

Development of Job Instruction on Student Readiness in Carrying out Internship in the Automotive Engineering Skill Competency

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Abstrak. One of the Ministry of Education and Culture strategies to realize quality and industry-recognized vocational education and training for the Industrial Revolution 4.0 is to provide opportunities for students to carry out industrial work practices or project work with business and industrial world (DU/DI). In practice, vocational students in automotive engineering skill competency tend to be unprepared which results in ineffective internships. This development research aims to formulate the need for job instruction which is oriented toward the readiness of students to carry out an internship program in which there are basic components of instruction and preparation, understanding, testing and participation stages, and follow-up. The readiness of students includes knowledge, skills, and attitudes. Research development uses the ADDIE development model procedure, namely (1) Analysis, (2) Design (3) Development, (4) Implementation, (5) Evaluation. This study aims to: 1) Develop job instruction, 2) Know the feasibility of job instruction, 3) Know the effectiveness of job instructions; 4) Know the increase in student readiness before carrying out internships. The feasibility test obtained a score of 3.63% with a very feasible category. Practicality of 92% with a very practical category. The job instruction that was developed was also tested for its effectiveness with an N-Gain value of 78% which means it is effective and the result is a student readiness level of 84.47% in the ready category. The results of this development research show that job instruction has a positive effect on student readiness and can be used at the stage of industrial work practice debriefing of Automotive Engineering Skill Competency.

Key words: Job Instruction, Industrial Work Practices, Readiness of students.

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INTRODUCTION

One of the Ministry of Education and Culture strategies to realize quality and industry-recognized vocational education and training for the Industrial Revolution 4.0 is to provide opportunities for students to carry out industrial work practices or project work with business and industrial world (DU/DI).

Work practice activities in the world of work, known as industrial work practices (prakerin) provide opportunities for students to gain competencies that are not obtained at school. They get knowledge about developments that occur in the industrial world, and insight into the workforce. Through this internship, students are expected to get hard skills and soft skills so that they are ready to face the workforce. Job readiness is characterized by the extent to which prospective graduates possess a set of technical skills and soft skills (Hossain et al., 2020).

Internship (Prakerin) influences student work readiness. Students gain real experience of knowing the workforce, and apply all the knowledge they get at school according to their competencies (Lestari & Siswanto, 2015).

However, in reality the skills that have been learned are sometimes not in accordance with the needs of the industrial world (Novita, 2022). Work competencies that are not in accordance with the industrial world can be seen when students carry out the prakerin. Kuat & Kristiyanto (2020) in their research stated that the suitability of work competence and industrial culture of students who carry out internships in official workshops is still lacking. Atmawati et al., (2017) stated that prakerin would be effective if it is industry-based.

Based on the observations, the work done by students during internships is still limited and irrelevant to their expertise. Students are not fully able to apply the knowledge and skills learned in school. The reality in the field is that there are still many students carry out prakerin not optimally. Students have not been able to carry out a specific task using tools (hard skills), information and work procedures that are commonly carried out, and show performance with measurable quality. In addition, students have not had basic operational knowledge and real knowledge in specific work areas. Because

of that, they cannot choose solutions to problems that arise in order to be responsible for their own work.

Students who have not had soft skills make the implementation of *prakerin* to be ineffective. Lack of communication and adaptation skills causes students to just sit and wait for orders from mechanics without paying attention to the work being done. Sometimes the industrial world feels disturbed by the existence of internships because the mechanics who work must also guide students.

Another thing that is often encountered during *prakerin* is that students are still confused about what to do, are unfamiliar with the vehicles that will be worked on, both the problem of component layout and the technology used in these vehicles. This is a natural thing if the industry provides basic jobs for students because the industries have not known the capacity and competency of students. Students who practice are people who are just learning about these jobs so they must be taught, and their work must be supervised.

Collaboration with industry in designing curriculum is urgently needed to increase student work readiness (Hossain et al., 2020). *Prakerin* learning is work-based learning because all activities carried out by students are applying the theory obtained at school to activities in the field.

