



Development of Students Learning Module for Disaster and Environmental Knowledge Subject for Undergraduate Students of Universitas Syiah Kuala

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Abstract. Disaster education is an essential part of disaster mitigation steps in shaping character and building a culture of disaster preparedness. Knowledge on Disaster and Environmental (PKL) is a general course taught at the Undergraduate level at Syiah Kuala University. This research and development aim to produce valid, effective, and practical modules for PKL. The research and development model used in this study is an adaptation of the research and development steps proposed by Borg & Gall, and the learning design model used in the initial product planning stage adapting the model proposed by Dick & Carey. Expert validation and student readability test were followed to confirm the quality of the module. Three expert validators were involved, and 24 students were enrolled in several questionnaire-based approaches of their perspective to the pre-and post-revision product module. The results of this study created a PKL learning module that has a valid value (score 4.01-4.33), and the average results on the student readability test were in a good category (score 4.13-4.56). The final product that has been revised according to input and suggestions from the validator has the quality for exemplary utilization.

Keywords: Dick & Carey Model, Disaster and Environment Science, Learning Module

Introduction

Disaster Education is one of the essential components in mitigating disasters, shaping character, and build a culture of disaster awareness in every individual (Azmi, et al., 2019). There is evidence that most major injuries, damage, and death due to disasters can be prevented and action preparedness disasters such as the adjustment of housing against the risk can reduce the damage that is caused by the disaster and therefore improve recovery. (Aghaei, et al., 2018) besides, disaster preparedness would be more effective if the community has cooperation that both in allocating resources power and perform recovery right after the disaster (Hoffmann & Muttarak, 2017; Pascapurnama, et al., 2018).

Over several decades past, studies show that people who are trained in society can be prepared to face a disaster and responded with a well. Besides, some reported that the education of disaster is a tool that is functional, operational, and saving costs for the management of risk (Medina, 2016).

The Hyogo Framework for Action (HFA) (2005-2015) emphasizes five performance priorities for reducing disaster risk in the world. Priority function The third is to apply science knowledge, innovation, and education to create a culture of safety and resilience

at all levels. According to the HFA, the disaster at essentially reduced if the public conscious, and his motivation is creating a culture of prevention and resilience against disasters. In connection with the terms of these, the collection and dissemination of knowledge and information on hazards, vulnerabilities, and capacities especially for people susceptible should be a priority (Zhou, et al., 2014).

Higher education has a very important role in efforts to reduce disaster risk (DRR). One of them is producing human resources with DRR insight and strengthening the capacity of knowledge (knowledge capacity). (Setyowati, 2019) in the context of this, the University of Syiah Kuala been doing invaluable groundbreaking: the implementation of disaster knowledge build utilizing Knowledge on Disaster and Environment (PKL) Subject in the curriculum of undergraduate programs, which in turn, can create graduates as components of society that responsive and resilient to disasters (Dwiningrum, 2017; Kitagawa, 2017).

To support the achievement of the mandate of the curriculum framework indicted to PKL courses, it is necessary to develop learning materials in the form of modules that are expected to be able to answer student needs and can contribute to learning in Disaster and Environmental Knowledge courses at the Universitas Syiah Kuala (Kitagawa, 2020).

Methods

This research enrolled a research model of development. Methods of research and development is a method of research that is used to produce a product-specific and test the effectiveness of products. Research on product development models is based on trials and then revised to produce a product that is fit for use. The model of research and development that is used in research is the model of development of Dick and Carey. (Dick & Carey, 2005).

The subjects in this study were taken using a purposive sampling technique, which is the undergraduate student that already taken the programming MKWU Disaster and Environmental Knowledge course a year before. A total of 24 students were enrolled and agree to participate in several questionnaire-based to approach their perspective to the pre-and post-revision product module.

The procedure of research is composed of four stages, namely: 1) stage of analysis requirement, 2) product design phase, 3) validation and evaluation, and 4) the end product. At the stage of the analysis of needs, researchers perform analysis on Study Plan (RPS) with the purpose to produce materials or topics that will be developed in the module. At the stage of the design of products, activities include determining the components of the module the concept of delivering and organizing the material, the type of task that is given, the evaluation, pictures, articles, examples, and layout module. Eventually, the whole process ended up in the design of the product early in the form of modules that previously had prepared instrument ratings of products to be used as a guideline in designing the product.

The validation and evaluation stage is the core stage in the form of a series of product development assessments. Stages of pre-validation are done by consulting the product beginning to faculty mentors to receive feedback early. The pre-validation stage is useful for assessing the feasibility of a product before being assessed by the validator. Validation of the design is a process of activities to assess whether the design of the products that will be developed in a rational will be more effective than the old or not (Sugiyono, 2012).

Validation of the design is early done by way of asking experts/specialists who are already experienced to assess the products are designed. Expert or experts carry out the validation of the product that will produce an evaluation and advice in the development of the product.

The results of the evaluation and recommendation of the expert or experts are used to fix and revise the products that are being developed. The circuit further from the stage of validation and evaluation is the stage of testing legibility. Products that have been declared feasible by experts or experts are then tested on students as potential users. The products are applied to the process of learning Knowledge of Disaster and Environment for later students to assess and give feedback to the module.

