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ASSESSMENT OF LEARNING MODEL DEVELOPMENT NEEDS WORK BASED LEARNING MODEL TO IMPROVE ELECTRICAL MEASUREMENT SKILLS

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Abstrack: This study aims to find out: 1) assessment of the needs of WBL learning model development and 2) the effectiveness of the WBL model to improve electrical measurement skills. Data collection techniques through interview and questionnaire methods. The research approach is development research (R&D) with the concept of Thiagarajan 4D (Define, Design, Develop, and Disseminate). The data were analyzed with descriptive, qualitative and inferential statistics. This research is a qualitative descriptive research by analyzing the material needs for the development of learning models. The results of the study were in the form of WBL model learning products on TBU cadet electrical measurement practices that were feasible and effective: 1) the need for professional identity, aspects of personal knowledge in metacognitive competence contributed the most to the achievement of electrical measurement skills, and 2) test results in the TBU IX experimental class group with effective WBL model learning compared to the results of the TBU X control class group through traditional learning.
Keywords: needs analysis, work based learning, electricity measurement

A.INTRODUCTION

Makassar Aviation Polytechnic is an official vocational education with a vision to become a superior Polytechnic, with character and accountability in producing competent, professional and globally competitive aviation Human Resources (HR). Through its curriculum and education system, it aspires to produce competent graduates in the field of sustainable aviation transportation. As Barabasch (2019) argues, innovation schools and training institutions need to respond to shifting competency requirements by adjusting pedagogical practices, assessments, curricula, and learning environments that contribute to creating creative workers. Therefore, educational institutions can ensure lean and focused planning and efficient education reform, in order to realize effective changes to improve the quality of student learning outcomes. Makassar Aviation Polytechnic with a

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learning curriculum of 30% theory and 70% practice, emphasizes practice more dominant than theory as the hallmark of vocational education. Practical learning can shape the psychomotor aspects of students / cadets that are focused on mastering practical skills in the workplace. Improving the practical skills of cadets is carried out, one of which is by learning practical On Job Training (OJT) or internships. According to Wijaya (2019) that apprenticeship is a compulsory program for outstanding students who are quite effective in supporting practical work courses to improve abilities and skills as well as field attitudes. The opinion implies that practical learning in schools, which is continued on internship practice with authentic assignments, is seen as a transfer of professional competence in the context of practical skills in the workplace. They can take advantage of the vast learning environment by facilitating cadets in developing skills by offering access to resources.The phenomenon that occurs in the TBU Taruna apprenticeship still experiences many obstacles faced in work at the airport. This was conveyed by the supervisor during the evaluation of internship activities for the last three years. More than 60% of cadets who practice OJT at the airport are constrained by taking electrical measurements. The measuring instrument used is an analog type Multimeter to measure SQFL voltage. This incident was corroborated by the results of the TBU internship evaluation team in conducting direct practical tests on 24 cadets at the internship location. The task assigned is to operate an analog Multimeter to measure aircraft landing aid equipment on CT CCR current measurement and UPS battery voltage measurement. The results are range switch setting errors of 62% (15 cadets), calibrating errors and pointer designation readings on a scale of 38% (9 cadets). Candra et al (2020) suggested that students' difficulties in analyzing electrical circuits have an impact on work results that are not optimal caused by mismatches in learning materials and learning methods. According to Raelin (2018), emphasizing the application of Work-Based Learning (WBL) in schools by involving school partnerships with organizations that provide job opportunities as experiential education. Lafton & Furu (2019) also suggest that WBL is effective for educational complexity by outlining learning concepts applied in practice. This occurs in the weakness of students' cognitive understanding, so they find it difficult to know their development and limited reflection of their learning experience. (Nation, 2019). As Zehr & Korte (2020) say it has been found that students cannot seek school-to-workplace learning relationships, as a result students find it difficult to apply job skills.

Traditional learning is an obstacle to the connectivity of professional knowledge competencies and competencies in the workplace. To that end, Renta Davids et al (2017) emphasize for compulsory placement, school-to-job alignment, job-based supervisors, access to resources and task complexity are significant moderators between competencies learned in school and competencies used in the workplace. For this reason, a needs analysis is needed for the development of the WBL learning

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model by investigating professional identity in aspects of professional knowledge, aspects of personal knowledge and aspects of self-evaluation in TBU cadets.

B.METHOD

This research method uses a qualitative descriptive approach and quantitatively through questionnaires. Data collection techniques with observation, interviews and questionnaires. Observation on activities and places of practical learning activities for TBU cadets. The research approach is research on the development (R&D) of the Thiagarajan 4D concept (Define, Design, Develop, and Disseminate). The research subjects were 4 lecturers of electrical measurement practice and 24 TBU cadets at the TBU Study Program of the Makassar Aviation Polytechnic in 2021/2022. While the object of research is aspects that support or inhibit competence, namely professional identity includes aspects of professional knowledge, aspects of personal knowledge and aspects of self-evaluation. Data analysis techniques are carried out by qualitative, descriptive analysis and inferential analysis.