The effectiveness of implementing the *prakerin* program depends on cooperation with industry. The implementation of *prakerin* through collaboration between schools and industry consists of planning, mentoring and *prakerin* assessment (Ramadhan et al., 2021). The *prakerin* objectives were not achieved because the students' competencies were not optimal, vocational education never invited industry to integrate competencies according to industry qualification standards, lack of provisioning roles, and no structured evaluation exams (Sugiyarto, 2020).

Technical guidance is a very important part

of providing skills before students carry out *prakerin*. Intensive training is provided in the form of basic vocational skills training and expertise programs based on specifications for types of work in the industrial world and an understanding of supporting theories. Training is a pattern or concept that becomes a reference in the implementation of out-of-school training that emphasizes practice and competence and requires reference guidelines that can be used to carry out an activity in order to achieve the expected goals.. (Trisetiyanto et al., 2019). Tripathi, R., & Chaurasia, K. (2014) explained that there are 5 steps to implement the training prior to *prakerin*, namely: 1) analyzing the work and skills to be learned, 2) preparing instructors 3) Preparing training materials, 4) Establishing cooperation with industry, 5) Evaluating and making updates.

One of the companies where automotive SMK students do internships is at PT. Nasmoco which is under the auspices of Toyota. This company uses job instructions for new employees who do not have work experience. This can be used as a reference as a basis for the development of job instructions for automotive SMK. It is necessary to develop a job instruction program for *prakerin* programs because it will have an impact on the work readiness of students when carrying out *prakerin*. In order to obtain an effective, efficient and practical job instruction, it is necessary to carry out a job instruction model for *prakerin* program in the automotive engineering skill competency.

METHODS

The research method used in the present study is development research to validate job instructions which are developments from existing products. The research steps used adopted modifications from Borg and Gall and Sukmadinata through 3 stages, namely: (1) Preliminary study, (2) development and design of job instructions, (3) validating job instructions.

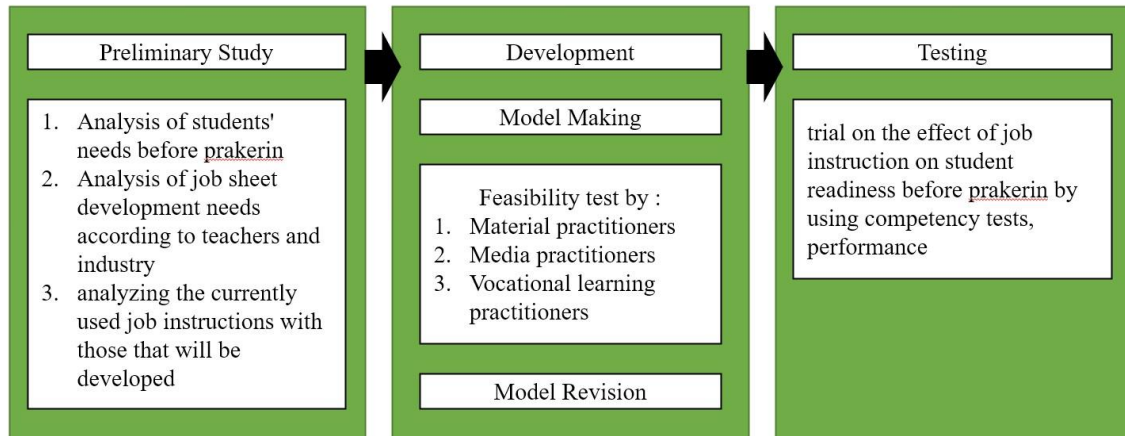


Figure 1. Research Steps

The development model used in this development is ADDIE. The model consists of a five-stage design framework. Those stages are analysis, design, development, implementation

and evaluation (Onguko et al., 2013), In order to minimize errors and encourage continuous improvement, revisions after each stage are suggested.