Product Design

At the product design stage, the activities include determining module components, the concept of delivering and organizing the material, pictures, articles, examples, and module layouts. This stage will produce the initial product design. After the initial product of the module is obtained, the next stage is the pre-validation stage. The pre-validation stage is useful for assessing the feasibility of a product before being assessed by the validator.

The development of the PKL course module consists of the collection and selection of references and module design. The module section consists of the beginning, the core, and the end. The initial section consists of a cover and a table of contents. The content section consists of material and learning outcomes and the final section consists of a bibliography. In the preparation of the PKL module, various references are needed regarding the material and module writing (Kitagawa, 2020; Musliyadi, et al., 2018).

Validation and Evaluation

In the next stage of the product, the results in the product end in the form of a module that has been revised by criticism and suggestions from the stage of validation and evaluation. In this development study, we have done the evaluation formative only. The results of the formative evaluation are carried out as input or input to improve the initial product. A brief structure showing the used steps for creating the module showed in Figure 1. At this stage, there are two activities carried out by the researcher

1. At the stage of this research design sheet validation module teaching, module teaching test, and sheet legibility of students while on the activities of evaluation which researchers carry out test's legibility module teaching the students.

2. Revise the module teaching, the stage is researchers do revision module teaching of the results of the validation of experts and the results of testing legibility (Back, et al., 2018).

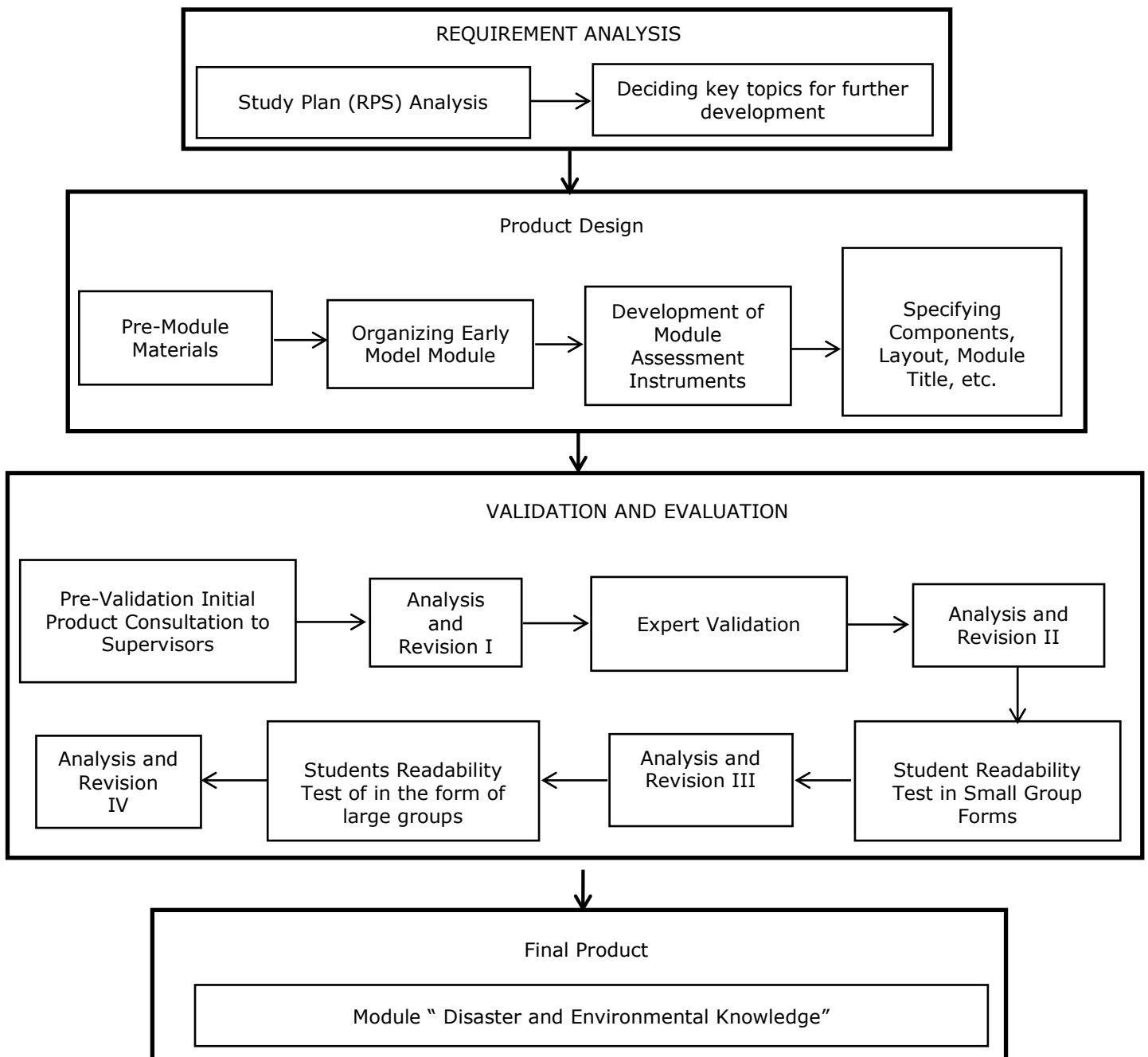


Figure 1. Module Development Procedure adapted from Borg & Gall (1983), Dick & Carey (2005)

