

A Work-Based Learning E Deal Model For Building Construction Workers

Syafiatun Siregar, Harun Sitompul, Kinanti Wijaya, Siti Zulfa Yuzni, Ahmad Andi Solahuddin

Abstract: This research was based on the problem of high urban informal workers, limited formal employment and lack of special training for informal workers. Based on the preliminary study, it was found that there was a need for work-based learning models and on the job training to overcome problems of knowledge and skills of building construction workers. This study developed an E DeAL learning model supported by the Model, Module, Instructor Guide and Participant Guidelines. The results of the validation analysis of learning products and supporting learning models in all aspects of assessment analyzed were categorized as valid. The results of the practicality analysis shows that the products produced are practical to use. The results of the assessment of effectiveness shows that product of learning was effective and had an impact on participants' skills and knowledge. Based on the findings, it can be concluded that the product of this research is valid, practical, and effective.

Index Terms: building construction worker, E DeAL model, learning model, work based learning

1. INTRODUCTION

CONSTRUCTION work is an activity related to the construction of infrastructure or civil constructions. It is a series of activities which must meet requirements and must go through a certain scope of work. It is usually carried out by a group of people. Construction work is identical to work on construction projects where construction works only last temporarily and within a limited period of time. The resources used to carry out building construction work are clearly stated in the regulations. Construction workers who are directly involved in project implementation play an important role in achieving project objectives as human resource. Workers in building construction are similar to physical sector jobs, the majority of which are male workers. A building construction worker does not have to have a higher education to enter the work force. Work in the field of building construction is never ending. Construction workers will find it very easy to get a job in this field. The educational background of construction workers are mainly secondary education. The formal job market, however, is highly competitive and requires a formal education background. In other words, if you want to enter the formal job market, you must have a college diploma. This will have a significant impact on urban residents who are low educated and unable to enter the formal labor market. Statistics Indonesia in August 2017 stated that in Medan, the population with a lower education level than high school reached 32.23% out of the total population 2.5 millions. The productive workforce working in the informal sector reached 57.50%. Based on the statistics above that the high number of people working with lower secondary education, it can be seen that competence of workers is still low. The low level of informal workers' education has resulted in a limited employment area, especially to enter formal employment. The informal employment sector is the most common form of business in the community. Many forms of informal sector are carried out by the community, especially those with low education or uneducated.

• Syafiatun Siregar is teaching in Universitas Negeri Medan, Indonesia. Email: syafiatunsiregar@gmail.com

For some people with small capital, they will open their own businesses, while those who do not have a business place will still become traders (traveling traders, hawkers, and others). From the statement above it can be assumed that the informal employment sector is open to anyone, very easy to enter it, and does not require a diploma or capital. Informal workers who do not have capital tend to enter the world of work that relies solely on physical strength, namely as workers in the construction services sector. The easiest work to enter in the construction services sector is as a construction worker. The result of interviews with several contractors in Medan shows that generally construction workers have a maximum education of high school graduates. Building construction workers do not have the basic expertise or competence in entering the world of building construction work. The world labor market of building construction is quite extensive and has never stopped both large and small scale so that many need labor. The objectives to be achieved in this study are to develop and produce E DeAL models for building construction workers and to determine the validity, practicality and effectiveness of the E DeAL model.

2 LITERATURE REVIEW

2.1 Work-based Learning

Work-based learning (WBL) that is often carried out is in the form of various types of internships. In line with its development, WBL has been carried out in higher education in fields such as medicine, education, and social work. Higher education is always associated with the preparation of graduates to work which is basically associated with the profession that will be carried out in the world of work. Research conducted by Eraut [1] on educational research, explains the gap between knowledge/skills needed in the workplace and the knowledge/skills obtained through formal education. Eraut [1] classifies knowledge of vocational and professional education programs as follows:

1. theoretical knowledge
2. methodological knowledge
3. practical and technical skills
4. general skills
5. general knowledge about the work in question.