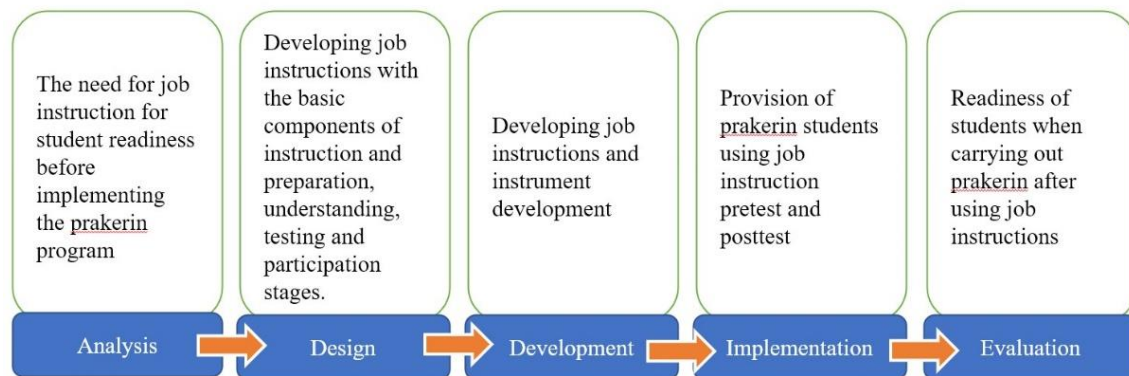


Figure 2. ADDIE Development Model

RESULTS AND DISCUSSION

Implementation of Job Instruction Development with the ADDIE Model

The development model used in this research is the ADDIE model, with the stages of analysis, design, development, implementation, and evaluation. Based on the research and development that has been carried out, the following research results were obtained:

Analysis

The initial stage carried out in this research is Analysis. In the analysis stage, an analysis of the needs of job instruction and an analysis of increasing the readiness of Vocational High School students (SMK) competence in Automotive Engineering before carrying out *prakerin* are done. Based on the observation and interview data, it was found that the analysis of the needs for developing job instruction is as

follows: (1) Analysis of the problem of students readiness during *prakerin* who do not master the knowledge, skills and attitudes in accordance with the industrial world. This is because the learning materials have not been adapted to the needs of the industry; (2) The need for job instruction to be developed will assist teachers in preparing student competencies consisting of the basic components of instruction and preparation, understanding, testing and participation stages, and follow-up; (3) Determining topics used as contents of job instructions in accordance with industrial needs, namely work on periodic maintenance of 10,000 km; (4) Basic Competencies and achievement indicators according to school and industry curriculum.

Based on the needs of students to be ready to carry out *prakerin*, a job instruction is needed. It provides guidance on the knowledge, skills and attitudes that must be possessed during *prakerin*.

Therefore, job instruction on prakerin program is developed to increase students' readiness to carry out prakerin.

Design

The second stage of the ADDIE development model is the design stage. The design stage is carried out to make it easier for researchers to design the job instructions that will be compiled. The design stage includes the criteria for preparing the job instruction framework, collecting and selecting references, designing job instructions, compiling job instruction response instruments.

The job instruction framework consists of basic instructions and preparation,

understanding, testing and participation stages, and follow-up. Gold, (1982) explained that in making job instructions we must pay attention to what motivates people to learn, the need for students to understand, the importance of participation and feedback, how the application of knowledge complements the learning process.

The design stage includes the criteria for preparing the job instruction framework, collecting and selecting references, designing job instructions, compiling response job instruction instruments.

Table 1 below illustrate the design of job instruction:

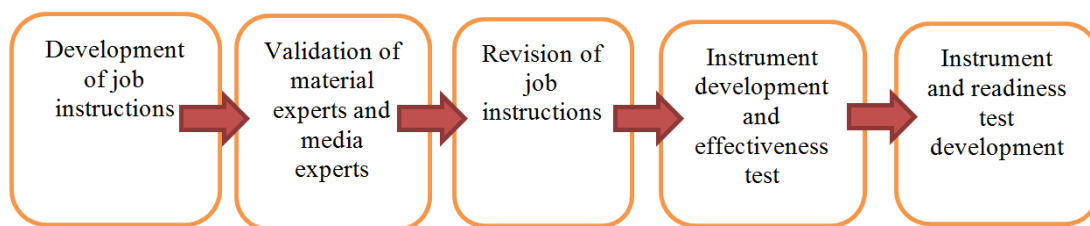
Table 1. Job Instruction Design Stage

Design stage	Design Context
Design Preparation	Cover section Foreword Table of contents User manual for teachers User manual for students Practical material Time schedule Warm-up exercise 5S (5R) Culture Repair Instructions (lifting the vehicle and location of passengers) Repair instructions (before carrying out the inspection) Content section Bibliography
Design	Basic instructions and preparation It contains important points, warnings of tools and materials that must be prepared Understanding It contains material of the work to be performed Trial and participation stage It contains the work procedures of the performed work Follow up It contains Competency test to determine students' abilities which include attitudes, knowledge and skills
Instrumental assessment preparation	the instruments were adopted from the BSNP questionnaire which has been proven valid and then adjusted to the discussion of the prakerin program job instruction

