



## THE LEARNING MEDIA DEVELOPMENT MODULE OF TECHNICAL IMAGES BASED ON CYCLE 5E LEARNING APPROACH

Indriana Yuni Astuti<sup>1</sup>, Indah Widiastuti<sup>2</sup> and Basori<sup>3</sup>

<sup>1,2</sup>Mechanical Engineering Education, Universitas Sebelas Maret Surakarta

<sup>3</sup>Informatic and Computer Engineering Education, Universitas Sebelas Maret Surakarta

Email: [yunia3396@gmail.com](mailto:yunia3396@gmail.com)

### KEYWORDS

Module  
4D  
Drawing Technique  
Learning Cycle  
5E

### ABSTRACT

This research analysis engineering drawing module that is developed based on Learning Cycle 5E approach includes 2013 engagement, exploration, elaboration, evaluation and adaptation to the Competency Standards and Basic Competencies of Curriculum. Learning Cycle 5E was chosen as a development model because it is considered in line with the Curriculum 2013. The objective of this research are: (1) Developing a learning media Drawing Technique in the form of module based on 5E learning cycle approach as supporting technical drawings of subjects in Vocational High Schools. (2) Doing accessibility analysis developing a learning media drawings technique in the form of a module based on 5E's learning cycle approach as supporting technical drawings of subjects in Vocational based on material assessment, media, and teacher's subjects. Developing a learning media module drawing technique based on learning cycle approach 5E refer to developing 4D thiagarajan model. Developing 4D consists of 4 models main steps: define, design, development, and disseminate. Because there are some reason, this developing research is limited to development steps. While for the teacher is responding to the questionnaire. The results of this research are: (1) A 5E Learning Cycle Engineering Drawing Module is developed on the basic competency of the size tags and layout of image size, sign recognition and the location of the cut image, the introduction and application of the cut image type. (2) Feasibility study engineering drawings Module 5E Approach Learning-based media derived from the results of the expert assessment of the material and media experts. The result of the expert assessment of the download material an average percentage 87.5% it is included on the criterion of "very good". The results of the assessment of the experts the media earn the average percentage of 88.006% and included on the criterion of "very good", and now from the responses the teacher obtained the mean percentage of 91.67%, it is included in the criteria of "very good".

### INTRODUCTION

At the year 2014/2015, the government officially applies the 2013 curriculum on a national scale (Permendikbud, 2013). Changes in the curriculum of KTSP into the 2013 curriculum will have consequences for change. According to Nasution (2008) of the change can be: substitution (replacing textbooks), alteration (increase or decrease the hours of lessons fields of study particular), variation (change in method), (Extra time teacher to get energy and facilities new), and new orientation (change in teaching orientation). In connection with the changes in the curriculum, it is necessary to adjust the module to the applicable curriculum.

K 2013 curriculum demands child to get used to observing, asking, thinking, trying, and communicating, also increases curiosity (Mendikbud, 2014). Modules that will be developed should meet these expectations. One strategy that is able to realize these expectations is the Learning Cycle ( LC ) learning strategy . LC is a student-centered learning strategy. LC consists of a series of stages of activities organized in such a way that students can master the competencies that must be achieved in learning with the active role of students (Dasna: 2003). According to Wena (2009) LC consists of five stages: (1) interest generation, (2) exploration (3) explanation, (4) elaboration (5) evaluation

This research is a development research that aims to developing media in the form education and Drafting module approach based Learning Cycle 5E and Conduct a feasibility analysis of the development of learning media that.

Miarso in Rohman (2013: 34), learning media is everything that can stimulate the learning process. Module is wrong one type from learning media. Modules are printed teaching materials designed to be studied independently by students. Modules are also called media for independent learning because there are instructions for self-study, so readers can do learning activities without the presence of direct instructors (Syamsudin, 2005: 168). As wrong one learning medium module have some characteristics among them: Self Instructional; Self Contained; Stand alone; Adaptive; Friendly user.

Learning Cycle is a constructivist-based science learning model. This model was developed by J. Myron Atkin, Robert Karplus and the SCIS (Science Curriculum Improvement Study ) Group , at the University of California, Berkeley, United States since 1967 (Dean Zollman & N. Sanjay Rebello, 1998: 1). Constructivism theory considers that learning is a process of building knowledge little by little, which then results are expanded through a limited context and not suddenly. Knowledge is not a set of facts, concepts, or rules that are ready to be taken or remembered. Humans must construct that knowledge and give meaning through real experience (Baharuddin and Esa Nur Wahyuni, 2007: 115-116). 5E Learning Cycle consists of from 5 stages of learning including: Preliminary phase; Exploration phase; Phase explanation; Elaboration Phase; Phase Evaluation.

## RESEARCH METHODS

The procedure for developing technical drawing learning media refers to the 4D ( four-D model ) development model. This model was developed by S. Thiagarajan, Dorothy S. Semmel, and Melvyn I. Semmel (1974: 5). The 4D development model consists for 4 stages main namely: define, design, development, and disseminate. This method and model is chosen because in Indonesia the main foundation of education is based on the curriculum, so the preparation of the learning device in advance must be carried out in the curriculum analysis.

