DEVELOPMENT OF STUDENT MODULE IN LEARNING DRAWING TECHNIQUE WITH COMPETENCY BASED LEARNING

Albertus Laurensius Setyabudhi[1*], Sanusi[2], Hermansyah[3], Okta Veza[4]
[1,2]Teknik Industri, Fakultas Teknik, Universitas Ibnu Sina
[3,4]Teknik Informatika, Fakultas Teknik, Universitas Ibnu Sina
*email: abyan@uis.ac.id

ABSTRACT

This study aims to produce teaching materials in the form of handbooks to improve the quality of learning in the industrial engineering department of the school of Engineering, Ibnu Sina Batam. This study uses a 4D Model that is defined, designed, developed and disseminated. In the determination stage, curriculum analysis and student analysis are carried out before designing the learning module at the design stage. At the development stage, validity, practicality, and effectiveness are tested. A total of 40 Industrial Engineering 2A college students were subjected to this study and 35 Industrial Engineering 2F college students were the control class that did not use modules in the learning process. The results showed that the module produced was valid. The module validity test was obtained as 4.3 for the material and 4.2 for the media which means that the module was developed in a valid category. The practicality test measured from student questionnaire obtained 85%, which means it is very practical. The results of the development module are also used effectively which is indicated by the level of completeness of the students by 86% and can increase student motivation. Student activity also increased by a percentage of 84.8%.

 Keywords: handbook, validity, practicality, effectiveness, competency

ABSTRAK

Penelitian ini bertujuan untuk menghasilkan bahan ajar dalam bentuk buku pegangan untuk meningkatkan kualitas pembelajaran di departemen teknik industri di sekolah Teknik, Ibnu Sina Batam. Studi ini menggunakan Model 4D yang didefinisikan, dirancang, dikembangkan dan disebarluaskan. Pada tahap penentuan, analisis kurikulum dan analisis siswa dilakukan sebelum merancang modul pembelajaran pada tahap desain. Pada tahap pengembangan, validitas, praktikalis, dan efektivitas diuji. Sebanyak 40 mahasiswa Teknik Industri 2A menjadi sasaran penelitian ini dan 35 mahasiswa Teknik Industri 2F adalah kelas kontrol yang tidak menggunakan modul dalam proses pembelajaran. Hasil penelitian menunjukkan bahwa modul yang dihasilkan valid. Tes validitas modul diperoleh sebagai 4,3 untuk materi dan 4,2 untuk media yang berarti bahwa modul dikembangkan dalam kategori yang valid. Uji praktikalis yang diukur dari angket siswa diperoleh 85%, yang artinya sangat praktis. Hasil pengembangan modul juga digunakan secara efektif yang ditunjukkan oleh tingkat kelengkapan siswa sebesar 86% dan dapat meningkatkan motivasi siswa. Aktivitas siswa juga meningkat dengan persentase 84,8%.

Kata Kunci: buku ajar, validitas, praktikalis, efektifitas, kompetensi

INTRODUCTION

The world of education is also an inseparable part of human life. With education, a person has basic capital in competition in the current era of globalization. Education as a human resource should receive continuous attention in efforts to improve its quality. Improving the quality of education also means improving the quality of human resources, because humans are the first and foremost product of education itself. Improving the quality of human resources is a reflection of the success of a nation in advancing human civilization. The quality of education will determine the survival of a nation. Therefore the world of education is demanded to be able to create quality human resources and achievement. Humans are expected to be able to solve problems faced and create new technologies to improve human well-being and comfort in carrying out activities. However, behind that education is a human engineering activity. Therefore, humans also determine the success of education itself for human success as well.

In the current era of globalization, the demands of learning in universities are in addition to demanding hard skills, students are also required to be able to improve soft skills in all fields, so they are ready to enter the workforce and become quality resources. Engineering education should, in addition to providing sufficient theories, also need to provide examples of problem-solving that are real projects by utilizing learning strategies that support engineering education. (Purnawan, 2007).

