

Instructional Design of Successive Approximations Model (SAM) for Project-Based Learning Media Development

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Abstract. The learning objectives at Universitas Negeri Medan are committed to producing a product as an output. Producing an output requires an educational tool. This study intends to determine the instructional design model for developing project-based learning media in digital form as an educational tool. Collecting data through participatory action involves a team and learning design experts, the Department of Mechanical Engineering Education research subject, using the Successive Approximations Model (SAM) instructional design. The results of this study show that instructional design is more time efficient and flexible if it is used as a model for developing learning media integrated with project-based learning. The Successive Approximations Model in this treatment has three stages which are divided into seven activities, namely; 1) preparation phase; collection information, 2) iterative design phase; design of project learning concept maps and learning media, validity test, and 3) iterative development phase; practicality test, effectiveness test, evaluation.

Keywords : Successive Approximations Model (SAM), Learning Media, Project-Based Learning.

1 Introduction

Higher education, in general, is committed to producing actual products as the output of the learning process. At this achievement, learning facilities are needed that are effective, affordable and can be updated based on technological developments[1]. The learning facility's low cost and practical are also a doctrine for lecturers to create and develop their learning media[2]. Creating or developing learning media has several stages of the process contained in the instructional design[3].

The instructional design model has always been a reference for developing a learning media because it is more systematic, effective, and efficient in solving learning problems[4]. Learning problems here are influenced because and developed no educational facilities were to produce learning devices packaged in learning media as a solution[5]. Several instructional design models can be used for the development of learning media products, namely; 1) Dick and Carey, 2) Borg and Gall, 3) Four-D, 4) ASSURE, and 5) ADDIE[6].

ADDIE instructional design (Analysis, Design, Development, Implementation, and Evaluation), 2012 Allen left ADDIE. He switched to the Successive Approximation Model (SAM) because this design resulted in a more energetic and practical learning experience.

Another consideration is the Successive Approximation Model (SAM) provides an agile approach to product development because it facilitates continuous improvement to produce a product with gold criteria[7].

2 Literature Review

The Successive Approximations Model (SAM) stages in this treatment have three steps which are divided into eight activities, namely; 1) preparation phase; information (information gathering) and SAVVY Start (brainstorming, sketching, and prototyping), 2) iterative design phase; project planning (project planning) and additional design (additional design), and 3) iterative development phase; design proof, Alpha, Beta, and Gold[8].

The learning media products in question are pocketbooks and video tutorials. Pocketbooks are books that contain concise texts whose contents can be in the form of instructions for implementing practices or training[9]. Based on the usefulness of the pocketbook as a practice and training guide, be main contents of the pocketbook must be structured to explain the process from the beginning to the end[10]. The contents of content written in its pocketbook, apart from implementation, from being a guide to commitment agreement between students and lecturers during the learning process, along with stages are preparation, shown in Figure 1.[11].

