

# Development of Assessment Tools Certification Competency Test in Higher Education

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**Abstract**—This study aims to develop, validate, and measure the feasibility of the assessment tools for competency certification test used in the examination process and competency certification of Diploma III Electrical Engineering students. It is a development model adopted from Educational Design. Data in this study were collected through two groups of instruments, namely development instruments and instruments of assessment tools certification competency test. The development instruments were questionnaires for material experts, assessment experts, and users. Assessment tools certification competency tests were written tests, interview tests, and performance tests. Competitive certification assessment tools Test scores through questionnaires of material experts, product experts, and users. The results of study on assessment tools for competency test devices were obtained from an average score of 3.58 from expert judgment and 3.06 from student ratings for valid aspects, from an average score of 3.57 from expert judgment and 3.08 from student, and acquisition assessment of the average score of 3.40 from expert judgment and 3.18 from student. These results indicate that the assessment tools of competency tests have been determined for the criteria for an assessment tools of competency test. The feasibility test results obtained from an average score of 3.11 with a percentage of 77.69% belonging to the "Good" category.

**Keywords:** *assessment, certification, higher education*

## I. INTRODUCTION

The development of infrastructure in the electricity sector in Indonesia encourages the improvement of the quality of human resources (HR). This is in line with the era of the Asian Economic Community (MEA) which demands competitiveness between groups, organizations and countries in the form of human resource development as intellectual assets. Improving the quality of human resources cannot be separated from the role of education. It means through education it is expected that human resources can develop their potential, so that they become productive human beings. Universities or colleges are formal educational institutions that have a role in producing graduates who are productive and able to apply their knowledge. The contradictory fact that the number of unemployed college graduates is quite significant. The unemployment data released by the Central Statistics Agency as of February 2019 for the Diploma I-III level is ranked second and the bachelor level is ranked third. Seeing the reality, the task of universities or colleges is to

prepare skilled and competent graduates, by aligning relevant learning between institutions and the industrial world.

Follow up on the regulations of the Minister of Education and Culture Number 81 of 2014 concerning Certificate of Companion for Diploma, the higher education institution is required to carry out competency tests and certifications. Several universities in Indonesia have formed Professional Certification Institutions (LSP), namely implementing test institutions and competency certifications that have obtained licenses from National professional certification body (BNSP). The Department of Electrical Engineering Education Faculty of Engineering Yogyakarta State University has a Diploma III Electrical Engineering study program with a concentration in the field of Electric Power Utilization Installation. Currently, Department of Electrical Engineering Education has become one of the Competency Certification Institute for competency test sites from PT. GEMAPEDEKABE and has established LSP P1 to be able to carry out internal competency tests and certifications. The implementation of the certification and competency test require several elements, such as Assessor, TUK, and Assessment tools. These three elements are minimum requirements that must be met to carry out the test and competence.

The problems that exist in UNY LSP P1 are that assessment tools re used to carry out tests and certifications competency have not been developed that. The positions assessment tools in competency test are very important. A good quality of test will be able to measure one's true abilities. [1] says the test results will show the level of competence possessed by individuals according to their actual abilities. The assessment process cannot run well if there are no assessment tools, namely instruments for assessing competencies. These instruments can be in the form of observation demonstration checklists, observations of products or services, portfolios, written questionnaires, list of interview questions, and others. In general, the criteria for competency certification test kits or commonly referred to as assessment tools include validity, effectiveness and practicality [2].

Referring to the competency characteristics of the electricity engineering workforce, the right type of assessment to be developed in competency certification activities is authentic assessment.[3] states that authentic assessment expects learners to understand real-world situations. Authentic assessment is the application of the

essence of knowledge and skills. According to Nitko & Brookhart [4] that authentic assessment includes structured tasks, performance tasks, projects, portfolios, demonstrations, experiments, oral presentations, and simulations. According to Ormiston [5] explained that authentic assessment consists of various assessment techniques. First, direct measurement of student skills related to long-term educational outcomes such as success in the workplace. Second, authentic assessment requires extensive involvement of students and lecturers. Third, process analysis is used to produce students' positive responses to the acquisition of attitudes, skills and knowledge. Some opinions about the authentic assessment above in the next discussion, described several authentic assessment methods, including assessment of self-assessment (performance assessment), performance (performance assessment), written test assessment, and interview.

The development of assessment tools for competency certification test has HOTS characteristics. This selection of HOTS characteristics is because competition in the workforce today requires high-level thinking skills so that college graduates are able to compete with workers from abroad. Through the HOTS instrument, it is expected that college graduates are able to have higher thinking than just memorizing or telling something they have heard or learned. Memorizing is a low-level thinking ability similar to a robot, not through a deep thought process [6]. Unlike HOTS, which prioritizes the decision-making actions that go through several processes such as manipulating, categorizing, combining, and finding solutions to the problems faced. HOTS includes critical thinking, reflective, metacognitive, creative [7].