Eraut [1] states that out of all the knowledge provided there was little in accordance with the workplace. Development of

learning models in the implementation of vocational education must continue to be carried out by its teachers so that the quality of graduates is in accordance with the demands of the job market. Vocational education institutions are required to be able to anticipate and deal with changes that occur in facing the challenges in the work force and competencies that are getting higher along with technological advances and the dynamics of the workplace by utilizing the various capabilities that exist. Various reviews of the quality of education are the background of the problem for holding vocational education using the Work-based Learning approach (known in Indonesian terms as Teaching and Work-based Learning). From the various theories put forward by experts, it can be concluded that the WBL is a workplace-based learning approach. WBL applies experiences gained in the workplace and to social activities, academic activities, and career development of participants. WBL can be a supplement in learning activities. The learning approach in organizing vocational education is very influential on the quality of vocational education outcomes both in terms of processes and products. The results of the latest researches conclude that the use of Work-based Learning in the world of education has been a major influence on achievement, motivation, and continuing education[2]. The results of the research and evaluation of the WBL indicate a relationship between learning outcomes and the impact of graduates. The graduates have a significant effect on the structure of school learning and the industrial world. Program objectives, workplace-based curriculum and learning designed and implemented must be accompanied by adequate human resource support and properly evaluated. Evaluation of programs that are properly implemented will have a positive impact on graduates[3].

2.2 Model Concepts

Learning models have broad meanings and sometimes are compared to learning strategies, learning methods and learning procedures. Work-based learning as a learning approach plays an important role in improving the professional development of workers, the learning process and increasing competence. WBL is used as a reference in various countries as learning programs in schools/colleges to gain experience from real work environment [4]. WBL is also used to prepare teenagers in the transition from school to work. Furthermore, WBL is carried out in an effort to learn about the reality of the workplace environment and make graduates ready to make the right choice in work[5]. Another definition states "Work-based learning is any coaching that relates to the wants of the work on supply in your organization"[6]

2.3 E DeAL Learning Model Structure

The E DeAL (Experiential, Demonstration, and Action Learning) learning model developed refers to the theory of Joyce and Weil [7] and refers to the rational and theoretical basis described in the previous chapter. A learning model must have several components as elements. The E DeAL learning model consists of planning, learning activities and output. The initial planning of the structure of the E DeAL model is (a) conducting a needs analysis and training, (a) recruiting and selecting prospective participants and (c) conducting an instructional needs analysis to determine basic competencies and competency standards. Learning activities consist of syntax, social systems, principles of reaction, and impact of supporters. The results of the E DeAL learning model are

coupled with the influence of the system, namely the instructional impact and the nurturant effect. DeAL learning model was developed to answer WBL problems of building construction workers. Building construction workers will gain learning experience, can demonstrate and be able to take action in carrying out work in the field of building construction. John Dewey [8] stated that education requires meaningful practical activities. Dewey's thinking is reinforced by Prosser [9] who believes that science cannot be moved from one field of learning to another, and learning will be effective if implemented specifically and directly on the problem. Learning will be effective if the learning process involves participants actively, not only requires participants to just listen, take notes or observe. Participants must learn actively, be able to actualize their abilities and skills in their jobs, especially in building construction work.

2.4 Methodology

The product of the development carried out by the researcher must go through a step of development research procedure which is usually depicted in the flowchart of activities from beginning to end. The development procedure describes the product design components developed. The product component contains the properties of each step of development explaining analytically the function of components in each stage of product development and explaining the relationship between components in the system. Research on the E DeAL model of building construction workers in this study used the ADDIE (Analysis, Design, Development, Implementation and Evaluation) Model learning design [10].

2.4.2 Analysis Phase

This stage was carried out by field observation, systematic and intensive information gathering regarding the implementation of the E DeAL learning model. The target of the E DeAL learning model was to improve the quality of learning participants, namely the construction workers. The analysis phase begins with gathering information from various sources such as consultation with practitioners, review the literature, review the curriculum in vocational schools, results of previous studies, and field practices in various workplaces. This was done to take a snapshot of WBL organizers in the construction work field. Field observations and studies conducted are related to the characteristics of building construction workers, building trends, the willingness of the building construction industry to work together, the capabilities and capacities of building construction service partners.