One learning strategy that can help college students to have creative thinking, problem-solving, and interaction as well as assisting in investigations that lead to solving real problems is competency-based learning. The purpose of competency-based learning is very important because it is a form of implementation rather than a Competency-Based Curriculum. So the expected goals in competency-based learning are in line with the expected goals in the Competency-Based Curriculum. Curriculum changes are very important in efforts to advance education. The importance of these changes is in accordance with Abdul Malik Fadjar's statement that in education, there are four things that must be seen (1) growth, (2) change, (3) renewal, and (4) continuity (Kompas 15/9, 2001). However, these changes should be followed by the mindset of practitioners and educational theorists towards the concept of learning. Costa (1999) states that changing the curriculum means changing your mind.

Competency-based learning emphasizes learning towards the creation and improvement of a series of abilities and potential college students in order to be able to anticipate the challenges of various lives. This means that if all this time learning is more oriented to aspects of knowledge and target material that tends to verbalize and lacks applicability, then in competency-based learning is more emphasized on aspects of knowledge and skills targets. Through this competency-based learning, it is expected that the quality of graduates is more meaningful and has certain competencies according to environmental needs.

In teaching and learning activities, it takes the involvement of educators, students, and learning resources. And the most frequently used learning resources are teaching materials. The selection of teaching materials in the form of teaching modules is because modules have become very urgent needs both for lecturers as educators and students as knowledge prosecutors. The application of the module can condition the learning activities to be more well planned, independent, and with clear outputs so that besides learning can be done face-to-face, college students can also learn independently wherever they are.

The industrial engineering study program of the Ibnu Sina Batam Technical College is a long-established study program, wherein its implementation, the Technique Drawing still lacks standard teaching materials and has special characteristics in accordance with the Indonesian National Qualification Framework curriculum which has been formulated by study program. Therefore, the researcher wants the Drawing Technique to have teaching materials in the form of lecture modules that are in accordance with the vision and mission of the study program integrated into the curriculum of the Indonesian National Qualification Framework based on Competency-Based Learning.

On the basis of some of the above phenomena the researchers are interested in developing teaching materials in the form of teaching modules for Drawing Competency-based Learning based techniques, then the problem can be formulated as follows:

1. what is the process of development of student module in learning drawing technique with competency-based learning to improve the quality of learning outcomes?
2. how is the design of development of student module in learning drawing technique with competency-based learning as a learning resource that is able to create student soft skills?

