allowed to self-explore by determining specific measure with available materials. However, they tend to find easy measure to make and therefore they should be shown tolerance only if they work more carefully and accurately. A study by Sudiyono et.al (2011:84) indicated the speech method completed with LKS may increase competency in making cut image. Nevertheless, it affects students' concentration during learning and takes longer. Learning should be packaged for students to be more active and efficient. According to Budiman et.al (2017:50), the practicality assessment consist of easy language indicators for understanding, though, *jobsheet* was not packaged in pocket book size to be more practical in bringing.

Some of the above mentioned studies indicate students might increase their practical competency to lathe the rectangular thread in which the *jobsheet* should be structured to have broad structure, working steps completed with figures, finalized with tolerance, #d working drawing, and pocket size *jobsheet*, and therefore students felt easier to learn everywhere and anytime so that there was update of *jobsheet* before.

The objective of the study was to test validity, reliability, effectiveness, and practicality of *jobsheet* development of basic competency to lathe the rectangular thread to be useful during learning as well as functioning as literacy relevant to this study.

METHODS

The study used *Research and Development* method with 4D consisting of *define, design, develop* and *disseminate stages*. However, this

study only reached the third stage because of limited time and fund.

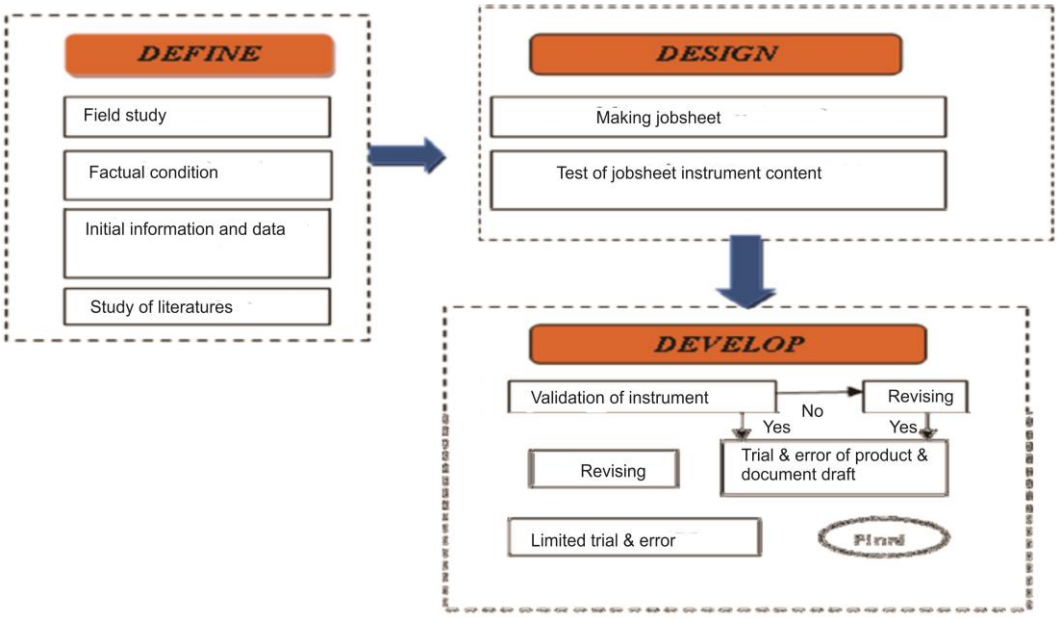

Figure 1. Stages of Research and Development

The data collection method was passive observation. Two experts tested validity and reliability instruments of *jobsheet* contents using *Content Validity Ratio* and counted by using *Content Validity Index* (Lawshe, 1975:567).

The higher the CVR, the more important the validity was (Hendryadi, 2017:173). According to Lawshe, the formula is:

$CVR = (n_e - N/2/(N/2)$

Where:

CVR = *Content Validity Ratio*

N_e = the number of members of panelists who answered importantly

N = total panelists

Reliability test used Kappa coefficient according to Anthony J. Viera and Joanne (2005:360), whereas interpretation of Kappa value was based on Landis and Koch (1977:165) pursuant to the following Table:

Table 1. Kappa Interpretation

Kappa Statistic	Strength of Agreement
<0.00	Poor
0.00-0.20	Slight
0.21-0.40	Fair
0.41-0.60	Moderate
0.61-0.80	Substantial
0.81-1.00	Almost Perfect

The effectiveness was tested by *quasi experiment* with *two-group pretest-posttest design* using the following formula by Sryabrata (2012:12):

T1	X	T2

Where:

T1 : pretest

X : treatment

T2 : posttest

To understand difference between control class and experiment after and before the treatment, the collected data were tested by *independent t-Test* criteria of 5% significance interval. High-low category of learning results were as shown in the following table:

Class interval:

Maximal score = 4/4 x 100 = 100

Minimal score = ¼ x 100 = 25

Score range = 100 – 25 = 75.