2.1 Theoretical Model and Stages of R&D 4D Cycle This theoretical model is used as the initial concept of research to answer the following problem formulation:

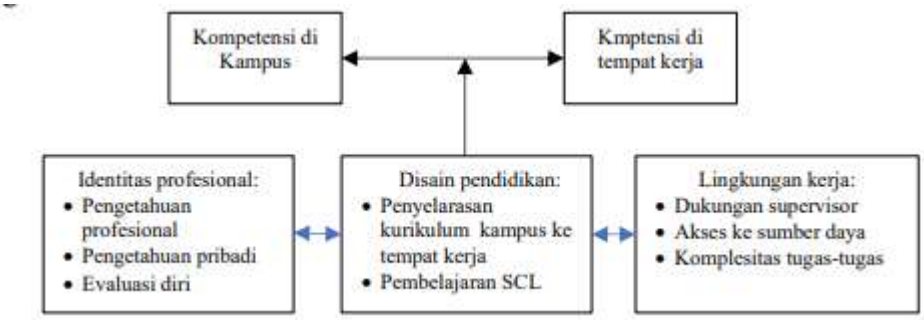

Figure 2.1 Theoretical Modeling Concepts

Based on the concept of the model above, connectivity and competency transformation of both places can be influenced by the identity of aspects of professional knowledge and self-evaluation, educational design and work environment include curriculum alignment, emphasis on learning on students, supervisor support supervisors and work environments namely: supervisor guidance, access to resources and complicity of tasks.

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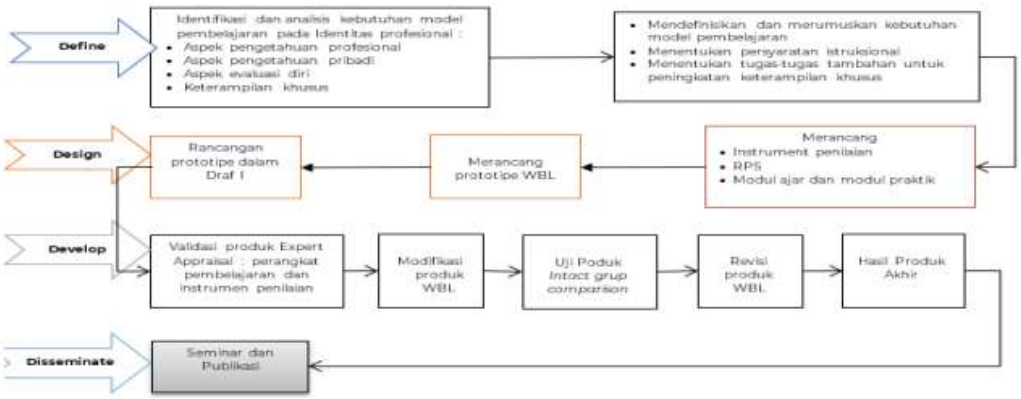

The research framework uses the R&D model of Borg and Gall (2014) Thiagarajan (1974) 4D stages. The define stage of the R & D model is observed by identifying and analyzing needs in aspects of professional knowledge, aspects of personal knowledge and aspects of self-evaluation of TBU cadets. The design stage is carried out instrument design to measure the success of learning electrical measurement practices. Continued to design RPS learning tools, teaching modules and WBL-based practice modules. In the development stage, learning instruments and tools are validated through FGD by a team of validators. Improvements to the validation results were carried out in limited classes by dividing the experimental class of the WBL model and the control class using traditional methods to determine the effectiveness of the WBL model through test questions. In addition, questionnaires were distributed to determine the response of TBU cadets in the use of practice modules and responses to WBL-based electrical measurement practice learning activities assessed by observers. The dissemiante stage is carried out with seminars to obtain responses and suggestions and publication of articles as a wide dissemination of information on the final product of the WBL model.

C. RESULTS AND DISCUSSION

3.1 Results of Interviews and Questionnaires on Aspects of Professional Knowledge, Personal Knowledge and Aspects of Self-Evaluation

3.1.1 Define Stage

Table 3.1 Summary of Interview Results

Wawancara dosen	Kinerja dosen membimbing Taruna praktik pengukuran listrik sudah cukup baik, dilihat dari aspek identitas profesional, pengetahuan profesional, dan aspek evaluasi diri. Namun dosen masih perlu upaya meningkatkan kemampuan Taruna terkait pengembangan praktik pengukuran yang difokuskan pada pengukuran peralatan kelistrikan seperti yang ada di Bandara
Angket dosen	Secara keseluruhan dosen pada aspek identitas profesional, pengetahuan profesional dan aspek evaluasi diri dalam pembimbingan praktik Taruna, dosen sudah memenuhi syarat sebagai pengajar praktik pengukuran listrik
Wawancara Taruna	Identitas profesional aspek pengetahuan profesional, pengetahuan pribadi dan aspek evaluasi diri Taruna rata-rata kurang baik atau kategori rendah
Angket Taruna	Secara umum hasil observasi pada ketiga aspek dengan kategori kurang positip dan tidak positip. Hal ini memberi pengertian bahwa aspek pengetahuan profesional, pengetahuan pribadi dan evaluasi diri Taruna berkategori rendah