The most important thing in the competency certification test process is developing a competency certification test device. In this study, the design stages of the development of competency test devices adopt the steps to develop test kits from the Department of Training and Workforce Development, [8] which discusses assessment of vocational education, that is:

- a. Analyzing competency units
- b. Choose the competency test method
- c. Develop competency test devices
- d. Trials

## II. RESEARCH METHOD

Development procedure of assessment tools for competency certification test used in the examination process and competency certification adopted from the Research Design Education developed by McKenney and Reeves (2012). Education Design Research consists of three stages, namely preliminary studies (preliminary research), design and development (prototyping), and development of development (retrospective analysis). The trial subjects in this study were students, lecturers, assessment experts in the Department of Electrical Engineering Education, Yogyakarta State University. The procedure used in this study is in Table 1.

Table 1. Stages of Study

Stage	Process	Output
Preliminary studies	a. Problem analysis b. Literature study c. Context analysis	Conceptual design framework, which includes: a. Purpose b. Criteria c. Proposition
Design and Development	a. Design b. Development c. Evaluation	Results of development intervened
Development Review	Analyze preliminary study data and development data	Characteristics of development results

### 3.1. Preliminary Research

The step of developing assessment tools for diploma III student begins with needs analysis, literature study, context analysis, and expert discussion. The results of the preliminary study showed results related to the unit of competence. After knowing the competency units that are developed, the next step is to carry out literary studies related to the assessment model and the content of the material to be tested. The competency units developed are as follows: (1) Designing simple building electrical installations, (2) installing simple building electrical installations, (3) assembling and installing simple building lighting PHBs, (4) installing earthing systems, (5) inspecting assemblies and installing simple building lighting PHBs, (6) ) operate Connection Equipment For (PHB) simple building lighting, and (7) maintain and repair simple building electrical installations

### 3.2. Preliminary Research

#### 3.2.1. Design

The design of the test device was developed through several stages, namely the determination of the form of assessment tools, the development of question indicators, the determination of the type of question, and the scoring technique and assessment of the items that had been developed. The form of the assessment tools chosen for the certification competency test are written test, performance test, and interview test. The form of written test questions that will be developed are multiple choice, true-false, matchmaking, description, and label. The preparation of the items in the written test is done referring to the preparation of the HOTS question. In addition to written test questions, the form of performance test questions was also developed based on the competency units that have a simple building installation scheme, from several competency units combined into a problem that can assess the performance. Interview test questions refer to the competency unit tested in the competency certification scheme, at least in one competency represented by one question.

#### 3.2.2. Development

The results of the design of assessment tools are further developed in the form of Competitive Test Materials (MUK)

in accordance with the form that has been standardized by BNSP. The assessment rubric that was developed was used as a reference for determining the results of competency tests, so that assessors easily determine the results of the graduation test. Forms that are in the MUK are as follows: (1) form of application for competency certification; (2) self assessment form; (3) the form of planning and organizing assessments; (4) assessment appeal forms; (5) assessment and confidentiality agreement form; (6) the form develops assessment tools; (7) the form of designing and developing assessment tools; (8) form of observation-demonstration / practice checklist; (9) the report sheet observation-demonstration / practice form; (9) a list of oral test questions; (10) written question form; (11) interview questionnaire form; (11) the form reviews and tests assessment tools; (12) form of assessment decisions and feedback; (13) feedback form from certification participants; (14) assessment report form; (15) the form reviews the assessment process.

### 3.2.3. Material Validation

Material testing was carried out by analyzing items through HOTS instrument review conducted by 2 (two) lecturers from the Department of Electrical Engineering Education who are experts in the field of Electricity Utilization Installation Engineering. The results of the study show that there are some questions that are not feasible to use because they do not meet the HOTS criteria so it needs to be revised. Aspects that were assessed in the review of HOTS questions included language, material, and question construction.

### 3.2.3. Feasibility Test by Product Experts

The instrument for expert validity testing is in the form of an assessment questionnaire on the quality of the material to be tested to students. The assessment of this material is carried out by 2 Electrical Engineering Education Lecturers in Yogyakarta State University who are experts in the field of Electricity Utilization Installation Engineering. The assessment carried out by the assessment expert is the result of a questionnaire containing 30 questions related to assessment tools for the student competency certification test. The assessment is based on the Likert scale that uses scores from 1 to 4. The assessment aims to measure valid, practical, and effective criteria from the developed test devices.

**Table 2.** Results of the Expert Feasibility Assessment

No.	Aspect	Average Each Aspect	Percentage of Each Aspect
1.	Validity	3,58	89,58
2.	Practicality	3,57	89,29
3.	Effectiveness	3,4	85
	Overall Quality	3,52	87,96

As a whole, the results of the assessment from the experts get a result of an average of 3.52 with a percentage of 87.96, the assessment tools of competency test are categorized as "Very Good" and can be used with improvement. Improvements in accordance with comments and suggestions on questionnaires filled out by experts, improvements made include writing sentences on the question and the level of difficulty of the question.

