

# Development of Learning Module Work Competence Integrated Character Value of Electricity in Vocational High School

Riana T. Mangesa and Gufran Darma Dirawan

*Electrical Education Engineering Department, Makassar State University,  
Makassar, Indonesia.*

## Abstract

The purpose of this research is to develop learning modules based work competence integrated character value on vocational education. Learning module is one of several product development research subjects learning models for Electrical Installation Practice I. The research method was designed using the approach of Research and Development (R & D). The research refers to the stage of the modified Borg & Gall models into five stages, namely,

- (1) a needs analysis to identify work competence;
- (2) design and development;
- (3) validation;
- (4) testing and
- (5) evaluation.

Data analysis was done descriptively. Sampling at three Vocational High School Technology in South Sulawesi, namely, SMKN 1 Tallasalapang, SMK T Gowa and SMKN 5 Makassar. Subject trials consist of: (a) the student installation engineering expertise Class XI who are following subjects of the electrical installation and (b) teachers for electrical installation expertise. The results showed,

- (1) description of the achievement of overall competence of learners is very high;
- (2) demonstrate competency-based learning modules work fulfills the feasibility and effectiveness in terms of both theoretical and empirical terms.

**Keywords:** Module, Integrated Learning Competency.

## INTRODUCTION

Various problems indicate that the weakness in the education system in some vocational high school (*Sekolah Menengah Kejuruan/S-M-K*), adversely affects the competences of the learners and the lack of character values in the learning process. Is the case that the planned educational goals in the Strategic Plan 2015-2019 Year of the teacher. The teachers do not only expected to teach the intelligence to students but also the values of personality, morality, honesty, creativity and responsibility, which has not been implemented to the fullest, (Ministry of education and culture, Kem-dik-bud,2015). \* 7  
The development of science and technology (Science and Technology), as well as the global era of education, because the need of student to prepare a competent workforce that can compete. Adjustment competency needs of business and industry, and the integration value of the character, requires planning appropriate curriculum learning system and the phenomenon of science technology development.

The curriculum should be directed to the knowledge of practical / pragmatic and responsive to community needs. According Baswedan.A (2015) \* 2, SMK be one solution to the problems of education in Indonesia. Vocational High School is not just a place to educate, but also to promote the progress of a regional center. The construction of Vocational High School must be in accordance with the potential in the region. Therefore, the potential of skilled workers in the region should be improved.

The effectiveness of learning in vocational achieved if the method or approach of learning for the environment and the characteristics of students. Because only the teacher knows more characteristics of students they teach. Learning becomes effective when the learning is process able to provide or supplement the information or new knowledge for students, Muchith (2008: 6) \* 9. Planning an effective learning system is a plan that can be applied to any subject, either in the form of learning theory and practice. Things to consider in practice learning, are:

- (1) efforts to optimize the environment to create learning conditions for students, changing behavior, such as environmental organization, as an organization that is alive;
- (2) efforts to prepare students to be good citizens.

In relation with the regulation of National Education Standards Agency (NESAs) No. 0031 Year 2014/2015 and Decree of NESAs No.0031/P/BSNP/III/2015 on Standard Operating Procedures and national exams, it is functionally apparent that the need for competence in vocational education is a structure that has manifested itself in vocational curriculum. Implementation of the curriculum is an activity related to the management of the learning process, namely, (Peraturan BNSP, 2015) \*11

- (1) identifying and selecting instructional materials;
- (2) develop quality teaching materials and
- (3) develop individual learning packages.

Finch & Crunkilton (1999: 258) \* 6 state that competence includes tasks, skills, attitudes and appreciation must be owned by the students to be able to carry out learning tasks in accordance with specific tasks. Therefore, for the development of the curriculum in instructional practices based on competency, carried out development refers to the Law No. 20 of 2003 article 36, concerning the development of the curriculum at the National Education Standards \* 12.

The formation of character values applied to the engineering environmental factors on the subjects of practice through competency-based learning approach. Because the subjects of

practice learning occurs in three areas of competence, namely cognitive, affective and psychomotor. With an emphasis on the values of accuracy, honesty, creativity and responsibilities as the formation of an attitude (attitude).