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3.1.2 Design Phase

Table 3.2 Details of WBL Model Prototypes

No	Prototipe Model WBL	Uraian
1	Tujuan model	Untuk menilai praktik pengukuran dan meningkatkan keterampilan pengukuran listrik dengan pembelajaran model WBL Taruna TBU
2	Karakteristik model	1. Integrasi pembelajaran praktik pengukuran listrik dengan aspek pengetahuan profesional, pengetahuan pribadi dan evaluasi diri berbasis kerja 2. Praktik pengukuran listrik yang dibuat dalam alur pekerjaan sesuai target capaian keterampilan yang dibutuhkan di tempat kerja
3	Komponen model	1. Perangkat pembelajaran RPS, modul ajar dan modul praktik berbasis WBL 2. Instrumen penilaian bentuk soal tes dan non tes (angket) 3. Data hasil penilaian instrumen
4	Sintaks model	1. Inisiasi, 2. Seleksi, 3. Eksplorasi, 4. Perumusan, 5. Pengumpulan, 6. Presentasi, 7. Penilaian
5	Instrumen model	1. Observasi kemampuan dosen mengelola pembelajaran WBL 2. Observasi desain pendidikan dan lingkungan kerja 3. Oservasi respon aktivitas Taruna terhadap pembelajaran WBL 4. Angket aspek identitas profesional, angket aspek pengetahuan pribadi, angket aspek evaluasi diri 5. Angket respon terhadap pembelajaran model WBL
6	Panduan penggunaan model	Memuat pedoman : pelaksanaan pembelajaran model WBL, cara mengumpulkan informasi, cara memanfaatkan informasi dan cara membuat hasil laporan

3.1.3 Develop Phase

The results of the questionnaire of the close relationship between aspects of professional knowledge, personal knowledge and self-evaluation of TBU cadets on electrical measurement skills simultaneously as follows:

Gambar 3.1 Hasil Angket Taruna

In the picture above, it seems important that TBU cadets can develop personal knowledge. Metacognitive activities ask cadets to reflect on what they know in learning, so that they are able to develop into practice the measurement of electrical currents and voltages in CCR, SQFL, UPS equipment. Lecturers need to provide electrical measurement practice jobs which begin with providing basic electrical measurement practice activities, such as measuring current and voltage on components similar to the equipment object. Cadets are encouraged to review the material in the basic measurement practice job that has been learned through independent presentations and discussions and conduct self-evaluation in order to find out their own abilities and weaknesses.

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3.1.3.1 Pretest and Postes Test Results Learning Outcomes of Electrical Measurement Practices

Figure 3.2 Data on Pre-Test Results and TBU Cadet Test Post

In the picture above, it can be explained that the results of learning the electrical measurement practices of cadets TBU X traditional methods obtained pre-test values between 63-78 and test post values between 76-86. While the learning outcomes of TBU IX cadets WBL model obtained pre-test scores between 50-70 and test post scores between 81-93 with an average score of 88. These two results give an understanding that learning electrical measurement practices with the WBL model has a more positive effect when compared to conventional methods in improving the learning outcomes of TBU cadets.

3.1.3.2 WBL Model Effectiveness Test Results

The calculation results of the N-gain score test are used to determine the effectiveness of the WBL model as shown below:

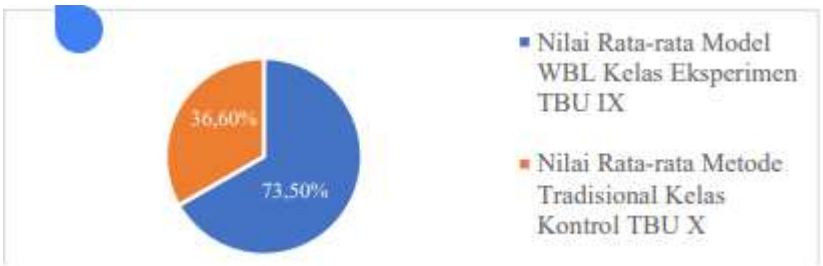

Figure 3.3 N-Gain Value of Experimental Class and Control Class

Based on the results of the analysis above, it is concluded that metacognitive competence firmly affects the improvement of learning outcomes of TBU cadets' electrical measurement practices. Therefore, lecturers need to build practical learning by training the thinking level of TBU cadets through practical jobs designed with the right learning strategies. Learning WBL-based electrical measurement practices is stated to be more effective and can affect the improvement of learning outcomes of TBU cadets.

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D. CONCLUSION

Referring to the research objectives set, it can be concluded that professional identity factors aspects of personal knowledge metacognitive competence contribute the most to the achievement of electrical measurement skills is the need for materials used for the development of the WBL model. The learning outcomes of electrical measurement practices through tests in the TBU IX experimental class group are more effective than the learning outcomes of electrical measurement practices in the TBU X control class group. This WBL learning model can solve problems in electrical measurement practices invented by themselves so that TBU cadets can motivate in work in team collaboration and increase their job career confidence in the future.

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