

Learning Outcomes in Vocational Study: A Development of Product Based Learning Model

¹Ganefri, ²Hendra Hidayat, ¹Indrati Kusumaningrum, ³Mega Silfia Dewy and ³Sartika Anori

¹Faculty of Engineering,

²Faculty of Engineering, State University of Padang,

Jln. Prof. Hamka Air Tawar Padang, Postal Code, 25132 West Sumatera, Indonesia

³Faculty of Teaching and Education Science, Bung Hatta University,

Jl. Bagindo Aziz Chan, By Pass Aie Pacah Padang, Postal Code, 25176 West Sumatera, Indonesia

Abstract: The vocational studies are strictly concern with the learning outcomes as well as the impact to the development of human resources. Since, this article discussing the research development program of product based learning model, the analysis of curriculum and learning became the basis of development program. This research methodology was using Research and Development (R&D). It included the research which develops and results product based learning model. Technique of data analysis used was technique of descriptive data analysis by describing its validity, practicality AND effectiveness of product based learning model. The validity was measured by expert judgment while the practicality was measured by applying the product to the students which was judged by practicality questionnaire and the product effectiveness was measured by conducting classroom action research. The effectiveness in this research is in the form of the improvement of student's learning outcomes in the learning process at vocational study in the form of products which are needed by society. Besides, this development was also aimed to improve the ability of entrepreneurship through business plan in learning process at vocational study. The results were the validity of product based learning model was stated valid in the aspects of construct, content AND presentation, meanwhile its practicality, based on lecturer and students respond was stated practical and its effectiveness was stated effective in improving student's learning outcomes, also improving the student's ability in entrepreneurship through designing business plan. By using product based learning model, the learning outcomes resulted was qualified AND the student's ability of entrepreneurship was improved.

Key words: Learning outcomes, vocational study, product based learning model, entrepreneurship, plan

INTRODUCTION

Education is a way to improve the welfare of the nation. Education that can support future development is education that develops learner's potentials, so that they can solve the problems which they face. Higher quality of education is in line with the quality of human resources generated. The quality of Indonesian education in educational reformation still needs to have priority attention. The quality of education can point to the quality of the process and product quality. An education can be stated qualified in terms of the process (which is also strongly influenced by the quality of inputs) if the learning process taken place effectively AND learners are experiencing meaningful learning process, supported by human resources, funding, facilities AND infrastructure. Qualified education process will result qualified products (graduates) as well.

Qualified education in today's information era is the determining factor in producing a society that has the competence to be able to enter the job field which is increasingly competitive due to the development of global world. One of the importances of the quality of education is as a basic milestone in advancing the progress of a nation's human resources and the progress of national development. It is stated and mandated in the legislation of Indonesia. One of them listed in the Act's National Education System No. 20 2003 Article 3 which states that National Education serves to develop the ability and character development as well as the civilization that dignity in the context of the intellectual life of the nation, aimed at developing the potential of students in order to become a man of faith and fear of God Almighty, noble, healthy, knowledgeable, capable, creative, independent AND become citizens of a democratic and accountable.

National education standards stipulated in Government Regulation No. 19 Year 2005, namely the National Education Standards need to be aligned with the dynamics of the development of society, locally, nationally AND globally in order to realize the functions and objectives of national education, the government has issued government regulation (PP) version as an amendment to Regulation No., 19 in 2005, the PP is the PP No. 32 of 2013. One of the real form of the implementation of the learning process that is mandated by Government Regulation No. 32 of 2013 which is a process of learning in vocational education, because the learners are given the opportunity to develop the potential and creativity so it is expected to have the appropriate skills expertise. Vocational education is required to deliver a competent workforce in order to increase productivity and efficiency as well as the readiness of the international labor market competition in the era of globalization. In the vocational education, students are expected to have the skills, knowledge and attitudes and competent to enter the workforce and to develop potential and creativity so that not only acts as a job seeker but also as the provider of employment. So that, in order to be able to achieve the learning process as it has been mandated by the Government Regulation No. 32 of 2013 Article 19 Paragraph 1 about the process of learning, the development of the components of learning that can support the learning process so that learners can participate actively and provide enough space for the initiative, creativity AND independence in accordance with their talents, interests and physical and psychological development of learners (PP No. 32 of 2013 Article 19, Paragraph 1). One component of learning that needs to be developed is standards-compliant learning model to support education in order to run effectively and efficiently.