Development

This stage aims to see the feasibility of the

job instructions that have been designed. The development steps are as follows:



Picture 3. Development Stage

IMPLEMENTATION

The implementation or application phase can be done if the results of the expert test (feasibility test) and the practicality test carried out by the user meet the feasible and practical criteria. Implementation is the stage of applying the job instruction program with the respondents. There are 35 students of automotive engineering program at SMK Negeri 1 Kaligondang who were given treatment in the form of giving job instructions before carrying out internship (prakerin). Responses from filling out questionnaires by students are taken into consideration for testing the effectiveness of job instruction. At the implementation stage, instruments are also given to test student readiness. Like testing the effectiveness of job instructions, readiness tests are carried out before and after treatment.

Evaluation

The next stage in R&D research (research and development) is the evaluation stage. At this stage, improvements are made to fix the system by processing the data that has been obtained from the previous stages that have been carried out. The stages evaluated in this stage are divided into two evaluations, namely formative evaluation and summative evaluation. Formative evaluation in this study is related to the feasibility test and practicality of job instructions and summative evaluation in relation to the effectiveness test of job instructions. In the evaluation stage, the data obtained is analyzed to find out the deficiencies of the job instructions to be made, the evaluation results are in the form of suggestions and questionnaires. This evaluation is carried out after the four previous stages in the

ADDIE model have been completed. The evaluation stage is an analysis of the effectiveness of job instructions, if there are no revisions, then the media is suitable for use. The effectiveness of job instruction is analyzed using the t test with a significant value of $0.000 < 0.5$ and the N-Gain test is 77.9.

Feasibility, Practicality, Effectiveness of Job Instruction and Student Readiness Feasibility of Job Instruction

The feasibility test for this module refers to research by (Karend, 2020) which were obtained from filling out a media expert validation questionnaire consisting of two experts at BPTIKP Central Java. Based on the calculation of data obtained from Media Expert 1's responses, the average score is 4.88. It is in the very decent category. From media Expert 2, the average score is 4.81 with a very decent category. The average score of the two Media Experts is 4.84 which is in the very decent category. Based on the results of the Central Java BPTIKP Media Experts assessment, It can be concluded that the job instruction is in the very feasible category.

Based on the results of the feasibility test by material expert, the average score is 3.63. It is in the very feasible category. The results of the material expert validation show that the development of job instruction is relevant and appropriate as a guide for students before carrying out prakerin.

Practicality of Job Instruction

The practicality test was carried out involving users, namely teachers and students. In this study, the results of the practicality test of job instruction are emphasized in the scalability test, the Scalability Coefficient or Ks. The teacher's Ks score obtained is 0.77 and the student's Ks score is 0.89. With the eligibility criteria less than 0.60 (Nazir, M. M., & CIA, C. J. D. B. R., 2005)

The results of the practicality test from teachers and students with an average score of 92% with very practical criteria. It can be stated that job instruction is appropriate to be used as a guide to prepare students before carrying out internship (prakerin).

Student Readiness

In order to know whether there is a significant difference, the Post Test score is used

on the student readiness assessment sheet by using a paired sample t test. Based on the calculation, it is known that the significance score (Sig) is $0.000 < 0.05$. It can be concluded that there is a significant difference between the readiness of students before and after using job instruction. The result of the calculation is that the calculated T value is 15.395 with the T table score at ($df = 34; = 5\%$) is 2.042. Because T count is greater than T table, it can be concluded that there is difference before and after being given treatment using job instruction to increase the readiness of SMK students in Automotive Engineering Skills Competency.