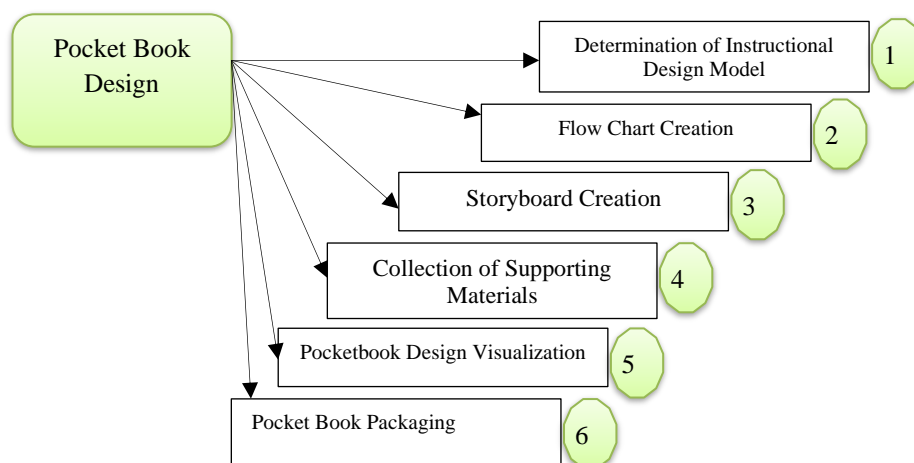


Fig. 1. Stages of Compiling a Pocketbook

Video tutorials are a combination of audio and visual media containing learning messages containing concepts, procedures, or theories to help understand the delivery of learning materials[12]. Video tutorial packaging, according to its function as a practice or training guide, must explain how to do it to make it easier for the user[13]. The design of video tutorials as information delivery in which there is a combination of video, animation, narration, text, and graphics are packaged in the form (.mp4), and the stages are shown in Figure 3 [14].

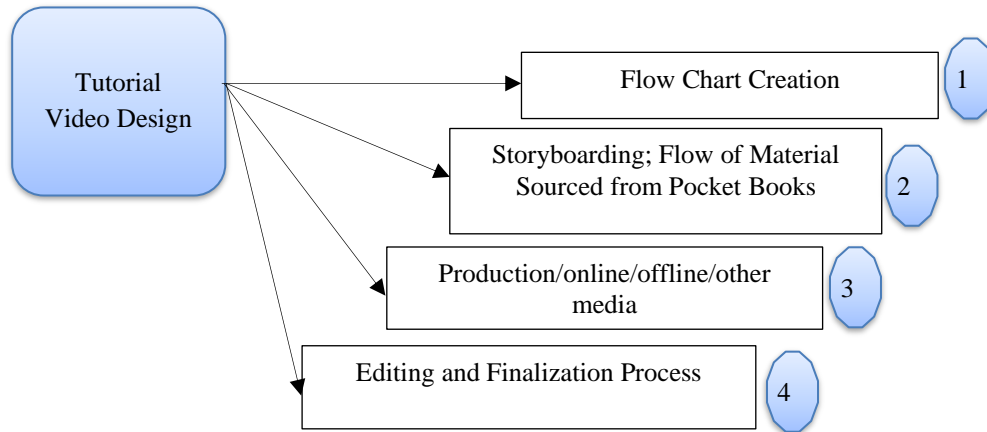


Fig. 2. Stages of Making Video Tutorials

The design of pocketbook learning media and video tutorials is by the learning objectives of subjects derived from university regulations. Here the commitment to produce actual products requires learning media that can provide process guidelines for quickly making actual products as learning outcomes[15]. To produce learning outcomes, the packaging of learning media must be integrated with project-based learning so that later actual products will be made according to the needs and timeliness[16].

3 Methods

3.1 Research Design

This research is a participatory action through a project-based learning approach and an instructional design model[17]. The integrated process of the instructional model begins with changing the SAM model into a project-based learning media design evaluation tool, and the SAM phase is adjusted and simplified to evaluate the instructional media design[18], shown in Figure 3 [8]:

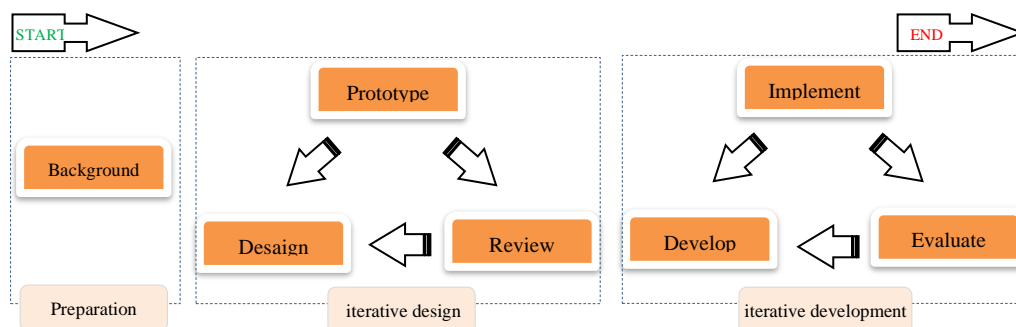


Fig. 3. Successive Approximation Model (SAM)

3.2 Data Collection

Data collection techniques were obtained through discussions involving the research team and learning design experts. The research team consisted of 4 lecturers from the

Department of Mechanical Engineering Education, Faculty of Engineering, State University of Medan, and 1 lecturer as an expert in the field of vocational learning design[19].