The learning model is one of the important and major components in supporting the learning process. It is necessary to improve the utilization and management, so that the desired objectives can be achieved. The learning model is a plan or a pattern that is used as a guide in planning for learning in the classroom. Arends (1997) also states, "the term teaching models refers to a particular approach to instruction that includes its goals, syntax, environment AND management system" According to Joyce and Weil (2004) model of learning is a conceptual framework that describes procedures systematic in organizing learning experiences to achieve specific learning objectives AND has a function as a guideline for the designers of learning and teachers in planning and

implementing learning activities. The learning model is a plan that is used as a guide in the classroom and has a function as a guideline for the designers of learning and teachers in planning and implementing learning activities. In short, the learning model is a procedure or steps that need to be done by the educators to facilitate students to learn actively, participatory and interactively with the intention which meets the educational goals, namely the development of the potential for self-learners optimally.

The learning process in vocational education is still far from the principles that have been described in the PP 32 in 2013. Vocational education is required to train competent workforce in order to increase productivity and efficiency as well as the readiness of the international labor market competition in the era of globalization. However, based on data that is owned by the Central Bureau of Statistics from February to August 2014, Unemployment Rate (TPT) is still largely dominated by graduates of vocational education. This case gives a description to us that there are problems in education, especially in vocational education, about the discrepancy competence, poor quality of graduates. So that, what is required from business, industry and employment opportunities are not be able to be filled. Actually the learners have been prepared to be able to work in the field and can also develop itself in the work field, including entrepreneurship. In addition, the learning process has not foster analytical thinking ability and high while the needs of the field demanding kind of work with such a condition. In facing of such issues, it needs to make changes in the learning process, one of them is by changing the conventional learning model to the new models of learning which can guide and train students to develop their creativity in teaching so that it can improve skills and learning outcomes. One of learning model that could be expected to bridge the problem-based learning model is a product which is an active learning model that can provide opportunities for students to think actively and develop their creativity and can produce learning outcomes that address the challenge the world of work and society.

Ganefri (2013) states, "production-based learning models is defined as the procedures or steps that need to be performed by the educator to facilitate learners to actively learn, participate and interact with a competency-orientation to produce a product either goods or services required". While the implications of the concept of competence and qualification capabilities resulting from the rapid evolution of technical education in work organization and planning (Grootings, 1994). So

that, an act of professional competence (Delcourt, 1999) and a number of important competencies students need can be a professional duties (Echeverria, 2002).

Product-based learning model are an educational process expertise or skills that are designed and implemented based on standard working procedures and real (real job) to produce goods or services that fit the demands of the market or consumers. Based on learning which emphasizes product learning, the students can produce product or services that meet the standards of the world business/industrial world and society. Convincingly, product based learning model is in line with the concept of vocational education. product based learning model are defined as procedures or steps that need to be done by educators to facilitate learners to actively learn, participate and interact (Chinowsky *et al.*, 2006) with competency-oriented to produce a product either goods or services with Standards National Indonesia. So that, production-based learning model including effective models for competency-based education (Parsons *et al.*, 2005; Mulcahy, 2000; Kelly, 2007) is integrated with the knowledge, skills and attitudes.

Literature review

Review of literature of instructional model: The learning model is a plan or a pattern that is used as a guideline in planning for learning in the classroom. Learning model refers to the learning approach that will be used, including the purposes of teaching, the stages in the learning activities, learning environment and classroom management (Arends, 1997). Furthermore Arends also states, “the term teaching models refers to a particular approach to instruction that includes its goals, syntax, environment AND management system” Meyer (2004), states that “the model of teaching is an overall plan or pattern for helping the student to learn specific kinds of knowledge, attitudes or skills”. In line with the opinion of Joyce and Weil (2004) which states that “a models of teaching is a plan or pattern that we can use to design a face-to-face teaching in classrooms or tutorial setting and to shape instructional materials books, movies, tapes and computer-mediated courses and curriculums (long term courses of study). Furthermore, Joyce and Weil also said learning model is a conceptual framework that describes a systematic procedure in organizing learning experiences to achieve specific learning objectives and has a function as a guideline for the designers of learning and teachers in planning and implementing learning activities. This is in line with what was stated by Eggen and Kauchack (1996) that the learning model provides a framework and direction for teachers to teach.