The results of the calculation of the N-Gain score test in this study showed that the average N-Gain score is 84.47, the minimum score is 39.13% and the maximum N-gain score is 94.44%. Based on this result, it can be concluded that the average N Gain score is 84.47%, It can be said that the use of job instruction can increase students' readiness before prakerin.

DISCUSSION

This research and development resulted in the final product in the form of job instructions for students in Vocational High Schools (SMK), especially in the Automotive Engineering Expertise Program. The main purpose of learning to use this job instruction is to increase the efficiency and effectiveness of debriefing activities before students carry out internship (prakerin). Job Instruction is designed to produce products that are feasible, practical and effective to be used as a reference to equip students in terms of knowledge, skills and attitudes according to industry needs.

The first stage of development research is the analysis stage which includes analysis of media needs which is carried out by observation. The purpose of the observation is to find out the product, namely in the form of job instruction needed in preparing students before internship (prakerin). Based on observations of the problems that arise in preparing students before carrying out learning internships in schools that are still conventional in nature and not in accordance with industrial work standards, there is no competency synchronization with the industry, student readiness in terms of knowledge, skills and attitudes needed when carrying out internships is not yet in accordance with the industrial world and there is no job instruction as a guide that can make students ready to carry out prakerin. It is needed the job

instruction that fits the needs of students, contains understanding, students do work directly through participation and there is feedback in the form of follow-up.

After doing the analysis, the next stage is designing the job instruction for prakerin program. The intended design includes the criteria for preparing the framework, collecting and selecting references, and the design/draft design aims to facilitate the process of making job instructions. The job instruction framework consists of basic instructions and preparation, understanding, testing and participation stages, and follow-up. Those components are according to Gold, (1982). He explained that in making job instructions one must pay attention to what motivates people to learn, students' needs to understand, the importance of participation and feedback, how the application of knowledge complements the learning process.

The job instruction framework contains basic instructions and preparation. Learning outcomes that use work preparation sheet learning during practice are better than those that do not use work preparation sheet learning (Dabet et al., 2022).

“Job instructions are written statements about what the job holder is doing, how it is done, under what conditions it is done, and why it is done. It should accurately describe the job content, environment and working conditions” (Robbins, 1996)

Patrick Graupp & Robert J. Wrona defined Job Instruction on their book “The TWI Workbook: Essential Skills for Supervisors” (year 2006), as the simplest way to instruct employees to make sure they remember and do their job properly, safely, and effortlessly.

According to Herbart in De Jong & Versloot, (1999) job instruction method consists of 4 steps. Those steps are “preparation (show), presentation (tell), application (do), and inspection (check).” Furthermore, O de Jong stated that in order to make job instructions, it is necessary to analyze the type and purpose of the work. Job Instruction must pay attention to the quality of work, work procedures, work processes and problem solving, and maintenance of worker qualifications. Evaluation determines the effectiveness of training. (DeVaughn, 2022)

Toyota uses job instructions in instilling the values that exist in work competency. Toyota uses Job Instruction to improve employee work competency in the workplace. Development of job instruction in learning by practicing work

according to the actual work and workplace. Toyota uses job instructions with three main techniques to analyze important points and outline jobs. Work should be broken down into manageable training chunks so that important information can be effectively transferred. Second, the job instruction method is also known as the four-step method. The four steps are preparing students for presenting, operating, testing performance, and following up. Third, Toyota uses Job Instructions to assess work competency as a basis for increasing worker careers (Meier, D. P., & Liker 2005).

the development of job instructions is not only paying attention to the methods used and the knowledge but also skills and attitudes that must first be synchronized with the industry. Competency that is in accordance with industrial needs that must be mastered by students is periodic maintenance of 10,000 km.

The fourth stage is the implementation stage (application). Implementation is the stage of applying job instruction to automotive expertise competency students who will carry out prakerin that consists of 35 students as respondents. The end result of this development research is job instruction for prakerin program.

The feasibility study on the results of the module development is based on the results of the assessment sheet for the responses of Media Experts, namely from BPTIKP Central Java and Material Experts from experts in the automotive field, while in the practical test the effectiveness test and creativity test are carried out by the users of the module. The validity of the development result module studied in this study includes content validity in the form of suitability between the concepts presented and theories and construct validity, namely the suitability of the transformation or translation of concepts and theories into an operational form Golfashni (2011). The validity of a product as a result of development can be determined based on the results of validation activities (Azwar, (2014).