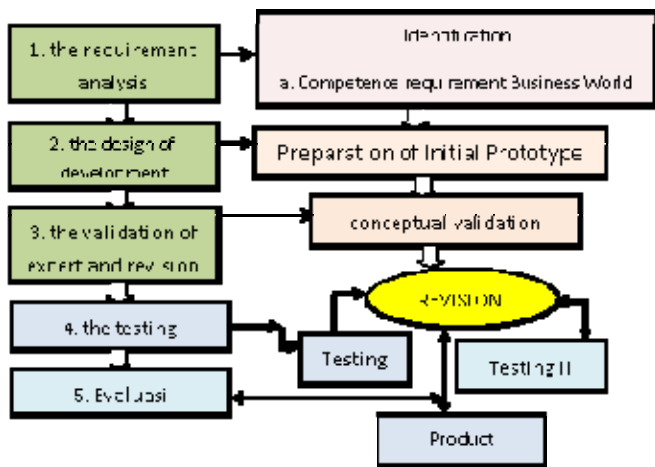
In addition with the development of character education, learning principles used are the laying and introduce the character values in the learning plan (*Rencana Pelaksanaan Pembelajaran/R-P-P*). Therefor achieving the goal of cognitif,affective and psychomotor integrated in decision making by students through the stages identify, assess and determine options through the process of thinking, behave, and doing something.

**RESEARCH METHODS**

This type of research is the Research & Development (R & D). According to Borg and Gall (1983: 772) \* 3 phase models of R & D can be used to develop and validate the products in educational research. Therefore, this study refers to the stages of R & D is a modified form the five stages, namely,

- (1) the requirement analysis;
- (2) the design of development;
- (3) the validation of expert and revision;
- (4) the testing; and
- (5) evaluation.

Research framework that has been modified is shown in Figure 1.



**Figure 1:** Research framework

Needs analysis conducted to collect data to identify competency Business World/Industrial World through workshops with the Electrical Contractors Association of Indonesia Branch Makassar. Validation phase activities conducted by a team of subject matter experts conceptually and practitioners by teachers and lecturers of Diploma in focus group discussion (FGD).

The testing stage conducted through sampling at three Vocational Technology High School in South Sulawesi, namely Gowa Vocational High School, Vocational High School 1 Palangga and Vocational High School 5 Makassar, on the class XI who are following subjects of the electrical

installation and the teachers for the electrical installation expertise.

Furthermore validation of the instrument carried with assessment score of one (1), two (2), three (3) and four (4), interpreted into the category of the validity of every aspect assessed, with the determination of the validity of the criteria for categorizing the quality of the instrument refers to Djemari Mardapi (2008 : 123) \* 5, modified as needed as follows:

**Table 1:** Types and Sources of Data Research

Data Types	Data source	Detail	
Profile of Competency workforce electricity field, ( <i>Workshop Dacum</i> )	electricity expertise from AKLI & PLN	11 people	
	Expert facilitators College	3 people	
Competence and learning needs, (Questionnaire results Identify competencies and learning requirement in schools)	Vocational high school students	Vocational high school 5 Makassar Vocational high school 1 Pallangga Vocational high school Talasalapang Gowa	12 people 30 people 26 people
	Electricity Teachers		5 people
	Profile Competence & Learning (FGD results)	Electricity Teachers Electricity lectrure of D3 programs	10 people 6 people
	Validity devices and instruments	Expert & Education Practitioners Electricity Teachers	5 people 8 people
Test Model I is limited to small groups	Vocational high school 5 Makassar		12 people
	Vocational high school 5 Makassar		2 people
Test Model II extended to large groups	Vocational high school 1 Pallangga		30 people
	Vocational high school 1 Pallangga		3 people
	Vocational high school Talasalapang Gowa students		26 people
	Vocational high school GowA teacher		3 people

**Table 2:** Validity Categorization Value

No	Category	Value
	Valid	$M + 1.SB_x \leq X$
	Fairly Valid	$M \leq X < M + 1.SB_x$
	Less Valid	$M - 1.SB_x \leq X < M$
	Invalid	$X < M - 1.SB_x$

Specification:

M = the mean score for each aspect assessed

X = scores for each aspect rated X

SB<sub>x</sub> = Overall standard deviation score

**RESEARCH RESULTS**

**Needs Analysis Results**

Profile Competence Building Electrical Installation Simplified, shown in Table 3 below.