Based on some opinions on the above, it can be concluded that the learning model is a conceptual framework that describes a systematic procedure for organizing a learning experience to achieve specific learning objectives AND serves as a guideline for instructional designers and teachers in designing and implementing the learning process. One model of learning that is relevant to vocational education is an active learning with learning by doing (Bartkus, 2001; Hackett *et al.*, 1998; Johnson, 1999) one of learning by doing is a product-based learning model.

Review of literature of product based learning model:

Product-based learning model is an educational process expertise or skills that are designed and implemented based on the procedures and standards of work real estate or job (Blumenfeld *et al.*, 1991; Dickinson *et al.*, 1998; Westwood, 2008) to produce goods or services that fit the demands of the market or consumers. Product-based learning model emphasizes learning where students can undertake the production of goods or services that meet the standards of the world business/industrial world and society. It was confirmed by Suryadi and Yuza (2009) which says, “learning-based production that is learning with an emphasis on work planning, work procedures and the final products of learning that is worth selling or products according to the specifications of construction standards that have been determined” AND according to Marlina (2010), “production-based learning is learning that focused on aspects of integration which is based on the concept of meaningfulness. Meaningfulness means the students understand the concepts being taught through the experience of working on the object directly in the workshop or in the field (practical experience) so that, it can produce a product that meets industry standards”. Correspondingly (Ganefri, 2013) also states that” the production-based learning models is defined as the procedures or steps that need to be performed by the educator to facilitate learners to actively learn, participate and Interact with a competency-orientation to produce a product either goods or services required”.

In short, it can be concluded that the Product-based learning model can be defined as procedures or steps that need to be done by educators to facilitate learners to actively learn, participate and interact with competence orientations to produce a product either goods or services in accordance with the standards of the world of industry which is oriented to student centered learning (Bell, 2010).

Product-based learning model is a learning model that provides opportunities learners to develop the

ability of critical thinking skills and work together (Nickerson *et al.*, 1985) is highly relevant to the development of psychology students about the learning experience they gain (Gijssels, 1996), in the learning process with this product-based learning model the students are required to actively as raises important questions relating to the products to be made. Product based learning model consist of syntax or steps in the learning process which according to (Ganefri, 2013; Ganefri and Hidayat, 2015; Hidayat, 2015) in the learning model based on these products syntax or sequence of steps the lesson consists of 9 steps) analysis of the curriculum and the characteristics of learners) identification and analysis of the product) make the important questions about the product; mapping the question:

- Analysis of the needs of the equipment and materials of the products to be made
- Making the schedule of manufacture of the product
- The process of making the product
- The evaluation on a regular basis
- Making the business plan

Research objectives: This study was aimed to describe the development of production-based learning model in the aspect of validity, practicalities and effectiveness as well as the learning outcomes resulting from the implementation of production-based learning model in vocational education.

MATERIALS AND METHODS

This type of research was research development or Research and Development (R & D). According Sugiyono (2014) research and development is “to produce specific products that are used research and analysis needs to test the effectiveness of these products in order to function in society at large, it is necessary to study to test the effectiveness of these products”. The development model used in this study was a model of Borg and Gall. According to Borg *et al.* (1989) this development phase consisted of) research and information in this step is done by formulating the problem to be studied, namely to conduct a needs analysis, based on the results of a needs analysis and then the mapping. Planning, the second stage is to carry out planning to design a learning model. Develop preliminary developing an early form of the model and requirements is necessary devices in model development. At this stage it will make the process of validating the design of the model along with the instruments needed. Validation is done by several

specialists who are experts in their fields. Preliminary field testing. Limited test models of learning, at this stage the action taken is to validate the syntax constructs models based learning products developed through the stages of validation. Stages validation was done through discussions or interviews with experts. Main product revision. Revise the learning model in a limited test results. Main field testing, large-scale field test. Revision carried out in the previous process, then performing field tests on a large scale. Operational product revision, revising model of learning after the testing process. Operational field testing. Conduct field trials were conducted for prospective users of the product with the scope wider. Final product revision, doing the final revision of the learning model. Dissemination and implementation. Who reported the findings in the form of seminar presentations. This stage was the last stage which was carried out on the development of learning models, by reporting the results of research through scientific forums with seminars or scientific journal publications both nationally and internationally

To obtain the necessary data in this study, the researcher used data collection techniques such as questionnaires. Questionnaire is a technique of data collection is done by giving a set of questions or a written statement to the respondent to be answered (Sugiyono, 2014). The questionnaire can be in the form of multiple choice questionnaire forms and can also form an attitude scale. In this study, a questionnaire used was in the form of scale and multiple-choice stance.