The number of criteria (*Rating Scale*) = 4 (very good, good, poor, very poor)

Interval class length = 75:4 = 18.75 (19)

Table 2. Category of Results of Rectangular thread Lathing Learning

Interval	Category
83 – 100	Very good
63 – 82	Good
44 – 62	Poor
25 – 43	Very poor

The practical was tested through a positive response test using the following formula (equation):

Positive statement percentage (%)

$$\frac{\text{Total Practical Responses}}{\text{Total items}} \text{ x } 100\%$$

$$\frac{\text{Total Non - Practical Responses}}{\text{Total items}} \text{ x } 100\%$$

According to Ni'mah et.al (2017:354), practical test is said practical if students' responses achieved >61%.

Table 3. Practicality Interpretation

Mean score	Category
0% - 20%	Poor
21% - 40%	Sufficient
41% - 60%	Sufficiently good
61% - 80%	Good
81% - 100%	Very good

RESULTS AND DISCUSSION

Results of *Jobsheet* Content Validity and Reliability

Jobsheet content validity conducted by two raters of 8 indicators with 18 items showed the following results:

Table 4. Content Validated by 2 Raters

No	Indicator	Items of rating		Rating by Validator		CVR
				1	2	
1	Title	1	a. Title is written clearly	1	1	1
		2	b. Title is consistent with competency	1	1	1
2	Achievable competency	3	Achievement of competency is written clearly	1	1	1
		4	b. Indicator of competency achievement	1	1	1
3	Tools and Materials	5	a. Tools are written clearly	1	1	1
		6	b. Tools used are consistent with need	1	1	1
		7	c. Materials are written clearly	1	1	1
		8	d. Materials used are consistent with need	0	0	0
4	Working Instruction	9	a. SOP is written clearly	1	1	1
		10	b. Working time is written clearly	1	1	1
		11	c. Manual of occupational safety	1	1	1
		12	d. Instruction to regulate speed	1	0	-1
5	Supportive Information	13	a. Figure shows tolerance	1	1	1
		14	b. Figure is consistent with competency	1	1	1
6	Working Steps	15	a. Working steps are written clearly	1	1	1
		16	b. Figure of working steps is written clearly	1	1	1
7	Task	17	a. Task is written clearly	1	1	1
8	Rating	18	a. Rating sheet is written clearly	1	1	1
CVI						0.83

$$CVI = \frac{\Sigma CVR}{\text{Total items}} = \frac{15}{18} = 0.83$$

The *Content Validity Index was* 0.83 > 0 (criteria of CVR) and therefore the *jobsheet* development in this study can be considered as high validity.

The results of content reliability of 2 raters with kappa coefficient used cross tabulation was as shown in the following table:

Table 5. Rating of Rater 1* Rater 2

		Rater 2		Total
		0	1	
Rater 1	0	1	0	1
	1	1	16	17
Total		2	16	18

Table 6. Kappa value coefficient

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Measure of Agreement	Kappa	0.64	0.326	2.91	0.004
N of Valid Cases		18			

The Kappa coefficient value was 0.64 > 0. This result showed agreement between rater 1 and 2, and significance interval was 0.004 < 0.05, meaning the agreement is consistent between raters 1 and 2.

Results of effectiveness

The results of *pretest* and *posttest* learning was as shown in the following table:

Table 7. Results of *Pretest* and *Posttest* Learning

Data	Group	Min value	Max value	N	Mean	Std Deviation	t_{hitung}	Sign (2 tailed)	Criteria
Pretest	Experiment	55	75	10	67	5.37	0	1	Not really different
	Control	55	75	10	67	5.37			
Posttest	Experiment	70	85	10	80,5	4.38	6,17	0	Really different
	Control	65	75	10	68,5	3.94			

The results of *pretest* learning indicated the initial compositions of students had the same mean value in the experimental and control classes. Nevertheless, the *posttest* value showed the experimental class of learningwas higher than control class. For details see the following figure:

