Innovation Online Teaching Module Plus Digital Engineering Kit with Proteus Software through Hybrid Learning Method to Improve Student Skills

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Abstract. Demands the competence (competence) needs of the industry today is a competent workforce to the field of work. However, during this lecture material Digital Engineering (Especially Digital Electronics Basics and Digital Circuit Basics) is limited to the delivery of verbal form of lectures (classical method) is dominated by the Lecturer (Teacher Centered). Though the subject of Digital Engineering requires learning tools and is required understanding of electronic circuits, digital electronics and high logic circuits so that learners can apply in the world of work. One effort to make it happen is by creating an online teaching module and educational aids (Kit) with the help of Proteus software that can improve the skills of learners. This study aims to innovate online teaching modules plus kits in Proteus-assisted digital engineering courses through hybrid learning approaches to improve the skills of learners. The process of innovation is done by considering the skills and mastery of the technology of students (students) Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya to produce quality graduates. Use of online module plus Proteus software assisted kit through hybrid learning approach. In general, aims to obtain adequate results with affordable cost of investment, user friendly, attractive and interactive (easily adapted to the development of Information and Communication Technology). With the right design, implementation and operation, both in the form of software both in the form of Online Teaching Module, offline teaching module, Kit (Educational Viewer), and e-learning learning content (both online and off line), the use of the three tools of the expenditure will be able to adjust the standard needs of Information and Communication Technology world, both nationally and internationally.

1. Introduction

Referring to the development needs of the Engineer in the industry then the Department of Electrical Engineering - Faculty of Engineering - State University of Surabaya, especially in the Digital Engineering course requires innovative teaching modules online plus Hybrid Learning kit, in order to attract learners to learn even like the course resulting in an outcome to meet the demands described previously.

The course of Digital Engineering is a basic and combined course of several courses, among others, basic mathematics, electronic circuits, electrical circuits and logic circuits etc. Therefore, the relevance and achievement targets of each course must be clearly defined.
In an effort to make this happen, this study was conducted by reviewing the current teaching and learning process and measuring the success rate [5]. The study of literature on matters relating to the learning system with the objects of subjects that are of a composite nature are also carried out as a reference and benchmark. Industrial world as a place where the graduates will apply the ability to knowledge and skills it has also become a source that is not less important.

The main problem is how the development of learning tools can be implemented in Teaching and Learning Process (PBM) so as to give interest and interest of learners to Digital Engineering courses with approach according to industry needs [2]. In order to support the Competency Based Curriculum (CBC) industry needs, also has been prepared both manual module, computer-based module (both off line and on line) and Kit (Educational Tool) oriented to the achievement of work competence as well as accommodate the skills (Soft Skill ) learners. With regard to that, the problem that will arise is what the learning module that suits the characteristics of learning objectives is to provide attractiveness and interest of students to the Digital Engineering course so that the achievement of competence in the world of work as well as the achievement of competence in the field of Life Skills using materials the main teaching modules and computer-based learning tools.

To answer the problem, in this research will be designed the innovation of online teaching module plus digital assisted software kit of Proteus software through hybrid learning approach to improve learner's skill. It is expected that the results of this study will be able to bridge the needs of the world of work, especially from graduates of the Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya, who will later work as faculty and engineers in the industry.

2. University Strategic Plan And Research Road Map

2.1 University Strategic Plan
To realize and achieve the vision and mission of LPPM of Universitas Negeri Surabaya and consider the result of self evaluation, it can be formulated the objectives and targets of LPPM research of Universitas Negeri Surabaya, as follows: (1) Need to improve the quality and quantity of research for the mastery of science, technology or art; (2) Need to increase the number of leading research activities and national priorities that support the implementation of national development; (3) Need to improve the quality and quantity of facilities support (facilities and infrastructure); (4) Need to improve the quality of management system of LPPM Unesa; (5) Need to improve skills and skills of lecturers and students in the field of research; (6) Need to improve research cooperation with other agencies / agencies; (7) Need to improve the dissemination and marketing of research results through various media of scientific communication and social media.

2.2 University Research Road Map
The leading researches developed at Universitas Negeri Surabaya are grouped into two major groups, namely: (1) education group and (2) non-educational group and elaborated in research clusters as stated in the LPPM strategic plan of Universitas Negeri Surabaya 2016-2020 above.

In practice, research from both educational and non-educational groups can be developed through basic research, application, and capacity building, so that it can be funded by other sources outside DRPM, but still within Kemenristekdikti auspices as well as through collaborative research with various external parties. Especially for leading research is directed to the umbrella research model that has been pioneered since 2011, the theme and focus of research for leading research that is expected to be achieved and done in Unesa can be grouped based on research clusters, namely the theme and focus of research on educational and non educational clusters.