Research instrumentation: The research instruments were developed to collect data. In this study, the instruments used are a validation sheet and questionnaire product-based learning model (Sugiyono, 2014) defines questionnaire as a list of questions or statements that must be filled by the respondents to be evaluated. Validation sheet filled by experts and practicality questionnaire will be filled by the user, namely faculty and students.

Technique of data analysis: The data analysis technique used is descriptive data analysis techniques, by describing the data that is already filled with data frequency analysis techniques with the equation:

$$\text{Ideal score} = \frac{\text{Average score}}{\text{Maximum score}} \times 100\%$$

with the achievement of the respondents used the value category classification according to (Sudjana and Ahmad, 2001) in Table 1:

RESULTS AND DISCUSSION

The results of research on the development of products based learning model in vocational education are learning outcomes. This development approaches to the development phase in accordance to Borg and Gall. At this stage of development according to Borg and Gall there are ten steps but there are four core steps: planning, development, evaluation and dissemination. The planning stage consists of a preliminary analysis of the curriculum and learning into developing basic learning model. The next phase of development includes developing and designing all the ingredients of planning results from the development of learning tools such as lesson plan as well as learning model designed that production-based learning model. The next draft results into the evaluation phase with validation by experts linked to construct a product base learning model and content-based learning model of the product, according to Ferreira and Hood (1995) to cope with the development of a good model to go through validation phase both experts and statistics. Once validated test the practicalities of the questionnaire to the user as well as the effectiveness of the model seen from the activity.

Planning phase: Early stage in the research is the development planning stage. At this stage the researchers conducted a needs analysis and the formulation of learning objectives. In the analysis of the needs, the researchers analyzed the material and syllabus while in the formulation of learning objectives researchers identify basic competencies in accordance with the course syllabus practical electronic circuits and to formulate practical objectives to be achieved.

Development phase: At this stage, the design of the production-based learning models refers to the initial planning stage, then it can be resulting the design of the production-based learning model where this model was tested its validity.

Evaluation phase: At this stage of the evaluation conducted by an expert with the assessment in the form of construct validity test production-based learning models consisting of syntax, social systems, principles of reaction and support systems. Next, test the validity of the content of the production-based learning models consisting of quality content and learning and test the validity of the presentation of the product-based learning model that consists of aspects of the use of sentences and the language and aspects of the pictures. The

Table 1: Categories validity, practicality and effectiveness of product-based learning model

Effectiveness	Practicality	Validity	Level of achievement (%)
Very effective	Very practice	Very valid	90-100
Effective	Practice	Valid	80-89
Enough effective	Enough practice	Enough valid	65-79
Less effective	Less practice	Less valid	55-64
Not effective	Not practice	Not valid	0-54

Sudjana and Ahmed (2001)

Table 2: Recapitulation results validation construct expert on learning model-based product

Aspects of validity	Percentage	Category
Syntax	90.00	Very valid
Social system	93.33	Very valid
Reaction principles	86.67	Very valid
Supporting system	90.00	Very valid
Average	90.00	Very valid

Table 3: Recapitulation of the results of expert validation on contents of products based learning model

Aspects of validity	Percentage	Category
Quality of content	90.00	Very valid
Quality of learning	93.33	Very valid
Average	91.67	Very valid

Table 4: Recapitulation of the results of expert validation on presentation of products based learning model

Aspects of validity	Percentage	Category
Aspects of sentence and language use	86.67	Very valid
Aspects of pictures	86.67	Very valid
Average	86.67	Very valid

Table 5: Recapitulation of the results of expert validation on units of lesson plan of products based learning model

Aspects of validity of lesson plan	Percentage	Category
Validation of lesson plan content	90.00	Very valid
Validation of lesson plan construction	93.33	Very valid
Validation of lesson plan language	86.67	Very valid
Average	90.00	Very valid

