4D Model Learning Device Development Method of the Physical Geography Field Work Guidance Book

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Abstract. This research is a development research that goals to provide knowledge and understanding about how to make 4D model learning media to implementing in Geography Field Work. The output of this research is the acquisition of mastery knowledge from students on how to use the Physical Geography Field Work Lecture Manual as a 4D model of learning media. The Physical Geography Field Work Lecture Manual in this study was compiled and developed based on the 4-D Thiagarajan model which consists of four stages: define, design, develop, and disseminate. The stages in this research are planning, data/information collection, design, construction, testing and analysis of results. This research on the development of the Physical Geography Field Work Lecture Guidebook, and provides benefits to students in an effort to improve their creativity, ability and field study skills so that in the future the research output in the form of this Physical Geography Field Work Lecture Manual is useful in supporting the learning and teaching process in the UNESA Geography Education Department.

1 Introduction

In order for learning to be carried out properly need learning tools such as teaching materials. Teaching materials have an important role in learning. Teaching materials are tools and media that provide opportunities for students to gain learning experiences and are an important part in the implementation of education in educational institutions. The existence of teaching materials will be easier in the implementation of learning and will be easier to help students in learning. Teaching materials can be used by teachers and students to improve learning. With and through the available teaching materials, learners will gain experience dealing with a) facts in life, b) life models, c) symbols used in life [1]. Teaching materials arranged in the form of modules provide more opportunities for students to achieve the above objectives.

Learning outcomes are obtained from the learning process. Learning outcomes are the result of an interaction between acts of learning and acts of teaching. So that the understanding of learning outcomes can be viewed from two sides, one side is teachers and other is students. Therefore, the low learning outcomes of students in addition to student factors can also be caused by teacher factors. From the student's perspective, learning outcomes are influenced by low interest in reading is According with Setyosari [14]. While the factors that influence the low interest in reading students are related with the bad of attractiveness of existing

textbooks, the many types of entertainment such as games and television which then distract students [1]. Meanwhile, from the teacher's point of view to implement teaching success that are easily understood by students, the teacher must have skills in providing material, class management, and learning systems.

According to the results of the 1998 workshop seminar in Semarang, it was stated that geography is a science that examines the similarities and differences between natural phenomena and life on earth and the interaction between humans and their environment in the context of space and territory. From the objectives of learning geography, it is hoped that it will form positive behavior, especially caring behavior towards the environment. Based on the description above, it is necessary to conduct research on the development of textbooks in the Introduction to Geomorphology course: Field Work in the form of a Handbook for Analyzing Landscapes in the Laboratory and in the Field by focusing on the development of textbooks. Thus, researchers will conduct research with the title: Development of textbooks on Field Work courses in the form of a Guidebook for Analyzing Landscapes in the Laboratory and in the Field of Geography Education Study Program, FIS, Unesa Surabaya**.**

2 Research Method

The 4D model is one of the research and development methods. Develop learning tools use four D models. The

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4D model was developed by S. Thiagarajan, Semmel, and Semmel in 1974[1]. As the name implies, the 4D model consists of 4 main stages, namely Define, Design, Develop, and Disseminate. 4D Model Learning Device Development Stage:

2.1 Define Stage (Defining)

The first stage in the 4D model is the development requirements definition. This stage is the needs analysis stage of product development.To analysis the developer needs analyze and collect information on the extent to which development needs to be carried out.

The stage of defining or analyzing needs can be done through an analysis of previous research and literature studies. Thiagarajan et al (1974) mention that there are five activities that can be carried out at the define stage, which include:

2.1.1 Front-end Analysis

The initial analysis was to identify and determine the basic problems in the learning process so that it was the background for the need for development [6]. By conducting a preliminary analysis, the researcher/developer obtains an overview of the facts and alternative solutions. This can help in determining and selecting the learning tools to be developed.

2.1.2 Learner Analysis

Activity to identify the characteristics of students who are the targets for the learning tools development calls analysis of student or learner. Development of cognitive, the ability of academic, motivation and individual skills which related to learning topics, media, formats, and languages are the topics of the special questions.

2.1.3 Task Analysis

Task analysis aims to identify the skills studied by the researcher and then analyzed into a set of additional skills that may be needed [1, 4]. In this case, the educator analyzes the main tasks that must be mastered by students so that students can achieve the specified minimum competencies.

2.1.4 Concept Analysis

Analysis of concept involves identifying the main concepts to be taught, putting them in a hierarchical form, and the concepts of detailing individuals into critical and irrelevant matters [4, 7]. Concept analysis in addition to analyzing the concepts to be taught also arranges the rational steps to be carried out. This concept analysis includes an analysis of competency standards which goals to determine the amount and type of teaching materials and learning resources analysis, calls the sources that support the preparation of teaching materials definitions.

2.1.5 Objectives of Specifying Instructions (Formulation of Learning Objectives)

The learning objectives formula use for results summarizing of concept and task analysis to determine the behavior of the research object [4]. The summary will be the basic foundation that will use in design of learning tools and compiling test to be further integrated into the learning device materials.

2.2 Phase of Design (Design)

The second stage in the 4D model is design. There are 4 steps that must be passed at this stage, calls the test of constructing criterion-referenced (standard preparation test), selection of media (media selection), format selection (format selection), and initial design (initial design) [4,5].

2.2.1 Construction Criterion-Referenced Test

The test of standards preparations is a step that connects the definition stage with the design stage. The standard preparation test is based on the results of the specification of learning objectives and the analysis of students. From this, a learning outcomes test grid was compiled. The test is adjusted to the student cognitive abilities and the scoring of the test results are uses in an evaluation guide that contains a scoring guide and an answer key to the questions.