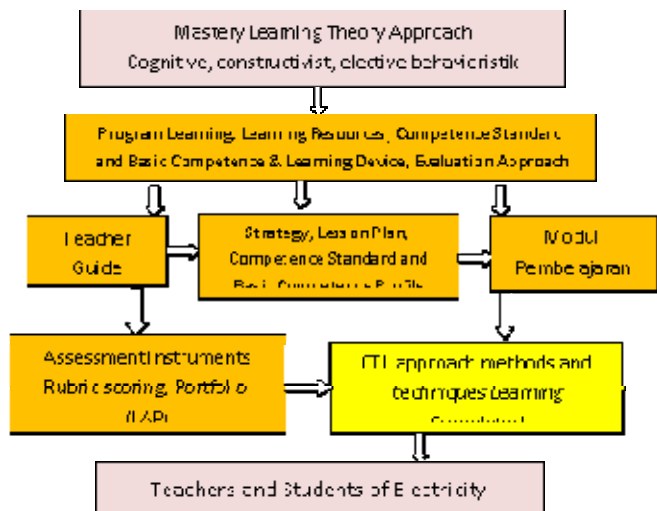
**Table 3:** Profile Competence Building Electrical Installation Simplified

No	Basic competencies
1.	Application of Occupational Safety and Health
2.	Installing Electrical Installation 1-Phase
3.	Installation of Panel Distribution
4.	Installation of Earthing

**Results Design Prototype Development Learning Model**

The results of the design are:

- (1) analyze the learning needs produced in the FGD, to determine the standard of competence and basic competences in electrical installations learning programs;
- (2) instructional design for the implementation of learning activities;
- (3) develop components lesson plan, develop material in the learning modules, developed a material assignment and evaluation of learning outcomes;
- (4) designing assessment instruments.



**Figure 2:** Model of Prototype

Teacher's guide contains the description of the module, component models and learning activities. In the book described the rationalization of the development of the model, stages of development, the characteristics of the model, learning materials, implementation guidance, assessment guidelines and scoring rubric learning.

Learning module (teaching materials) is designed to assist teachers in complete learning and support of students independent learning, mastering the material and achieve competency formed in three areas, namely: knowledge, attitudes and skills.

**Results Validation Prototype Conceptual Model of Learning**

The validation phase Competence Standard and Basic Competence by a team of subject matter experts conceptually and validation of education practitioners by teachers and lecturers in the level of D3 in a focus group discussion (FGD). Results of FGD activities become revise the draft recommendations Competence Standard and Basic Competence, modules and lesson plans.

**Table 4:** Competence Standard and Basic Competence Building Electrical Installation Installing Simplified

Standard Competence	Basic Competence	Indicators of Competence Achievement
1 Occupational Safety and Health	Applying Occupational Safety and Health	understanding the application of the rules work in accordance with occupational health and safety procedures in the workplace
		Responsible to check on the First Aid box
		Can implement standards and electrical rules
		Discipline wearing work clothes, as long as doing the work
		Meticulous in applying the rules on collateral does not happen failures in the work
2 Installing Electrical Installation	Installing Electrical Installation 1-Phase	Being able to use the gauge occupational safety and health for the security and reliability of the system
		Responsible for checking the function of process equipment usage procedures of occupational safety and health
		Interpret engineering drawings and installations
		Being able to calculate the cross-section and number of cables in the pipeline.
		Meticulous in installing the pipe in accordance with the design layout in the image one line.
Being able to discern the installation of single phase outside walls and inside walls		
Being able to construct the light armature wiring,		

		fittings, light point following the installation regulations.
		Discipline in installing socket-outlets and switches according to the rules.
Installing Panel distribution for 1-phase		Being able to implement procedures panel distribution assembly and wiring For a single phase.
		Thorough check the correctness of a current-limiting component and panel distribution box.
		Being able to assemble a current-limiting component distribution panel
		Responsible conduct wiring distribution panel according to standards
Instal the Earthing installation		Can prepare construction wiring earthing
		Can demonstrate the installation procedure installation earthing system
		Careful selection of the value of the electrode and resistance grounding system installations
		Discipline in showing completeness electrode equipment according to the rules
		Being able to assemble the installation of earthing with implementing rules and procedures Occupational safety and health.