Table 6: Recapitulation of the practicalities of test results production based learning model by the user

Aspects of assessment	Percentage	Category
Lecturer respond	86.67	Very practice
Student's respond	81.19	Very practice
Average	83.93	Very practice

recapitulation assessment of construct validation of a product-based learning model can be seen in Table 1. Validation given by lecturer has the number of aspects/indicators and a statement that vary depending on the type of validation given. Researchers used grading scale which has scores range from 1-4 depending on the degree of agreement lecturer on production-based learning model resulted. Besides the production-based learning model that validated, learning tools such as lesson plan also validated as Table 2-4. Furthermore, for the practicality of implementing this model, the researcher distributed questionnaire to lecturer AND students about how practical this production based learning model, the recapitulation of the results can be seen in Table 5-8.

Table 7: Recapitulation of effectiveness testing of product based learning model by user

Aspects of assessment	Percentage	Category
Lecturer respond	91	Very effective
Students' respond	93	Very effective
Average	92	Very effective

Next, for the effectiveness of the application of the model in the learning process is identified by observing the learning activities. The effective application of the model is seen from the implementation of learning by teachers ranging from preliminary activities, core activities AND closing activities. Meanwhile, the effectiveness of student learning is seen from learning activities on the application of the model. In addition, to look at learning outcomes, the pre-test or test initial test and post-test that are followed the practice of electronic circuit subjects were conducted.

Results of this research are the development of product-based learning model in teaching electronic circuits is valid, practical and effective. Results of expert judgment regarding the design of the product-based learning model are valid for use on circuit-based electronic learning products. Validation is done by four experts, namely validator 1 was as a validator of construct product-based learning model, validator 2 was as a validator of presentation of products based learning model, validator 3 was as a content and validator 4 as validator of lesson plan product-based learning model. Based on the validation results obtained, the construct validation of product-based learning model shows the category of very valid product (90.00%), presenting the validation results shows a very valid category (86.67%), the contents of the validation results shows a very valid category (91.67%) and lesson plan validation results shows a very valid category (90.00%). Overall the product-based learning model which is developed in the course of electronic circuit subject is very valid (89.59%). From the test results obtained a lot of expert inputs for the improvement of products based learning model that will be used in the practice of the learning on course of circuit electronics. As for input and suggestions obtained are as follows.

Revision on product-based learning model is done in accordance to the suggestions given by the validator to produce valid products based learning model and then it can be carried out as the trials on the practicality of the product-based learning model. The practicality of this product based learning model was testes through two types of test phases, firstly is lecturer response, the results of experiments shows that practicality values obtained from the product-based learning model is 86.67% with the category of very practical. Secondly is student response. The results of the test conducted found

practical value products based learning model is 81.19% with a very practical category. Overall the learning model based on products developed in the course of Electronics Circuit is categorized as very practical (83.93%). So that, based on the expert judgment and main field testing product-based learning model developed valid and practical for use in electronic circuits teaching. Then, the product was revised based on the deficiencies of the main results of the field test. The improvements made are an improvement on faults use of spelling, punctuation and extra-additional information to help ease the production based learning model. After the revision stages is performed operational field tests.

Results of operational field trials test is the effectiveness of products based learning model in getting through the increasing student activity and with pre-test test or the initial test and post-test to the learning outcomes of students who take the course of practice electronic circuit by using product based learning model. Student activities were observed consisting of five aspects such as discussion groups to answer the problem formulation, doing lab activities in accordance with the working steps and were able to prove the hypothesis that has been formulated, actively participated in practical activities and work closely with members of the group, observing the results of the lab and analyze observations correctly AND make conclusions according to the results of lab activities. From the observation activities of students as seen from the five aspects above, at the first meeting of the activity, the students are quite active: 48%, the second meeting of the activity is 75% and in the third meeting of the activity, the students are very active, i.e., 91%. Overall, the value of the achievement of student activities in the amount of 73.33% and are in the active category. Thus, it can be said that product based learning model based on practice test in electronic circuit's course can enhance the activity of students in the learning process. From activities were observed, it can be seen that the activities are student-centered, group work, interactive activities among students (Moursund, 1999) (Table 8).