4 Result and Discussion

4.1 Result

The Successive Approximations Model (SAM) steps proposed in this treatment have three stages which are divided into seven activities, namely; 1) preparation phase; collect information, 2) iterative design phase; project-based learning concept map design and designing learning media, media validity test and 3) iterative development phase; test the practicality of using media, test the effectiveness of learning media, and evaluate. Data collection takes place in the SAM model [7][8][18]:

Preparation phase

Collecting information is the first step carried out in this research:

- a. Conduct a literature review of previous research results on the instructional model used in learning media development.
- b. Determine research participants from among lecturers and hold Forum Group Discussions (FGD)
- c. Needs analysis is carried out to find out whether the object of research needs the existence of this research
- d. Analysis of the curriculum and learning tools that are already available in the mechanical engineering education department

Iterative Design Phase

At this stage, there are three activities:

- a. Prototypes; compiling a learning concept map that will be carried out by the course learning objectives making learning media storyboards, and collecting study material for learning materials.
- b. Reviews; review the results of the prototype activity together with the development team
- c. Design; designing the cover display/initial display of learning media, adjusting the layout of learning media, and testing the feasibility of media design by learning design experts/experts, software engineering and graphic design experts/experts in the activity design revisions or prototypes are carried out if necessary.

Iterative Development Phase

At this stage, there are three activities:

- a. Develop; aktivitas ini merupakan pembuktian apakah media yang sudah dinyatakan layak digunakan • Develop; This activity proves whether the media that has been declared suitable for learning media is easy to use. It is necessary to conduct experimental trials of pocket book learning media and video tutorials by lecturers who are effective in the subject. In the activity, design revisions are carried out if necessary.
- b. Implements; Test the effectiveness of pocket book learning media products and video tutorials carried out in two different courses in the mechanical engineering education department. In this activity, a design revision or prototype is carried out if needed
- c. Evaluate; is an assessment activity obtained from the design, development, and implementation for improving pocket book learning media and video tutorials. So in these activities, it can be seen whether the learning media is revised as minor or significant until the perfect learning media is obtained.

Designing a proposed instructional model for project-based learning media

The proposed Successive Approximations Model (SAM) instructional design is shown in Figure 4 below.

4.2 Discussion

The steps described below form the basis of the instructional media development process using the Successive Approximations Model (SAM) instructional design. Step 1- Preparation phase; the goal is to collect information from several sources to understand the data obtained and then study it in depth. Step 2- Iterative Design Phase; Start with making a draft design as review material for the development team before proceeding to the media production process and media feasibility test. Step 3- Iterative development phase; development objectives are to see if the learning media that has been designed can be tested for implementation when used by research subjects and to distribute learning media in two different class classes to see the effectiveness of the media and reflect on the improvement of book learning media pocket and video tutorials.