METHOD OF RESEARCH

Types of research

In this study, researchers developed a module based on a development model called the 4-D (four D model) which consisted of 4 stages: (1) Define, (2) Design, (3) Develop, (4) Disseminate. (Thiagarajan, 1974).
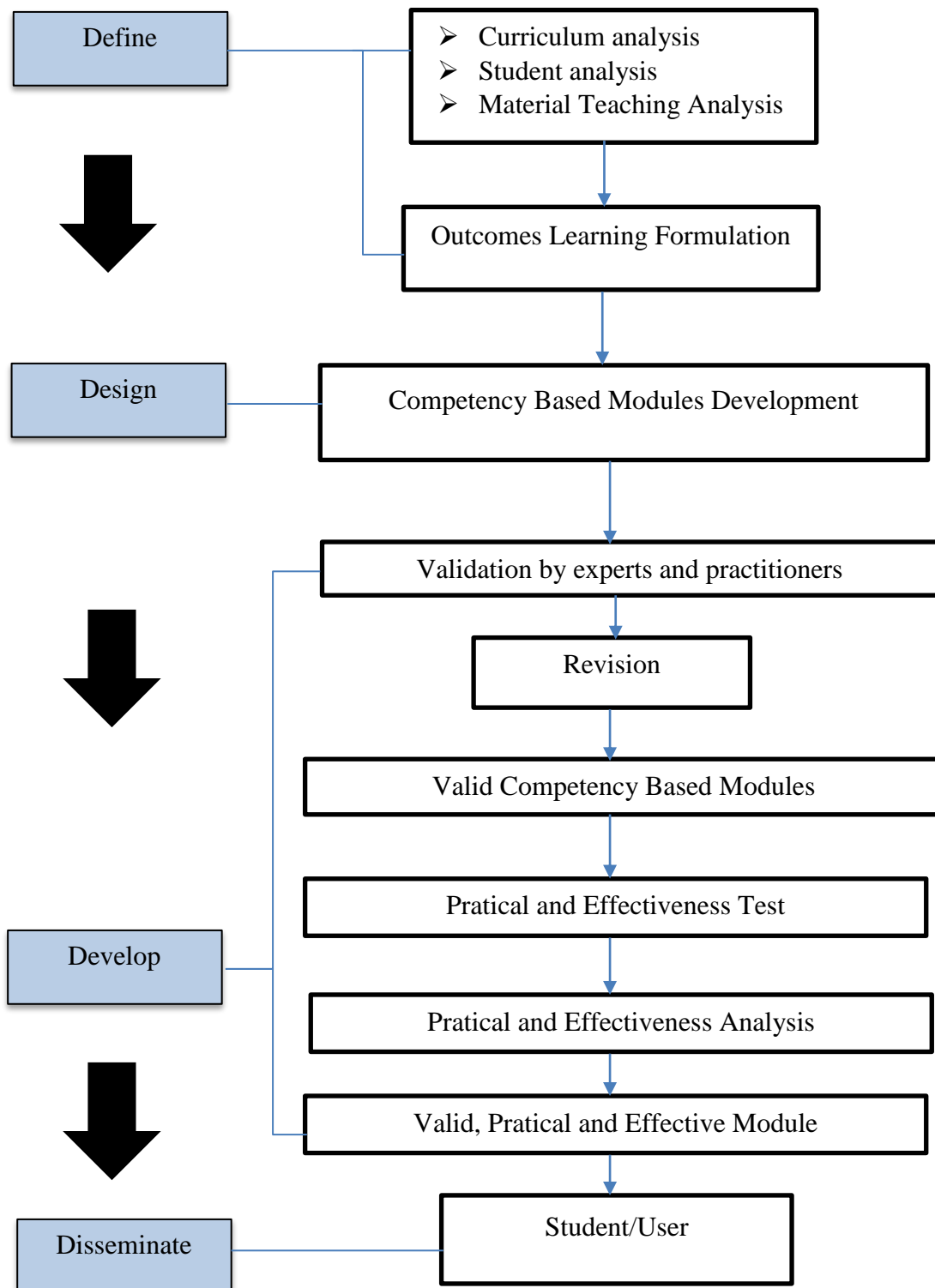
Research design

Define →
- Curriculum analysis
- Student analysis
- Material Teaching Analysis

Outcomes Learning Formulation

Design → Competency Based Modules Development

Validation by experts and practitioners

Revision

Valid Competency Based Modules

Pratical and Effectiveness Test

Develop → Pratical and Effectiveness Analysis

Valid, Pratical and Effective Module

Disseminate → Student/User

Figure 1. Competency-Based Module Development Planning Diagram (Modification from Thiagarajan, 1974)

Data collection technique

This study uses data collection techniques in the form of observations, interviews, and questionnaires conducted on prospective users, namely the head of industrial engineering study program, lecturers, practitioners, and students. Literature study related to the development of teaching modules, competency-based learning, 4D method development module design and other relevant material.

Data analysis technique

Data obtained from the results of validation and data taken from the implementation of the trial were analyzed with their respective techniques, including module validation data analysis techniques, module practicality data analysis techniques, and module effectiveness data analysis techniques.