The effectiveness of products based learning model is obtained by performing a pre-test test or the initial test and post-test to the learning outcomes of students who follow the course of electronic circuit by using product-based learning model. The results of students achievements are increasing by using prior learning model-based product by 52.90% with the learning outcomes after using Product-based learning model becoming 83.87%. This result indicates that the product-based learning model effectively used to improve student learning outcomes. In addition, the application of this model also establish teamwork, communication, leadership, commitment and motivation, self-control,

Table 8: Expert advice on products based learning model in the course of practice circuit electronics

Validator/focus	Suggestions
Construction of products based learning model	It should be explained what differences of activities which are done by lecturer and students in each learning model It needs to be adjusted the determination of sufficient time for implementing lesson plan designed
Presentation of products based learning model	It needs more attention on grammar and writing in the presentation guideline for learning model
Content/materials of electronic circuit	Learning outcomes on products based learning model is not in accordance with the syllabus Pay attention to written procedures and terms used in guideline of products based learning model
Lesson plan of products based learning model	Describe more about the differences over the activities carried out by students and lecturer in learning

confidence, openness, creativity, results orientation, efficiency, values AND the capacity for adaptation and innovation in problem solving (Rios *et al.*, 2010). In addition, in learning process by using production-based learning model requires a high level of cognitive because it produces products, analysis and critical thinking. The application of product-based learning model has an impact on student's skills and competencies such as collaboration in learning ability, ability to manufacture product planning, decision-making AND time management (Dickinson *et al.*, 1998). Good lesson plans have an impact on learning outcomes in the future (Adeyemi, 2008a, b; Bowjai *et al.*, 2008; Iroha, 2008).

CONCLUSION

Based on the results and discussions that have been described, there are some conclusions as follows: product-based learning model in practice on course of electronics circuits developed is stated valid after validated by experts product-based learning model in practice on course of electronics circuit developed is stated practical after testing process to students and a lecturer in a practice subject of electronic circuits in electro industry majors of The State University of Padang.

The developed product-based learning model in the practice on course of electronic circuit is stated effective after the pre-test and post-test to the learning outcomes of students. In addition, this model has an impact on learning outcomes which are formed in the form of student's skills and competencies such as the ability to think and high-level analysis, group work and collaborative capabilities, the ability to divide their time and ability to lead.

ACKNOWLEDGEMENTS

The researcher wish to thank all who have helped materialize this study. All the universities and stakeholders were who support the successful of this study.

REFERENCES

- Adeyemi, T.O., 2008a. Library resources and students learning outcomes in secondary schools in ekiti state, Nigeria. Pak. J. Social Sci., 5: 95-103.
- Adeyemi, T.O., 2008b. Teachers' teaching experience and students' learning outcomes in secondary schools in ondo state, Nigeria. Asia J. Inform. Technol., 7: 201-209.
- Arends, R., 1997. Classroom Instructional Management. The McGraw-Hill Company, New York, USA.,.
- Bartkus, K.R., 2001. Social skills and cooperative education: A conceptual framework. J. Cooperative Educ., 36: 48-60.
- Bell, S., 2010. Project-based learning for the 21st century: Skills for the future. Clearing House, 83: 39-43.
- Blumenfeld, P.C., E. Soloway, R.W. Marx, J.S. Krajcik, M. Guzdial and A. Palincsar, 1991. Motivating project-based learning: Sustaining the doing, supporting the learning. Educ. Psychol., 26: 369-398.
- Borg, W.R., M.D. Gall and J.P. Gall, 1989. Educational Research an Introduction. Pearson Education, New York, USA.,.
- Bowjai, P., S.U. Chankong, S. Kotrbantao and W. Sata, 2008. A study of learning outcomes, attitudes and environmental conservation behavior by using inquiry, collaborative and integrated teaching methods. Pak. J. Social Sci., 5: 931-935.
- Chinowsky, P.S., H. Brown, A. Szajnman and A. Realph, 2006. Developing knowledge landscapes through project-based learning. J. Prof. Issues Eng. Educ. Pract., 132: 118-124.
- Delcourt, J., 1999. New pressures for training in the company. Eur. J. Vocational Training, 17: 3-14.
- Dickinson, K.P., S. Soukamneuth, H.C. Yu, M. Kimball and D.R. Amico *et al.*, 1998. Providing educational services in the summer youth employment and training program. MA Thesis, Technical Assistance Guide, Center for Human Resources, Brandeis University, Waltham, Massachusetts. <https://eric.ed.gov/?id=ED420756>.