Phase definition is useful to determine and define the needs in the learning process, and to gather information relating to the products to be developed. This stage consists of initial analysis, analysis of students, task analysis, concept analysis, and analysis of learning objectives.

The Design phase aims to design a teaching material in the form of a module that can be used in technical drawing learning. This stage consists of media selection, format selection, and initial design.

Development stage is a tranlation process from the planning stage. Parts that have been planned in the planning stage will be arranged and designed in such a way that they become a draft product at this stage. The finished product draft is then validated and assessed to 3 material and media validator. This development phase aims to produce 5E Learning Cycle based modules that have been revised based on experts. Dissemination Phase In this study only limited dissemination was carried out. This stage is also used as an evaluation stage. Evaluation at this stage is carried out by giving questionnaires to technical drawing subject teachers. Method data collection used in research this is observation, method documentation, literature, and questioners. Instrument The research is sheet validation material, sheet media validation, and sheet teacher's response. Technique data analysis on research this is as the following:

**Qualitative analysis** is used to describe the results of observations, interviews, validation results suggestions, and documentation data. The data was analyzed in qualitative descriptive, some suggestions will be used for product improvement at the revision stage, while documentation records and observation records are described to know the direction of developing learning media.

**Quantitative Analysis.** Validation of learning modules 5E learning cycle performed by the validator materials and instructional media were analyzed using descriptive techniques percentage by the following formula (Sudjiono 2008) :

$$P = \frac{f}{N} \times 100\%$$

*Description:*

P = percentage score

f = number score obtained

N = maximum score number

The material validator and the media will answer questions by scoring according to the validation rubric (highest score = 4 and lowest score = 1). The eligibility criteria for LKS are determined using the Sudjana formula (2005) so that the qualitative criteria are presented in Table 4.4

Table 1. Percentage Range and Qualitative Criteria for Media Feasibility Tests

Range percentage (%)	Criteria qualitative
82% - 100%	Very decent
63% - 81%	Worthy
44% - 62%	Inadequate
25% - 43%	Not feasible

## RESULTS AND DISCUSSION

### Development Module

Research this developing learning media picture based techniques approach 5E Learning Cycle. Development model device on research this refer to in the Thiagarajan Model which consists from four stage namely, the definition, design, development, and disseminate.

**Stage Definition (Define)** consists of five main steps, namely an initial analysis-end by analyzing journal learning activities in class XI TPM, analysis of students conducted by analyzing documents showing the competence that has been obtained by the students in advance, material analysis, task analysis, and specifications of learning objectives are carried out by analyzing the syllabus in accordance with the applicable curriculum.

**Stage Design (Design)** after getting the problem of the definition phase, then performed the design. This design phase aims to design a teaching material in the form of technical drawing learning modules. This design stage produces: Modules are selected as the media that will be developed, the learning media development format developed is oriented to the 5E Learning Cycle learning model including Management, Exploration, Explanation, Elaboration, Evaluation, and adapted to the Competency and Basic Competency Standards of the 2013 Curriculum. at this stage resulting in the initial design (initial design) in the form: design covers that depict the material and completeness of the modules developed, Syllabus Curriculum 2013, instructions for Use module, material Description and instructions for Use module.

**Development stage** to produce a Technical Module of a 5E Learning Cycle Based. Results from the development stage (development) is as follows:

a. Engagement (Introduction)

Engagement is an introduction stage. The Engagement Stage in this technical drawing module contains an invitation to demonstrate an activity of "cutting" an object. This aims to form the concept of students' understanding of the view of the piece / cross section / slice on the inside of a cut object. It is expected that with a view of pieces or cross sections or slices this will give a clearer and more real picture of the parts of the object that were not visible.

b. Exploration

At this stage students are given the opportunity to work together in small groups without teaching directly from the teacher, to test predictions, do and record observations and ideas through activities that have been listed in the module and explore information from various sources. Students are directed to form 4-5 small groups and then discuss existing hypotheses or create new hypotheses. Try alternative solutions with colleagues around him, do and record observations and ideas or opinions that develop in discussions or obtained from various sources. So that students have the opportunity to work together in groups. At this stage the teacher acts as a facilitator and

motivator. This phase provides opportunities for students to voice their conflicting ideas and can cause debate and an analysis of why they have such ideas

c. Explanation

This stage contains commands so that students present the results of their discussions in front of the class in their own language. This stage leads to discussion activities. In this phase the teacher has the duty to encourage students to explain a concept with their own group / thoughts. This phase aims to complete, refine and develop concepts obtained by students. The teacher collects information from students related to exploration experience.

d. Elaboration

Learning activities in this phase direct students to apply the concepts that have been learned, make connections between concepts and apply them to new situations through follow-up activities that can strengthen and expand the concepts that have been learned. The follow-up activities can take the form of exercises related to the material being studied. Students are asked to do the exercises independently by applying the concept of understanding from the previous stage. Students will be able to learn meaningfully, because they have been able to apply / apply the new concepts learned in new situations.

e. Phase Evaluation (Evaluation)

The last stage in this cycle is evaluation. This stage contains questions that are used to measure students' understanding of related material. In this module, the evaluation phase is arranged in 1 section consisting of three materials. Students are asked to work on evaluation questions by connecting the pieces of concepts that have been obtained before. The teacher can observe students' knowledge and understanding in applying new concepts through openly asked questions and find answers that use observations, evidence, and explanations obtained previously.