The next stage after the validation test is carried out, it is concluded that job instruction has become the final product and is very feasible to use to increase student readiness before implementing prakerin. The conclusion about the feasibility of job instruction is obtained from the validation results of two media experts and three material experts. At the validation stage, media experts refer to research by Azizah et al.,

(2020) with an average score of media validation results getting a score of 4.79 with very feasible criteria.

Material Expert Validation, who is an expert in the automotive field. The results of the validation of material experts based on the content feasibility aspect get a score of 3.33 with very feasible criteria, the presentation feasibility aspect gets a score of 3.67 with very feasible criteria, the linguistic feasibility aspect gets a score of 3.62 with very feasible criteria, contextual scoring aspects get an average score of 3.85 with very feasible criteria and the average of all aspects in the material validity test obtained a score of 3.62 with very feasible criteria. The main purpose of using job instruction is to equip students to be ready to carry out work in the industrial world when carrying out internship (prakerin). The basic aim of Job instruction is to equip anyone with the required skills in the shortest possible time which ultimately helps companies to improve their skills. The job instruction process has helped students become more skilled in a shorter time and is also beneficial for teachers to teach effectively (Tyagi, 2021). The readiness of students to carry out practical work is influenced by the way teachers teach in class (Knight, 1997).

Student work readiness is formed because of understanding or knowledge (Kurniawati & Arief, 2016). Work readiness or work competence is the work ability of people which includes aspects of knowledge, skills and work attitudes in accordance with established standards (Law No. 13 of 2003 about Manpower). There are many factors that affect the work readiness of vocational students, according to Gunawan (2000:64-68) work readiness is influenced by factors of knowledge, skills, and mental attitude. The knowledge and skills possessed by SMK students can be seen from vocational competence. Meanwhile, in terms of mental attitude, we can see from the self-efficacy of vocational students (Pangastuti & Khafid, 2019)

Increasing student readiness including knowledge, skills and attitudes can be measured by using the N-gain test. There are three categories of improvement, namely: categorized as high if $(g) > 0.7$, categorized as moderate if $0.3 < (g) < 0.7$, and categorized as low if $(g) < 0.3$. The results of the calculation of the N-gain test can be seen as follows:

Table 2. N-Gain test Result

Indicator	Pre test	Post test	g	Gain Criteria
Attitude	56.32	69.83	0.309	Moderate
Knowledge	44.44	66.48	0.396	Moderate
Skill	77.16	90.79	0.84	high

Based on the analysis, the results of the homogeneity and normality test of the data obtained were normally distributed and homogeneous. Therefore, it fulfills the requirements to test the hypothesis using the t-test. In this study, the type of t-test used was the paired sample t-test. This type is used because the hypothesis to be tested is a correlated sample. This t-test was conducted using SPSS. The hypothesis to be tested are as follows:

H0: There is no difference in the level of readiness of students at SMK N 1 Kaligondang before and after using job instruction.

H1: There is difference in the level of readiness of students at SMK N 1 Kaligondang before and after using job instruction.

Based on the results of the analysis, the value of Sig. (2-tailed) of 0.000 which means the value of $0.000 < 0.05$. Based on the guidelines for Sig. (2-tailed) < 0.05 then H0 is rejected and H1 is accepted. So that there is difference in the level of readiness of students at SMK N 1 Kaligondang before and after using job instruction.

CONCLUSION

The Job Instruction for internship (prakerin) program can increase the readiness of Automotive Engineering Vocational High School students to carry out prakerin because it contains the basic components of instruction and preparation, understanding, trial and participation stages, and follow-up. The intended readiness of students includes knowledge, skills and attitudes.

Based on the responses of several experts, it shows that the job instruction program for prakerin programs is appropriate to be used as a guidance for providing knowledge and skills for students before carrying out prakerin.

Based on the results of user responses, namely teachers and students, module is in the practical category. It means that the job instruction can be used to support the implementation of prakerin in the Vocational High School Automotive Engineering Expertise Program.

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