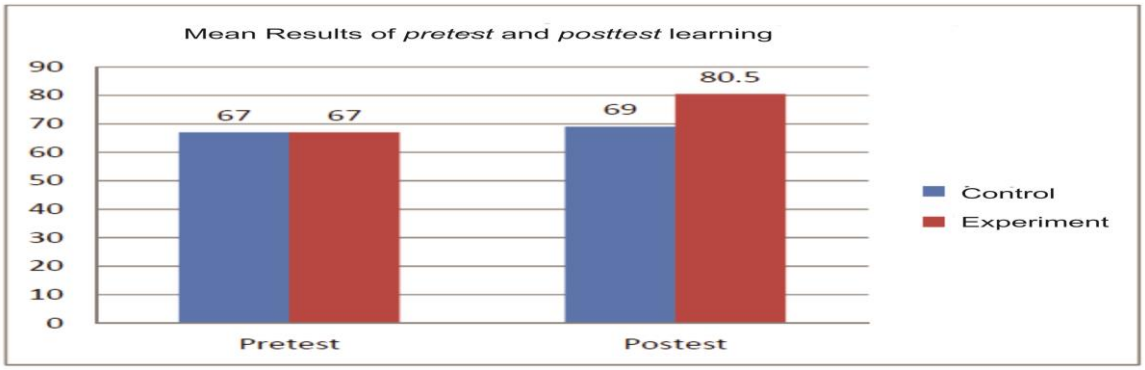

Figure 2. Results of *Jobsheet* Practicality Responses

The results of practical and non-practical responses obtained in the experimental class were as follows:

Table 9. Mean Practical and non-practical Responses of Experimental Class

Class	Mean	
	Practical	Non-practical
Experiment	98%	2%

Of students' responses concerning *jobsheet*, development results show mean percentage of 98% > 61%, and therefore the *jobsheet* may be considered practical.

Discussion

The results of *jobsheet* development were tested for validity by 2 experts stating the title, achievable competency, working instruction, supporting information, working steps, task and rating were feasible. This is because the title was consistent with basic competency taught and written clearly in title cover of *jobsheet*. The achievable competency presented technical procedure to lathe the rectangular thread. The information presented a working drawing completed with 2D and 3D figures for students to understand the product produced. The working drawing required tolerance to ensure students trained with accuracy. The working steps presented a way to set lathe machine of rectangular thread with colorful images for students to easily understand each process.

The task presented questions where student made observation from literacy summary on work coarseness. The tools and materials were invalid since they did not present the necessary materials such as coolants and gave incomplete procedure in regulating the cutting speed to lathe the rectangular thread.

The results of reliability test using kappa coefficient of 2 raters gave results with a constant of 0.64 or with substantial category. It was found reliable (consistent) in title, achievable competency, tools and materials, working instruction, supporting information, working steps, task, and rating. According to Utami et.al (2006:4), the kappa value of 0.69 was obtained by panelists. The outcome of the agreement were used as measures in determining Malaria *Falciparum.*

From the analysis of learning to lathe the rectangular thread, the results of development between control and experimental classes had competency with a mean value of 67, and the lowest and highest values were 55 and 75 respectively. This was because the *jobsheet* used produced working drawing shape without clear structure, low competency to lathe the rectangular thread, limited understanding on the relationship between cutting speed, feeding speed, thread chisel dimension for shaft and nut, and the students' ignorance to occupational safety.

After developing *jobsheet* consistent with basic competency, appropriate structure, and working instruction could regulate the speed. The case study of literature analysis was included in the *jobsheet*, tolerance inclusion, and working drawing to train students' accuracy and improve their competency. In addition, study by Putro et.al (2016:1) suggested the use of *jobsheet* could improve students' competency from 61% to 80%.

The rating of realism with practical and non-practical response were 98% and 2% respectively. According to Ni'mah et.al (2017:354), if positive response ≥ 61%, the developed *jobsheet* could be considered good. In terms of the ease to use, students understood what was meant in *jobsheet* where its language was easy to understand. There were instructions and figures which were easy to understand and imitate and the measure of *jobsheet* was consistent with pocket book and therefore it was easy to take everywhere and anytime.

In terms of usage, students could lathe the internal and external rectangular thread. This was proven by the results of rating and students could learn independently by understanding and (practicing what were included in the *jobsheet*.

On efficiency in learning, students were not given demonstrations even with one lathe, but were required to learn independently by reading the content of the *jobsheet*. If a student did not have understand, the teachers' role as facilitator to bridge problems facing the students could be effected. According to Siswanto et.al (2016:130), practicality can be achieved in the following ways (1) if learning could take place effectively, (2) studies are focused on students, (3) if necessary equipment was available, and (4) if there was good interaction between teachers and students.

CONCLUSIONS

According the results and discussion, *jobsheet* of basic competency to lathe the rectangular thread was valid and reliable for content. This was according to rating by the experts and effectiveness in improving the competency, and the practicality according to students' response. The developed *jobsheet* guides students while practicing and prompt teachers to support and maximize their role as facilitators.

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