- Echeverria, B., 2002. Management of professional action competence. *Rev. Investigacion Educ.*, 20: 7-43.
- Eggen, P.D. and D.P. Kauchack, 1996. *Strategies for Teachers, Teaching Content and Thinking Skills*. Allyn & Bacon Company, Boston, Massachusetts.
- Ferreira, J.A.A. and A.B. Hood, 1995. The development and validation of a holland-type portuguese vocational interest inventory. *J. Vocational Behav.*, 46: 119-130.
- Ganefri and H. Hidayat, 2015. Production based learning: An instructional design model in the context of Vocational Education and Training (VET). *Procedia Soc. Behav. Sci.*, 204: 206-211.
- Ganefri, G., 2013. The development of production-based learning approach to entrepreneurial spirit for engineering students. *Asian Soc. Sci.*, 9: 162-167.
- Gijsselaers, W.H., 1996. Connecting Problem-Based Learning with Educational Theory. In: *Bringing Problem-Based Learning to Higher Education: Theory and practice*, Wilkerson, L. and W.H. Gijsselaers (Eds.). Jossey-Bass, San Francisco, California, pp: 13-21.
- Grootings, P., 1994. From qualification to competition: What is spoken about. *Rev. Eur. Vocational Training*, 1: 5-7.
- Hackett, R.K., G.R. Martin and D.P. Rosselli, 1998. Factors related to performance ratings of engineering students in cooperative education placements. *J. Eng. Educ.*, 87: 455-458.
- Hidayat, H., 2015. Production based learning: An instructional design model in the context of Vocational Education and Training (VET). *Procedia Soc. Behav. Sci.*, 204: 206-211.
- Iroha, K., 2008. Classroom interaction patterns and students' learning outcomes in physics. *The Social Sci.*, 3: 57-60.
- Johnson, P.A., 1999. Project-based, cooperative learning in the engineering classroom. *J. Prof. Issues Eng. Educ. Practice*, 125: 8-11.
- Joyce, B.R. and M. Weil, 2004. *Models of Teaching*. 5th Edn., Prentice Hall, New Jersey.
- Kelly, W.E., 2007. Certification and accreditation in civil engineering. *J. Prof. Issues Eng. Educ. Practice*, 133: 181-187.
- Marlina, 2010. *Production Based Training Model Development in Vocational Education*. Indonesia University of Education, Bandung, Indonesia.
- Meyer, R.E., 2004. *Review of Educational Research*. McMillan, New York, USA.
- Moursund, D., 1999. *Project-based learning using information technology*. International Society for Technology in Education Publisher, Eugene, Oregon.
- Mulcahy, D., 2000. Turning the contradictions of competence: Competency-based training and beyond. *J. Vocational Educ. Training*, 52: 259-280.
- Nickerson, R.S., D.N. Perkins and E.E. Smith, 1985. *The Teaching of the Thinking*. Lawrence University, Appleton, Wisconsin.
- Parsons, C.K., E. Caylor and H.S. Simmons, 2005. Cooperative education work assignments: The role of organizational and individual factors in enhancing ABET competencies and co-op workplace well-being. *J. Eng. Educ.*, 94: 309-318.
- Rios, L.D.I., A. Cazorla, D.J.M. Puente and J.L. Yague, 2010. Project-based learning in engineering higher education: Two decades of teaching competences in real environments. *Procedia Soc. Behav. Sci.*, 2: 1368-1378.
- Sudjana, N. and R. Ahmad, 2001. *Learning Technology*. Sinar Baru Algensindo-Indonesia, Bandung, Indonesia.
- Sugiyono, 2014. *Quantitative Research Methods, Qualitative and R&D*. Alfa Beta, Bandung, Indonesia.
- Suryadi, D. and A.A. Yuza, 2009. *Production-Based Learning Model with Assessment Approach in Class Portfolio Employment Practices Building*. Indonesia University of Education, Bandung, Indonesia.
- Westwood, P.S., 2008. *What teachers need to know about teaching methods*. Australia Council for the Arts, Canberra, Australia.