The results of the validation sheet instruments are computed using the Excel program is the average score of the three assessment validator. Results of the instrument were analyzed with SPSS statistical analysis Coeffisien Cohen's Kappa, which is feasible if reliabilitasnya coefficient ( $r \geq 0.70$ ) (Nitko & Brokhar, 2007: 80) \* 10. Furthermore calculated to obtain the average value of each aspect and tabulated into a data summary tables, as follows:

**Table 5:** Summary of Results Validation Instrument Rating

No	Sheets Instrument Assessment	Mean	Coeffisien Cohen's Kappa $\kappa$	Valid ( $3.6 \leq M \leq 4.0$ )	Category
1	Guide Model	3,72	0,83	Valid	Decent
2	Lesson plan	3,69	0,81	Valid	Decent
3	Learning module	3,82	0,84	Valid	Decent
4	Assessment Rubric scoring	3,84	0,82	Valid	Decent
5	Student Response Assessment	3,72	0,84	Valid	Decent
6	Response Assessment Teachers	3,73	0,82	Valid	Decent

**The Teasting Results of Prototype Learning Model**

Testing activities I conducted at Vocational High School 5 with the number of of students 14. Testing activities II conducted at Vocational High School 1 Pallangga by the number of students 30. Before the implementation of test, carried the timing, implementation technical along with teachers and a team of observers. The activities of this test, carried eight meetings by using modules and other learning device.

The assessment criteria used were the assessment scores ranging from one to four, and then categorize the score accordance the value. According Arikunto Suharsimi, (2011: 32) \* 1 using assessment scores, then categorizes scores into categories of assessment, will avoid the inclusion of the element of subjectivity that is in assessor, because it follows the assessment criteria, item by item is not fundamental personal decisions. Scores of assessment criteria and categories are:

- a) score (3.6 to 4) is very good;
- b) Score (2.6 to 3.5) is good;
- c) scores (1.6 to 2.5) is fairly and;
- d) score (1 to 1.5) is less category.

In the Table 6, presented a summary of the evaluation of the small group test, accordance the results of assessment instruments that have been validated and fit for use.

**Table 6:** Summary Data Assessment Learning Device

Instrumen	Average	Category	Specification
Development of Lesson plan	3.58	Good	Revised
Learning module	3.52	Good	Revised
Media of learning	3.52	Good	Revised
Assessment Rubric scoring	3.51	Good	Revised
Average total : 3.53		Good	

Table 6 is a table summary data, which has been analyzed as a whole result of research, it can be concluded that the small group test there are some things that must be revised, since obtaining the average value of each instrument is still below the mean value of four, it is still necessary revisions for the

improvement of the testing II. In addition the stage of large group test carried after revising the results of testing I. Table 7 below is the use of learning modules, accordance assessment instruments that have been validated and fit for use.

**Table 7:** Data Assessment Learning Module

No	Aspects Assessed	Total Item	Results Assessment			
			Evaluator		Average	Category
			1	2		
	Title	2	3.56	3.54	3.55	Good
	Using the Module	2	3.63	3.61	3.62	Very Good
	Learning objectives	4	3.73	3.71	3.72	Very good
	contents of module	5	3.80	3.80	3.80	Very Good
	Time	2	3.78	3.78	3.78	Very Good
	Evaluation of Learning Outcomes	5	3.80	3.82	3.81	Very good
	Use of Languages	4	3.56	3.56	3.56	Good
Total Average					3.71	Very good

Data in Table 7 concluded that the use of test learning modules obtain the overall mean value of 3.71 by category very good. The results of the evaluation assessment sourced from observations of two assessors, when teachers use this module as a practitioner outside of the classroom.

## DISCUSSION

### *Achievement of Competency Profile*

The results of the review of competency requirement through the workshop is a matrix of work competence of the World Business/Industrial World. The results of this competence is the source of information in a focus group discussion (FGD). The participants are educational practitioners 20 people are, 10 teachers of Electricity Vocational High School, 6 lecturers D3 electrical engineering program, 4 facilitators assist the researchers.

Through FGD, it has been collected information to complete the design of data models, namely:

- (a) the required the guidebook and lesson plan development;
- (b) additional material required safety and earthing materials;
- (c) it was revealed that the elements of safety and occupational health competencies and competency elements earthing installation has never been a basic competence in learning, but only superimposed on another competency elements.

### *Achievement of Prototype Model*

Results of development that shows the relationship between the components of the model, such as the module that shows the determination of basic competencies, indicators of competence to be achieved, the learning objectives,

completeness support materials, guidelines and assessment methods, learning approaches used in the learning process.

Other activities as done in the lesson plan through the initial stages, stages core by explaining the content of the module, giving the opportunity to ask, give assignments practices, supervising, checking, guiding and evaluating the final stages guiding concluded the material, giving tests and assignments and follow-up.

Learning resources, teaching materials used show that the learning modules, convey the evaluation process, showing the activities of teachers in determining the success, achieving learning goals, make an assessment on the results of tests designed to achieve competency formulated in the form of measurable changes in behavior.