2.4.2 Design Phase

The first step taken was to determine the target of implementing the E DeAL model, the construct of the learning model and the limitations of the aspects that surround it. The design phase formulates the direction of the development of the E DeAL, model based on learning needs in the workplace and training in the workplace along with the scope of its facilities and infrastructure. The design stages include: formulating needs, learning objectives, determining the learning component procedures and the research products produced, designing new product concepts on paper and designing instrument devices. The purpose of the E DeAL model is to improve the quality of knowledge and skills that are the experience of construction workers who will enter the

construction work field. E DeAL serves as an independent learning process that consists of increasing skills, knowledge, competence, professional attitudes, and work mental readiness. To perfect the E DeAL model, Forum Group Discussion (FGD) was conducted by involving academics, experts, practitioners, and users. This discussion was done to obtain comprehensive information and input on the E DeAL model that was developed involving the work/industry. The design of the E DeAL model was discussed in the FGD (academics, experts, practitioners, users) whose participants have expertise relevant to the construction field. This involvement is expected to give value to the design of the model developed. Then a small-scale product trial was conducted, followed by observing, interviewing and distributing instruments through expert validation and model revision.

2.4.3 Development Phase

The development stage was the next stage after the analysis and design stages, namely developing a learning model, designing a learning module designing instructor guides and participant guides.

2.4.4 Implementation Phase

The design results of the E DeAL model are those produced at the model development stage, namely the prototype model that would be further developed. The prototype model served as a reference for the stages of further development. Continued development by strengthening the design product prototype was carried out. The stages of applying the model begin with trial activities, then evaluation and revision of the product. Then further development activities and implementation (large-scale model trials) were carried out. The objective of this activity is to establish and validate whether the prototype model is effective, efficient, and reliable. After going through limited trials and expanded trials, the final E DeAL model will be obtained.

2.4.5 Evaluation Phase

The evaluation phase is conducting evaluation activities from the stages that have been carried out. The stage of analysis, design, development, and implementation is carried out by parties involved in development such as users of the E DeAL learning model and learning managers. The results of the next evaluation are made in the final report.

Table 1. Result of validity test of the products

No	Name of Instrumen	V Aiken's Averages	Result
1	E DeAL Model Contents	0,874	Valid
2	E DeAL Module	0,874	Valid
3	Concrete Stone Finishing Work Module	0,890	Valid
4	Participant Guide	0,881	Valid
5	Instructor's Guide	0,915	Valid
Average		0,888	Valid

3 RESULT AND DISCUSSION

The E DeAL WBL model for building construction workers was carried out in two learning processes. The WBL learning was carried out in two places, in the Civil Engineering Workshop, Faculty of Engineering, Unimed, and training in the construction work site in Medan. The material provided was about concrete stone for finishing work. Furthermore, participants will receive on the job training (OJT) to apply the

knowledge and skills of concrete stone for finishing work in the building construction workplace.

The E DeAL syntax consists of 7 phases, namely:

1. Formulation of learning objectives
2. Presentation the material
3. Learn with experience
4. Prepare outlines for demonstration and practice steps
5. Demonstrate and practice
6. Carry out action
7. Monitoring, evaluation and assessment

3.1 Validity Test of the Products

The result of validity assessment of the products developed can be seen in Table 1 below

Table 2. Result of validity test of E DeAL learning model

No	Rated aspect	V Aiken's	Result
		avarages	
1	Rational	0,9	Valid
2	Supporting Theory	0,85	Valid
3	Development Goals	0,9	Valid
4	Syntax	0,877	Valid
5	Social System	0,883	Valid
6	Principle of reaction	0,919	Valid
7	Support system	0,919	Valid
8	Impact of implementation	0,895	Valid
Average		0,893	Valid