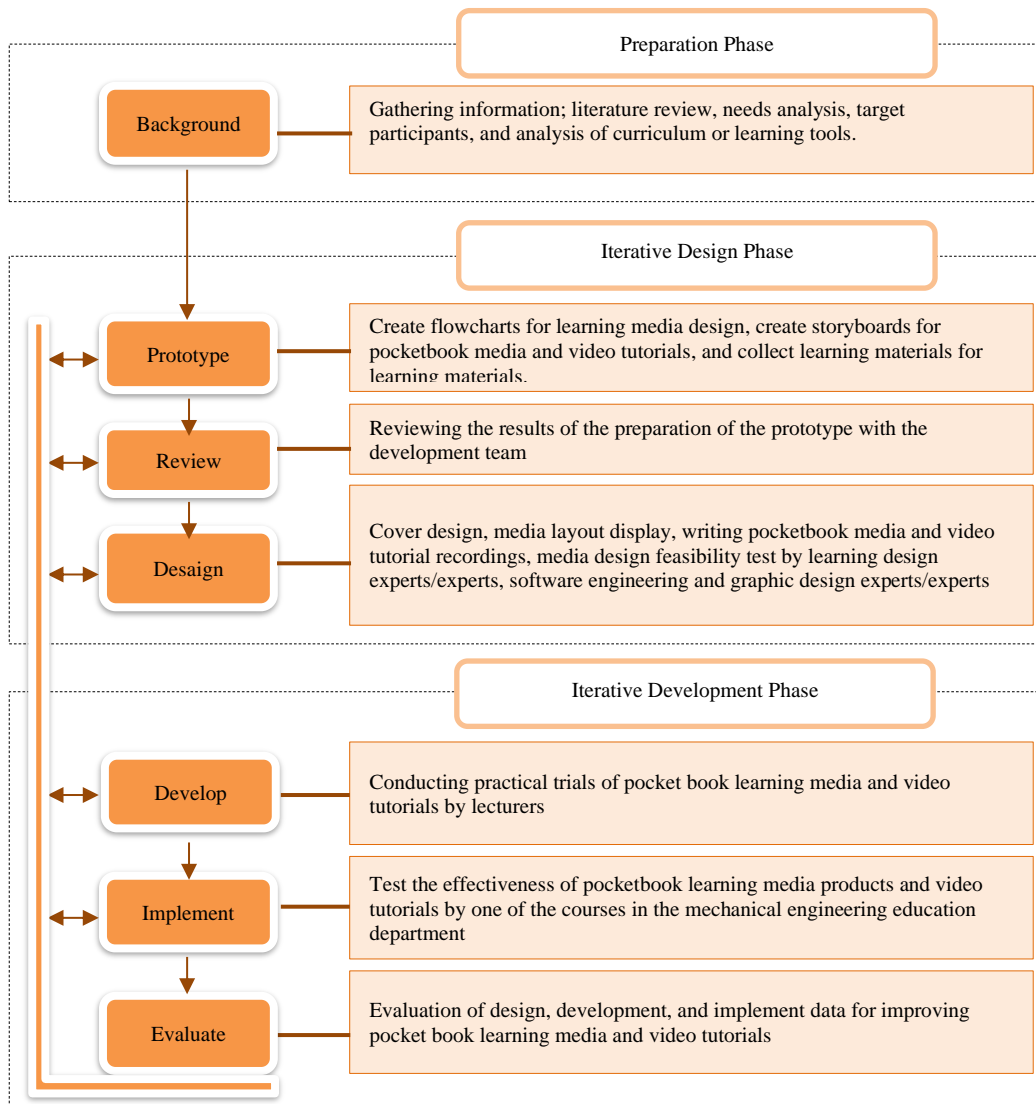


Fig. 4. Proposed Successive Approximations Model (SAM) Instructional Design

5. Conclusion

The findings of this study indicate that the Successive Approximations Model (SAM) instructional design can be used for the stages of developing learning media. Because the stages provided are very fast, especially in the Iterative Design Phase and Iterative development phase in the development of project-based learning media at the university level at the Department of Mechanical Engineering Education, State University of Medan. After using the SAM model for the development of learning media, it was found that the instructional model stages were detailed so that all the needs for making media became more focused, which were spread out from several activities, including; 1) collection of information (needs analysis, curriculum analysis and FGD with the development team), 2) drafting of pocket book learning media, 3) reviewing the draft of learning media with the development team, 4) producing learning media and test results feasibility, 5) trial the practicality of learning media, 6) test the effectiveness of learning media by two different courses, and 7) assessment of the results of practicality and effectiveness tests, it is possible to carry out minor or major revisions to improve learning media.

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