Findings

The validity test results of the development modules show that the modules produced are valid both in terms of material and media. Validity data is shown in the following table:

Table 1. Module Material Validation Results

No	Assessment Aspects	Average	Category
1	aspect of content feasibility	4,2	Valid
2	aspect of feasibility of presentation	4,4	Valid
3	Language Aspects	4,4	Valid
	Average	4,3	Valid

Table 2. Results of media validation for modules

No	Assessment Aspects	Average	Category
1	Aspect of graph feasibility	4,2	Valid
2	Presentation	4,2	Valid

	aspect of module		
	Average	4,2	Valid

The table above shows that the development module is in accordance with Competency-based learning, has an interesting presentation and is able to increase student interest in learning and has an effective language. Modules are also practical and can increase student motivation and make the learning process more effective. This is shown from the results of the module practicality as follows:

Table 3. Module Practicality Test Results

No	Rated aspect	Percentage	Category
1	display	85 %	Very practical
2	Material	85 %	Very practical
3	benefits	85 %	Very practical
	Average	85 %	Very practical

From the practicality test, the figure is 85% in the aspects of appearance, material, and benefits. From this value, it can be said that students are able to study the material in modules very well. In terms of appearance, the media used in the module can increase the attractiveness of students to learn very well. In terms of benefits, the module is able to increase student motivation.

The use of development outcomes modules based on Competency-based learning in the learning process is more effective than the conventional learning process. In the following table and figure, it is shown that the use of modules in learning can improve student learning outcomes and the percentage of student learning completeness in drawing technique.

Table 4. Percentage of student learning outcomes

No	Treatment	graduation percentage
1	Using module	86%
2	Without Modules	54%
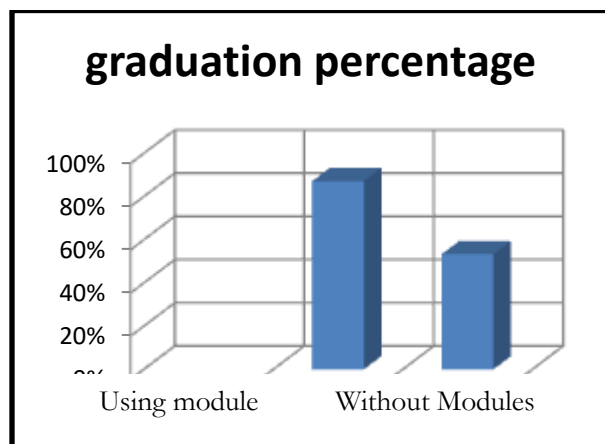
Picture 1. Comparison graph of student learning outcomes using modules and without using modules on students the industrial engineering department of the school of Engineering, Ibnu Sina Batam

The effectiveness of teaching material in addition to being seen from the percentage of learning can also be determined from the effectiveness during the learning process, ie where students can participate actively in the learning process. In Competency-based learning, it is expected that in the learning process scientific approaches can be applied. Students are expected to be able to observe, reason, ask, try and form networks. In learning to use modules, the five aspects of a scientific approach in Competency-based learning can be improved. This can be shown in the following table:

Table 5. The results of observing student activities in learning using modules

No	Aspects of observation of student activities	Average	Category
1	Observing Ability	95 %	Very good
2	Ask the Lecturer	75 %	Good enough
3	Reasoning Ability	72 %	Good enough
4	the Ability Try to work on the questions	89 %	Very good
5	Ability to discuss with friends	93 %	Very good
	Average	84,8 %	Very good

The data obtained an average score of 84.8% with a good category which means that students are able to follow the learning process using modules properly and the scientific approach can be implemented well. This is in line with research conducted by Arda Widyatama and Agung Prijo Budijono, entitled the development of teaching modules drawing the subject matter of projections and pieces equipped with lego-assisted block media aids assisted by information technology in 2018. The results showed (1) module products developed very feasible to use, (2) students show a positive response to the modules developed, (3) student learning outcomes have increased with both categories.

Based on the research conducted, it can be concluded that teaching materials are very important in the teaching and learning process because teaching materials in the learning process will be better planned and the learning objectives will be achieved. Teaching materials must refer to two concepts, namely: (1) subject matter which

is the contents of the curriculum in the form of concepts used to achieve learning objectives, and (2) learning material consisting of a unit of subject matter and materials compiled to achieve learning objectives.