3. Theoretical Framework
Taking into account the results of the four previous studies, it can be concluded that some references of problems are: (1) The results of the above study show the effectiveness of module learning, and
from the previous research also included suggestions for module learning also applied to other courses; (2) The result of the research shows that students who agree to use contextual teaching model are also applied to other subjects as 91.18%; (3) Problems in the Digital industry that requires the standard of competence is the ability to design analog and digital electronics hardware; (4) The teaching and learning process in the lectures that do not integrate between the use of teaching modules and props and combined with the use of e-learning. It will then be directed to a wider scope and scope and the use of more complex and varied learning tools; (5) Produce a model of Blended Learning method that combines Face-to-Face Learning (classical method) with Computer Based Learning (e-Learning method) so that the Teaching and Learning Process (PBM) becomes unlimited time and space
Thus it is not excessive to do research with the title of innovative online teaching module plus digital assisted software kit Proteus software through hybrid learning approach to improve the skills of learners.

3.1 Learning Strategy Using Media (tools) Figure
To support the teaching and learning process (PBM) using the media (tool) visual, it is necessary infrastructure in the form of learning tools consisting of: Hybrid Learning is a software application that can be run off line and on line to help Teaching and Learning Process (PBM) in classical

3.2 Contextual Teaching and Learning
According to Nurhadi et al (2004: 13) Contextual Teaching and Learning is a concept of learning where the teacher presents the real world into the classroom and encourages students to make connections between their knowledge and application in daily life.
Nurhadi et al (2004: 31) mentions that in Contextual Teaching and Learning there are seven important components or better known as the seven principles of Contextual Teaching and Learning, among others: (a) Constructivism (Constructivism); (b) Finding (Inquiry); (c) Questioning; (d) Community Learning (Learning Community); (e) Departure (Device); (f) Reflection; (g) Authentic Assessment.
Nurhadi et al (2004) explained that contextual learning should emphasize on: (1) Problem Based Learning; (2) Authentic Teaching; (3) Inquiri Based Learning; (4) Project-Based Learning / Duties; (5) Work-Based Learning; (6) Learning-Based Services; (7) Cooperative Learning.

3.3 Hybrid Learning
Hybrid learning is not a new concept, originally the paradigm Hybrid learning (often called Blended Learning) is a traditional learning method that supported e-services (Lawrence Tomei, 2008). E-services are designed to maximize the results of traditional learning. The influence of technological development, then Hybrid learning also developed by combining traditional learning with learning that utilize information and communication technology. Brunner quoted Solomon Negash et al (2008) revealed that hybrid learning have advantages, which are: (1) student performance and retention increase, (2) time and flexibility for students is greater, (3) colors on the teaching palette multiply, (4) depth of community enhances the learning environment, (5) the breadth of ‘interaction’ is enlarged, 6) it allows for a gradual transition from face-to-face to online learning, and (6) expectations are higher.
Hybrid learning combines various learning models, such as traditional learning and e-learning modeling. Traditional learning (face to face) in this study uses direct learning model and project / task based learning. The direct instruction model is based on the principles of behavioral psychology and social learning theory, especially about modeling. This is based on the fact that behavioral change in learning is largely derived from modeling, ie the behavior and experience (success and failure) of others. The Direct Learning Model is designed to help students to gain procedural knowledge, which is about structured knowledge and can be taught step by step (Mohamad Nur, 2011). This direct learning, the interaction of lecturers with students is quite intensive, both in class and in the laboratory (learning practice) and also the students are given a lot of practice and duties. In addition, this study applying e-learning model learning is learning that supported the internet with material that has been planned. Learning e-learning aims to make students more independent and responsible for learning. In other words, the e-learning learning atmosphere will force students to play a more active role in their learning.

Lecturers can upload the material on the e-learning site and students can learn it by opening the e-learning site anywhere. Learning can be delivered synchronously (at the same time) or asynchronously (at different times). Materials delivered through this medium have text, graphics, animations, simulations, audio and video, and provide ease for discussion groups with the help of chat forums, e-mails, bulletin boards.

Learning should be interactive, inspiring, fun, challenging, and motivating students to participate actively, and provide sufficient space for initiative, creativity, and independence according to their talents, interests, and physical and psychological development. The purpose of learning is the process to change student behavior in accordance with the competencies to be achieved. Competence contains the knowledge, psychomotor, and affective unity required for the fulfillment of professional duties. Competencies based on vocational education form the competencies needed for professional development throughout life. Schaap (2009: 482) states that the development of professional competences is a main objective of competence-based vocational education. Learning is viewed as giving meaning to experiences in a process of continuous progressive recontextualisation.