### 3.3. Final Product Study

Based on the results of the trials that have been conducted, then a retrospective analysis is needed to see the extent to which the assessment tools for competency certification test that have been developed meet the criteria of valid, practical, and effective.

#### 3.3.1. Field Test Results

The expanded test was carried out with the aim of obtaining empirical evidence stating that the developed assessment tools met the criteria of valid, effective, and practical. The field test involved 32 (thirty two) students of Electrical Engineering study program students. Test kits that have been revised taking into account the advice of material experts and assessment experts, the test equipment is carried out field trials to obtain the results of feasibility. The assessment of 32 students at the field trial stage was 3.11 with a percentage of 77.69. From the results assessment tools are categorized as "Eligible" and can be used.

#### 3.3.2. Evaluation of Practicality Aspect of Assessment Tools for Competency Certification Test

The competency certification test tools are said to be practical if the practicality criteria are met if 50% of respondents give a positive response to the minimum number of aspects asked. [9] explains that the product of development is said to be practical if: 1) the practitioner states that theoretically the product can be applied in the field, 2) the level of implementation of the product is categorized as "good". Practical criteria are met if the assessment category is in the positive category of all statements given. Because the questionnaire uses the response questionnaire using the Likert model scale with choices, namely 4 assessment categories, which are strongly agree (score 4), agree (score 3), disagree (score 2), strongly disagree (score 1). Based on the results of the description of the assessment of test equipment in terms of practical aspects through expert validation and user testing, the following results are obtained:

**Table 3.** Aspect Assessment Results Validity of the Assessment Tools

No	Respondents	Results	Percentage	Information
1	Product	3,57	89,29	Very practical
2	Student	3,18	79,43	Practical
	Average	3,375	84,37	Very practical

Based on the results of the assessment of the practicality aspects of the test devices which are assessed using questionnaires from both experts and students, it can be concluded that the competency test devices developed meet the criteria very practically, and are feasible to use and develop for further study.

#### 3.3.3. Evaluation of Effectiveness Aspect of Assessment Tools for Competency Certification Test

Assessment of aspects of effectiveness was obtained from respondents' questionnaires. The following is a description of the results of the assessment of the effectiveness aspects of the respondents' questionnaire:

**Table 4.** Aspect Assessment Results Effectiveness of the Assessment Tools.

No	Respondents	Results	Percentage	Information
1	Product Expert	3,57	89,29	Very Effective
2	Student	3,18	79,43	Effective
	Average	3,375	84,37	Very Effective

Based on the results of the assessment of the effectiveness aspects of the assessment tools which are assessed using questionnaires from both experts and students, it can be concluded that the competency test devices developed meet the criteria very effectively, and are feasible to use and develop for further study.

### 3.3.4. Feasibility of Assessment Tools for Competency Certification Test

The level of feasibility of the competency certification test equipment based on the results of this study has the following data:

**Table 5.** Results of the Expert Feasibility Assessment

No.	Aspect	Average Each Aspect	Percentage of Each Aspect	Information
1	Validity	3,58	89,58	Very Good
2	Practicality	3,57	89,29	Very Good
3	Effectiveness	3,4	85	Very Good
	Overall Quality	3,52	87,96	Very Good

**Table 6.** Feasibility Percentage Results from Users

No.	Aspect	Average Each Aspect	Percentage of Each Aspect	Information
1	Validity	3,06	76,61	Good
2	Practicality	3,08	77,03	Good
3	Effectiveness	3,18	79,43	Good
	Overall Quality	3,52	3,11	Good

The above data is obtained from the results of the average respondents' assessment of the test equipment in terms of aspects of validity, effectiveness, and practicality. From several trials, the results were feasible.

## III. CONCLUSION

The assessment tool of competency test developed in this study was used to assess the ability of D-III students in the field of technical expertise in the installation of electric power. This competency test material are adjusted to the Indonesian National Work Competency Standards (SKKNI) and the Directorate General of Electricity (DJK). The competency units tested are: 1) Planning simple lighting electricity installation; 2) Procedures for the installation of simple building lighting; 3) Design and installation of PHB; 4) Installing the Earth System; 5) Inspection of PHB circuits; 6) PHB operation; and 7) Protection and OHS electrical installation systems.

The development of assessment tools was carried out by a validation of a test device involving material experts to examine the questions to fit the HOTS question criteria, then for the assessment of the criteria the test equipment was carried out by the assessment expert. Furthermore, the results of the validation were revised and implemented to the field involving 32 D-III students in Electrical Engineering, Faculty of Engineering, Yogyakarta State University. The feasibility assessment conducted by students includes aspects of validity, practicality and effectiveness.

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