**Dissemination Phase** is also used as an evaluation phase. Evaluation at this stage is carried out by giving questionnaires to technical drawing subject teachers. Based on the results of the questionnaire The teacher's response shows that the average percentage of the results given by the teachers is 91.67%. Under the provisions of scale contained in Chapter III p refers to the percentage results criteria very well.

### Module Validation Results

Evaluation of module feasibility is based on instrument items contained in the assessment guidelines for teaching materials from BSNP 2006. Product validation data includes product validation data from material experts and media experts.

a. Results of Assessment of Material Validation

Based on the results of the validation assessment of the experts, the material (attached) shows the total score of Expert I is 80. Expert II 88, and Expert III 82. The three scores are then on average resulting in an average score of 82. Based on the formula for calculating quantitative analysis contained in CHAPTER III shows the percentage results of 87.5%. The percentage of validation results refers to very feasible criteria based on the qualitative criteria of the media feasibility test contained in CHAPTER III.

b. Media Validation Assessment Results

Based on the results of the validation of media experts (attached) shows the number of Expert I scores is 54. Expert II 59, and Expert III 55. The three scores are then averaged so that it produces an average score of 56. Based on the formula for calculating quantitative analysis contained in CHAPTER III shows the percentage results of 88.006. The percentage of validation results refers to very feasible criteria based on the qualitative criteria of the media feasibility test contained in CHAPTER III.

### Module Repair

Module improvements are done after validation by experts. Improvements made are based on suggestions and comments from experts at the time of assessment. Based on the results of expert material validation, media expert validation, teacher response, as well as improvements to the modules that have been carried out, the technical drawing module based on the 5E Learning Cycle approach is declared feasible to be used as an instrument for further development research. The module developed based on the 5E Learning Cycle approach includes a series of learning cycles. Learner cycle strategies relate to the overall content that must be learned, the order of the learning process, and adapted to the current curriculum. Learning to use a learning cycle strategy will result in meaningful learning that improves student learning achievement. This result is in accordance with Ahmed (2003). Further research must be carried out to examine the effect of using modules based on the 5E Learning Cycle approach.

## CONCLUSION

Based on the results of the research and discussion it can be concluded that: (1). the development of technical drawing module learning media based on the 5e learning cycle approach refers to thiagarajan's4d development model. The 4d development model consists of 4 main stages, namely: define, design, development and disseminate. Because of several reasons this development research is limited to the development stage. While for the disseminate stage (dissemination / evaluation) is done by distributing the teacher's questionnaire responses. (2) Feasibility of the Drawing Module learning media based approach 5E Learning Cycle is obtained from the assessment of material experts and media experts. The assessment results of material experts obtained an average percentage of 87.5%. Included in the criteria of "very good". The results of the assessment of media experts obtained an average percentage of 88.006% included in the criteria of "very good". From the teacher response questionnaire, the average percentage of 91.67% was included in the "very good" criteria.

## REFERENCES

- Baharudin Dan Esa Nur Wahyuni. 2007. Teori Belajar Dan Pembelajaran. Yogyakarta Ar-Ruzz Media.
- Dasna I W & Fajaroh F. 2007. Pembelajaran Dengan Model Siklus Belajar. Online at <http://lubisgrafura.wordpress.com/2007/09/20/pembelajaran-dengan-model-siklus-belajar-learning-cycle/>) diakses tanggal 17 Maret 2017
- Dean Zollman & N. Sanjay Rebello. 1998. Learning Cycles – Curricula Based On Research. Physics Education Research Conference. University Of Nebraska – Lincoln. August 1-2, 1998. Tersedia Di: [Http://Web.Phys.Ksu.Edu/Papers/Concepts/Lcintro.Pdf](http://Web.Phys.Ksu.Edu/Papers/Concepts/Lcintro.Pdf) (Diakses Tanggal 13 Maret 2017)
- Mendikbud. 2014. Esensi Kurikulum 2013. [www.kompasiana.com/amp/fatkoer/esensi-kurikulum-2013\\_5528f402f17e617b238b45a1](http://www.kompasiana.com/amp/fatkoer/esensi-kurikulum-2013_5528f402f17e617b238b45a1) diakses pada 10 Maret 2017
- Nasution S., 1999. Kurikulum Dan Pengajaran. Jakarta : Bumi Aksara
- Rohman M Dan Amri S. 2013. Strategi Dan Desain Pengembangan System Pembelajaran. Jakarta : Prstasi Pustakaraya
- Wena, Made. 2009. Strategi Pembelajaran Inovatif Kontemporer. Jakarta : Bumi Aksara