4. Research Methodology

This research is based on the development research design with the implementation procedure grouped into three stages. The study design is as follows.

4.1 First Stage

Develop a survey design and development plan through workshop techniques, brainstorming and focus group discussions.

4.2 Second Stage

Research development and quasi experimental research with pre posttest group only design. As for the preparation of synchronization of curriculum materials relevant to the needs of employment, the...
selection of essential topics, and the integration of topics into competencies and sub-competencies, as well as the design of online teaching module module plus digital kit assisted Proteus software through hybrid learning approach to improve the skills learners with reference to 4D devices, which include define, design, develop, and disseminate (Thiagarajan, Semmel, and Semmel, 1974).

4.3 Third Stage
Perform empirical tests of modules that have been prepared. At this stage the product research module is actually nearing the final. Nevertheless, to obtain empirical evidence that the research product has been feasible then some of the research product is tested empirically on a limited circle that is Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya. The results of limited trials are used as materials for the formulation of recommendations for use of research products (disseminate stage).

Implementation of empirical experiments conducted with the design of pre postest group only by selecting students, preferably the force of learners who are programming subjects studied Digital Engineering as a sample test. Implementation of the trial will be adjusted to the existing academic calendar schedule in the Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya and SMK.

The effectiveness of online teaching module innovation plus Proteus software assisted digital assist kit through hybrid learning approach to improve learner skills will be analyzed with inferential statistics, in the form of different test ( t test and anova).

5. Result And Output

5.1 Data on the results of INA Skills (LKS) 2012 - 2016
From the data of INA Skills (LKS) 2012 - 2016 it can be seen that the module that has been developed has reached the fourth stage of research development method that is disseminate method. So that the module is perfect and ready to be duplicated and deployed as learning tools of digital technique course. In the INA Skills (LKS), the teaching module materials that are based on the contest are not only specific to the Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya, but multi disciplines, and research objects developed not necessarily the latest technology or technology just to be useful, but include the development of learning tools.

5.2 Data result of dissemination of learning tools to students
Based on data analysis of student responses about the activities of learning device socialization conducted on students Electrical Engineering Department - Faculty of Engineering - State University of Surabaya above produces the data as follows. For questions 1, 2, and 3 all respondents consisting of 10 students from representatives of various courses in the Department of Electrical Engineering - Faculty of Engineering - Surabaya State University (100%) answered did not understand about the application of digital engineering in the industry, or about technical equipment digital. Respondents also argue that the competence of digital techniques is not taught in the Department of Electrical Engineering - Faculty of Engineering - Universitas Negeri Surabaya. This shows that the competence image of the Department of Electrical Engineering - Faculty of Engineering - Surabaya State University is currently limited to the basic materials of electrical engineering, ranging from logic circuits, electronic frames, and microprocessors only, not to mention the competence of digital techniques in the industry. Whereas currently the development of automation in the industry have many who use industrial robots.

For question no. 4 on hybrid learning technique-based digital module respondents who answered interesting is as many as 9 students (90%) of 10 students representatives of SMK-SMK and who think "not interesting" as much as 1 student (10%). As for the question no. 5 and no. 6 on the use of
computers and aids of module respondents who think "interesting" as many as 10 students (100%) and who say "not interesting" as much as none (0%). This indicates a positive response to learning tools in the form of modules and learning tools developed.

For question no. 7 all respondents as many as 10 people (100%) argue that the module developed can be easier in understanding the material. All respondents (100%) thought they were happy and motivated by learning using modules and teaching aids. This indicates that the module can motivate learners and help learners to understand the material.

5.3 Data of learning device validation result by lecturer

The completed module was then validated to 7 validators consisting of lecturers of instructional experts, educational experts, engineering experts and grammarians. And the average validator assessment result is 3.34 which fall into either category. So that the module can be used in trial 2 is a trial conducted on digital engineering lectures.

6. Conclusion

Based on the results of data analysis and discussion, the researchers can take the following conclusions:

This developed module is the results of research and monitoring of the researcher and team leader for 4 years continuously trying to develop applied product research entitled innovative online teaching module plus digital assisted software kit of Proteus software through hybrid learning approach to improve students' in the future capable of producing innovative online teaching modules plus digital assisted software kit Proteus software through hybrid learning approach to improve the skills of learners.

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