DISCUSSION / RESEARCH FINDING

The development model used in this study is the development of the 4D model which includes define, design, develop, and disseminate. The feasibility of learning media is obtained from the feasibility assessment conducted by media expert lecturers, material expert lecturers, and course lecturers as material experts. So that if it is developed in accordance with the development procedures, it will produce a quality product and is suitable for use as a learning resource.

Module feasibility testing by media expert lecturers, material expert lecturers, and course lecturers produced several inputs and revisions. These inputs and revisions are then used to perfect learning media so that they are more interactive, detailed, and easily understood by students.

The results of the validation of the material expert lecturers get an average of 4.3 in the valid category, while the results of the validation of the media expert get an average score of 4.2 including the valid category. From the results of the analysis of the validation data of media expert lecturers and material expert lecturers in the industrial engineering study program at the Faculty of Engineering, Ibn Sina University, the media developed are included in the valid category so that the module can be used for the learning process of industrial engineering study program students who study drawing techniques at the School of Engineering Ibnu Sina Batam.

CONCLUSION

From the research that has been carried out, it can be concluded that:

1. An engineering drawing learning module has been produced for industrial engineering majors based on Competency-based learning using 4-D Models.
2. The validity test of the development module with Competency-based learning obtained a value of 4.3 for material with a valid category, and a value of 4.2 for media with a valid category
3. The practicality of the results of the development module can be seen from the response of students with a score of 85% with a very practical categorical.
4. This technique drawing learning module, the results of its development are very effective in terms of the learning outcomes of students of Class 2A of Industrial Engineering at school of engineering Ibnu Sina Batam which has a mastery value of 86%. This completeness score is higher than of class 2F Industrial Engineering at School of Engineering Ibnu Sina Batam who does not use modules with a passing grade of 54%

RECOMENDATIONS

Based on the research that has been done, the researchers suggest several things to the lecturers and other researchers as follows:

1. The learning of technique drawing module with Competency-based learning do not yet have good quality for the whole of one school year, for that in the preparation of the next module needs to be improved and developed so that it becomes a good teaching material overall

2. Lecturers must further improve their skills in choosing learning methods that are appropriate to the curriculum of the industrial engineering department and student characteristics so that learning activities using these modules become more attractive to students.

3. In this module, there are animated images that are poured in interesting shapes. For further research, it needs to be developed further in making learning media using animation so that the module can be more interesting and the trials are extended to several other campuses which then proceed to the dissemination stage.

REFERENCES

Anwar, I. (2010). Pengembangan Bahan Ajar. Bahan Kuliah Online. Direktori UPI. Bandung.

Burke, J. W. (1989). Competency based education and training. Psychology Press.

Costa, A. (2002). Changing curriculum means changing your mind. Tenth International Conference on Thinking, Harrogate, England.

Doppelt, Y. (2003). Implementation and assessment of project-based learning in a flexible environment. International Journal of Technology and Design Education, 13(3), 255–272.

Purnawan, Y. (2007). Pengenalan PBL (Pembelajaran Berbasis Proyek).

Spencer, L. M., & Spencer, P. S. M. (2008). Competence at Work models for superior performance. John Wiley & Sons.

Stufflebeam, D. L. (2007). CIPP evaluation model checklist. Retrieved January, 8, 2012.

Wheelen, T. L., Hunger, J. D., Hoffman, A. N., & Bamford, C. E. (2010). Strategic management and business policy. Prentice Hall New Jersey.

Winkel, W. S. (2006). Psikologi Pengajaran (Cetakan ke-15). Jakarta: Grasindo.

Yunita, N., & Susilowati, E. (2010). Makalah Pengembangan Modul. Universitas Sebelas Maret: Lembaga Penelitian Dan Pengabdian Masyarakat.