Tests measuring the success known as Reference Assessment Benchmark, which in this research was developed in the scoring rubric, by specifying criteria for the achievement of competence in a number of category-specific tasks, set before the test (Vienna Sanjaya, 2008: 236) \* 13. Powered Majid Abd (2008:201)\* 8 and the Ministry of Education (2008: 15) \* 4 propose to observe the performance of of students, can use a tool or instrument of the rating scale.

### *Achievement of Validation Module*

Validation carried out twice. It was held on the preliminary draft of the assessment sheet modules. The result of using the SPSS statistical computation, to the assessment sheet Learning Module, demonstrates the value that varies. However, with a mean value between the pair combination validator, obtained a mean kappa coefficient of 0.90. Thus the instrument of learning modules, is said to be valid and reliable at a reliable level of  $0.90 \geq 0.70$ .

### *Achievement of Prototype Testing*

The results of testing I became the basis for the revision of the model along with the devices that were developed as a whole. The results of the discussion after the trials I, a teacher and two observers in Vocational High School 5 Makassar, give some suggestions to revise the modules namely; *firstly*, the revised terms to simplify the structure of the sentence; *secondly*, revision of writing the symbols is captioned; *thirdly*, add a sentence to clarify and support the understanding of the material in the module.

Procedures for implementingof the testing activities is expanded, equally activities on the testing I. The difference is in the subject, because the expanded test was conducted at two different schools with the number of students 56.

The results of testing of use of learning module shows the data of teacher assessment results and observers at the two schools as field practitioners who are experts in their fields. The results of evaluation of the learning module has a mean score overall is very good category. This criterion showed appreciation very high assessment on the modules developed, so that the results of the evaluation found to comply with very good categories used in the learning of electrical installation I.

As a continuation of the conceptual validation of the prototype model is carried out the tests. Through this test identified problems in the implementation process of learning, so that the model can be revised to obtain practical and effective criteria. To determine the effectiveness of study can be

viewed from two aspects, namely, teachers teaching aspect, namely the extent of the learning process can be accomplished and aspects of learners, namely the extent to which the desired learning objectives achieved through a learning process, Muchith (2008:33)\* 9.

Effective learning occurs if the students can respond actively, it can achieve the learning objectives as measured through the achievement of competencies, and classical can be achieved at least 80% of students gain competence individual score greater 70 KMK (minimum criteria for graduation).

Data Table 8 shows the results of the assessment of achievement of competencies on three aspects of cognitive, affective and psychomotor. The data is the result of achievement of competence the two schools as a subject in the implementation of expanded, namely in Vocational High School 1 Pallangga are thirty students, and in Tallasalapang Vocational high school are twenty-six students.

**Table 8:** Data Assessment of Competence Results

Subjek	Aspects Assessed	Results Assessment		
		Highest	Lowest	Average
Vocational high school 1 Pallangga	cognitive	95	79	91.7
	Affective	95	76	91.3
	psychomotor	95	81	91.8
Vocational high school Talasalapang	cognitive	96	75	92.4
	Affective	100	76	89.7
	psychomotor	95	81	93.3

Students as a subject, in Vocational High School 1 and Vocational high school Talasalapang, in using modules, achieving assessment that are described in Table 8 with the highest score = 100, and the lowest = 75 obtained by students in the three aspects of competence, namely cognitive, affective and psychomotor.

Data achievement effectiveness assessment models show the overall average value exceeds the value of the minimum criteria of graduation (SGA) score of 70. This result is measured individually through achievement of competence accordance indicators of learning objectives. This shows very good appreciation of the effectiveness of the model. So based on all the data in the above test results it can be concluded that the product (module) on the development of a competency-based learning model integrates the value of character, decent utilized for meeting the requirements of validity and effectiveness.

## CONCLUSION

Based on the results of research, learning modules as feasible and effective learning in vocational used in the field of electricity. This is demonstrated by the following matters. Firstly, an achievement of competence in a learning process that is used as a whole is almost equal and very high. Teacher gives a score assessment to students through the achievement of competencies according to the criteria in the scoring rubric on all three aspects of competence namely cognitive, affective and psychomotor aspects.

Secondly, achievement the effectiveness of learning modules based on competency to developed, determined by the results of the response students to the module, as well as the learning outcomes of modules by teachers who have been using and gave very good rating. Achievement of assessment with excellent category as a teacher assessment on modules developed shows that the learning module is very decent and effective used.

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