The accuracy of validity carried out with a measuring instrument must be based on the ability of the measuring instrument used to achieve the desired measurement objectives. The products produced in this study went through several stages so that the product is valid to be used. The aspects were assessed in the validity test of the product contents, namely content eligibility, construct feasibility and language feasibility. All of these components passed the validator test which means the product content is valid to use. The summary of the instrument validity test for products is presented in Table 1. Aiken's V average value of 0.888 is generated. Based on the V Aiken's value, it can be stated that the product that has been developed is valid for use. The validity instrument of the E DeAL Learning Model which was compiled and tested by the expert validator of the learning model must pass the validity test before being distributed to the validator for validation. The instruments will be tested through a mechanism of learning sequences that have been discussed through the FGD forum. The results of the recapitulation of the validity test of the E DeAL Learning Model instrument can be seen in Table 2. The results of the instrument validity test on the E DeAL learning model are presented in Table 2 above. The Aiken's V mean value is 0.893. The interpretation of the E DeAL product model produced as a whole is declared valid for use. Development of the E DeAL model for building construction workers was focused on designing learning syntax. The syntax of learning in its implementation has steps to achieve learning goals. In

general, the learning model developed cannot be said as a model. Therefore, a syntax which can accommodate E DeAL learning models of building construction workers was designed. To express the relationship between the syntax of the E DeAL learning model (7 steps) and the variables, the CFA statistical test was carried out. The aim of the CFA was to confirm or test the relationship between latent variables and indicator variables (Yang, et al, 2010). The results of the CFA statistical test conducted with Lisrel 8.51 can be seen in Table 3. below. From the summary, it can be stated that the latent Experiential, Demonstration and Action Learning variables with indicator variables can be classified fit. In other words, the relationship between each aspect of the overall learning model is acceptable.

Table 3. CFA Analysis result for syntax components

Construct /Variable	P-Value	RMSEA	χ^2/df	Result
Experiential	1	0	0	The fit is perfect
Demonstration	0.912	0	0.43	Model declared fit
Action Learning	0.591	0	0.94	Model declared fit

3.2 Practicality Test

Stone Concrete Finishing Work Module was deemed practical with an average V Aiken of 0.898 which means the product of the Concrete Stone Finishing Work Module can be practical to be used for learning. The results of the practicality test of the learning module was very supportive for the development of this research. The Stone Concrete Finishing Work module was therefore used as a learning module for participants The Participant Guides was also considered practical with the V Aiken's average of 0.889. It can be interpreted that the Participant Guide product is practical to be used for learning. Based on the results of practicality, the learning participants' guide was very supportive to the learning carried out by the participants. Practical Participant Guide was used as learning guides for participants in building construction workers.

Table 4. Result of practicality test

No	Effectiveness	Average score	Result
1	Assignment	79.87	Effective enough
2	Psychomotor	82.46	Effective
3	Affective	83.55	Effective

The Instructor Guide practicality test results were practical with the V Aiken's average of 0.867 interpreted that the Instructor Guide product is practical to be used for learning. Based on the results of practicality the Instructor's Guide was very supportive of the learning process. Practical Instructor Guides are used as a guide during the learning process. The product practice test summary of the learning model produced states that overall all practical products to use. The practicality test results of the E DeAL model of building construction workers

were gathered by the practicality questionnaire of each product produced. Practical testing is done to test the practicality of a model produced. The practicality test results show that the model is practical with the V Aiken 0,874, which is interpreted as the product being practical to use. Based on the results of practicality, the E DeAL Learning Model can be stated as 'Practical' to support the learning of the E DeAL model for building construction workers.

3.3 Effectiveness Test

The effectiveness test of the WBL model of building construction workers was carried out in the experimental class on May 7-9, 2018 at the Civil Engineering Workshop, Faculty of Engineering, Medan State University and continued on July 5-7 2018 in many building construction field projects. The effectiveness test was carried out in three assessments, namely assignment, psychomotor and affective assessment (see Table 5. below). The effectiveness test results showed that the implementation of tasks/jobs is quite effective using the E DeAL learning model. The effectiveness test of Psychomotor and Affective of E DeAL learning were also declared effective.