2.2.2 Media Selection

Thus, the selection of media is done to identify learning media that are appropriate / relevant to the characteristics of the material. Media selection is based on the results of concept analysis, task analysis, characteristics of students as users, as well as distribution plans using various media variations. The selection of media must be based on maximizing the use of teaching materials in the process of developing teaching materials in the learning process.

2.2.3 Format Selection

The choice of format in the learning tools development goals to formulate the instructional media design, the selection of strategies, approaches, developing methods, and learning resources.

2.2.4 Initial Design

Thiagarajan et al (1974) mention that the initial design is the overall design of the learning device [4]. Overall design must be done before carried out of trial. This design includes various structured learning activities and the practice of different learning abilities through microteaching.

2.3 Development Stage (Development)

The third stage in the development of four D model learning tools is development to produce a product development, in this case the product is a book. This stage consists of two steps, calls appraisal of expert (expert assessment) accompanied by revisions and development test (trial development) [1].

2.3.1 Expert Appraisal

Expert appraisal is a technique to get suggestions for material improvement [6]. By conducting an assessment by experts and getting suggestions for improvement of learning devices developed, and revised following to expert advice. Expert assessment is expected to make learning tools more precise, effective, tested, and have high technique.

2.3.2 Development Testing (Trial Development)

Development trials were carried out to get direct input in the reactios form, responses forms, comments from students form, observers on the learning tools which had been prepared. Trials and revisions were repeated with the goal of obtaining effective and consistent learning tools [6].

2.4 Disseminate Stage (Dissemination)

The last stage in the development of 4D model learning tools is the dissemination stage. The last stages of final packaging, diffusion, and adoption are the very important although often neglected [4].

The dissemination stage is carried out to promote the product developed so that it is accepted by users (sistem, groups or personals). Packaging material must be selective in order to produce the true form. According to Thiagarajan (1974) [4] there are three main stages in the disseminate stage, calls validation testing, packaging, diffusion and adoption.

In the validation testing stage, the product that has been revised at the development stage is implemented on the real target. At this stage, measurement of the objectives achievement also carried out which goals to determine the effectiveness of the product being developed. And then, after being implemented, researchers need to observe the results of achieving goals, the solutions that haven't been achieved must be explained so that they don't repeat themselves after the product is disseminated.

At the stage of packaging and diffusion and adoption, product packaging is done by printing an application manual which is then disseminated so that it can be absorbed (diffusion) or understood by others and can be used (adopted) in their class.

Things that need to be considered in carrying out dissemination/dissemination are user analysis, strategies and themes, timing of dissemination, and selection of dissemination media.

3 Result and Discussion

The 4D model is the research and development methods are used to develop learning tools. The 4D model was developed by S. Thiagarajan, Semmel, and Semmel in 1974[1]. As the name implies, the 4D model consists of 4 main stages, namely Define, Design, Develop, and Disseminate.

3.1 Define

3.1.1 Preparation Stage

Activities carried out at this stage are:
a) Studying supporting literature.
b) The research design, technique data collection, and data analysis techniques appropriate.

After conducting a literature review, the research team carry out research designs with the following results:
(a) Determination of the Observer Team
(b) Preparation of the Research Activity Schedule, calls Planning Implementation. Preparation and implementation activities learning tools include the use of the media, the subject taken, class used, class schedule used, the model/approach used, and the learning outcomes test that will be used be done at the end of the study. At the end produced learning tools include:

a. The Contract of Teacher or Lecturer
b. The Plan of Semester Lecture
c. Worksheet
d. Learning Media
e. Process and Outcome Assessment Instruments Learning
f. The Observation Sheet of Learning
g. The Validation Sheet of Learning Tool
h. The Stage of Implementation

Learning device development procedure using the 4-D Thiagarajan model which will be done including the stage of defining (define), the design stage (design), the stage development (develop), and the stage of deployment (spread).

3.1.2 Data Analysis Stage

The data analysis stage also calls Preparation of Program Implementation Report, this stage include: Monitoring, Evaluation, Supervision, and Planning Follow-up.

3.1.3 Results of Analysis and Discussion

Based on the observations can be explained that:
a. Student activities during learning observation results of student activities made effective.
b. Lecturer's Ability to Manage Learning
   Based on the observations made lecturer's ability to manage learning as follows:
- Implementation – 1, the lecturer's ability in managing learning in the classroom is generally valuable good.

- Implementation – 2 lecturers' abilities in manage the learning category very well, and
- Implementation – 3 lecturers' abilities in manage learning well.

Therefore, it can be said that the ability of lecturers in managing learning can be effective.

The results of the learning outcomes test conducted at the end learning of the studens after Implementation – 1, Implementation – 2, and Implementation – 3 shows the following results in table 1.

Table 1. Mastery of Student Learning Outcomes Using Guidance Book

	Sum of Students	Percentage
Mastery Learning (>75)	71	78
Imastery Learning (< 75)	19	22
Total	90	100

3.2 Student Response Questionnaire Results

This ***the Physical Geography Field Work Use Guidebook*** was followed by 90 students, and then based on collection of questionnaires given after the learning provided is obtained:

Based on the results of the response questionnaire in the table 2. Student response after ***The Physical Geography Field Work Use Guidebook*** get the Keyword to safely follow learning by using Guidance Books is positive.

Table 2. Student response after ***The Physical Geography Field Work Use Guidebook.***

Category	Sum of Students	Percentage
Exelent	11	12
Good	56	62
Moderate	27	3
Low	6	6
Bad	0	0
Total	90	100

4 Conclusion

1. Student activities during learning show effective results.
2. The ability of lecturers in managing learning is effective.
3. Student responses to learning use the guidance book when physical Geography fieldwork studies are positive.

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