Table 5. Result of E DeAL effectiveness test

No	Product Practicality Test	V Aiken's average	Result
1	E DeAL Learning Model	0.874	Practical
2	Stone Concrete Finishing Work Module	0.898	Practical
3	Participant Guide	0.889	Practical
4	Instructor's Guide	0.867	Practical

4 CONCLUSION

The conclusions of the E DeAL model research are DeAL Building Construction Work-based Learning Workers as follows:

1. The WBL development model produces E DeAL (Experiential, Demonstration and Action Learning) models that can be used as learning models for building construction workers. The E DeAL model was carried out in two places, namely at workshops and at the workplace.
2. The E DeAL model has an impact on improving skills, knowledge, ability to demonstrate and act, independent practice skills, group practice abilities, social skills and communication of construction workers on Concrete Stone Finishing work. The resulting impact is that participants become more responsible for work, foster creativity, effective communication between participants, self-development and the ability to take action. In addition, the accompanying effect of the E DeAL model was that participants can develop their own character, including caring, independent, responsible and creative.
3. The results of the analysis of Confirmatory Factor Analysis (CFA) state that the relationship between syntax developed (Experiential, Demonstration and Action Learning) was categorized as fit. The syntax component was sufficient to support the component construct and it was sufficient to obtain adequate fact

support.

4. The results of product validation analysis and supporting E DeAL learning models in all aspects of the assessment analyzed were categorized as valid. The results of the practicality test analysis state that the E DeAL learning model product, the Stone Concrete Finishing Module, Participant Guide, and Instructor Guide are practical to use. The results of the effectiveness assessment of the three aspects (task assessment, psychomotor and affective) state that the learning product is tested effectively and has an impact on the participants' skills and knowledge. Based on these results it can be stated that the research product is valid, practical and efficient.

ACKNOWLEDGMENT

This research was conducted at the Faculty of Engineering workshop in Unimed (University State of Medan). Therefore, the researcher thanks the Dean of the Faculty of Engineering who had given permission to use the laboratory during the the research. Acknowledgments were also given to the head of the workshop, staff and laboratory assistants who had helped during this research. The researcher also thanks the promoter and co-promoter who has guided and advised a lot during the completion of this dissertation research. May God bless us.

REFERENCES

- [1] M. Linehan, *Work-Based Learning, Graduating Through the Workplace*, Cork:CIT Press, 2008.
- [2] T.R. Bailey, K.L. Hughes, and D.T. Moore, *Working Knowledge Work-Based Learning and Education Reform*, New York: Routledge Falmer, 2004.
- [3] R.L. Lynch and D. Harnish, "Preparing Pre-service Teachers Education Students to Used Work-based Strategies to Improve Instruction In Contextual Teaching and Learning: Preparing Teachers to Enchance Student Success in The Workplace and Beyond," ERIC Dearinghouse on Adult, Career, and Vocational Education, Columbus: OH, pp. 127-158, 1998.
- [4] "Work-based Learning Guide," <http://www.iowaworkforce.org/files/wlg02.pdf> 2016.
- [5] K.A. Paris and S.A Mason, *Planning and Implementing Youth Apprenticeship And Work-Based Learning*, Wisconsin: Center on Education and Work, University of Wisconsin, 1995.
- [6] A. Glass, K. Higgins, and A. McGregor, *Delivering Work Based Learning*, New York: Scottish Executive Central Unit, 2002.
- [7] B. Joyce and M. Weil, *Models of Teaching (Third Edition)*, New Jersey: Prentice-Hall, 1986.
- [8] S. Joanna, "John Dewey and Pragmatism in the Primary School: a thing of the past?," *Curriculum Studies*, 4:1, 5-23, 1996, doi: 10.1080/0965975960040101
- [9] C.A. Prosser, "Practical Arts and Vocational Guidance," <https://trove.nla.gov.au/version/20966548>
- [10] N. Aldoobie, "ADDIE Model," *American International Journal of Contemporary Research*, Vol. 5, No. 6, December 2015, pp 68-72