Results and Discussion

The results of the validation of experts on the revision of the module are carried out on the input of experts in the review stage I and II is displayed on the table 1. From table 1, it can be concluded that although almost all indicators show the value of the good, but there is value enough on indicators clarity of instructions and directives. This may happen because the modules that we design have a lot of instructions and directives that

can be done by simplification to ensure the clarity and the use of directives on the part of the material that is more appropriate (SE Atmojo, et al., 2018; Jannah & Subadi, 2017).

Table 1. Validation Results Post revision of expert input

No.	Indicator	Average Score	Conclusion
1	Clarity of Material Order	4.33	Good
2	Clear Numbering System	4.0	Good
3	Settings System Layout	4.0	Good
4	Font type and size	4.33	Good
5	Description of the contents of the module according to the applicable curriculum	4.33	Good
6	The description of the module content is in costume the needs of the reader/student	4.33	Good
7	The description of the module content is suited to the needs of teaching materials	4.33	Good
8	The module description has a relationship between one subject and another	4.0	Good
9	The truth of the material substance	4.0	Good
10	The description of the module content is easy to understand	4.0	Good
11	Image according to module content	4.33	Good
12	The level of clarity of the image presented is adequate	4.33	Good
13	The image quality is adequate	4.0	Good
14	Grammatical correctness	4.0	Good
15	The simplicity of sentence structure	4.0	Good
16	Clarity of instructions and directions	3.67	Enough
17	Communicative language used	4.0	Good

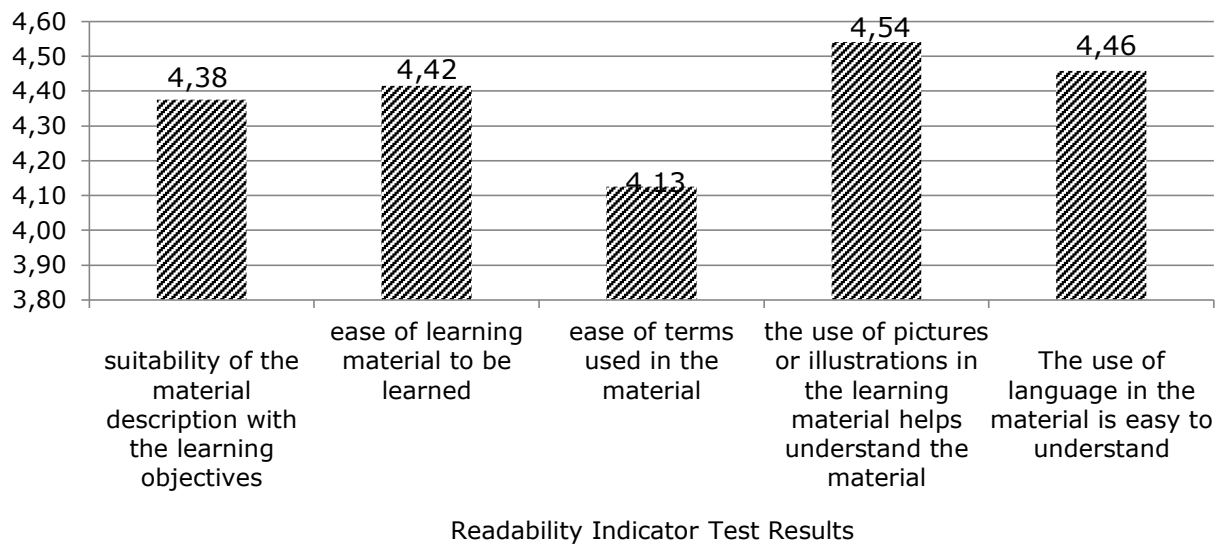


Figure 2. Student responses to the module readability indicators

The results of test of legibility that do to the students, presented in the graph In Figure 2. From the graph it looks that the indicators of the ease of the term had an average score of the lowest in comparison with all four indicators of the others. It is can be caused by as yet familiar of the students to the terms that are in the context of disaster and environment. Provision of shortcuts quickly and definitions of terms are important are needed to enhance the design of the modules in order to more easily to be understood by the students (Atmojo, 2018; Pascapurnama, et al., 2018).

The Final Product

At this stage, the researcher conducts activities to design the teaching module as the final product and carries out the formative evaluation. The teaching module as the final product of development consists of 3 parts, namely the beginning, the content, and the end. The section beginning consists of the word preface, list of contents, section contents consisted of six chapters that include chapter 1: Disaster History, chapter 2: Disaster Management Cycle, chapter 3: Disaster Risk Reduction, chapter 4: Disaster Mitigation and Community Preparedness, chapter 5: Disaster Recovery Process, chapter 6: Environmental Damage and Climate Change. The module is also equipped with is a list of references and an appendix (Pratama, 2020; Widiyanto, 2019).

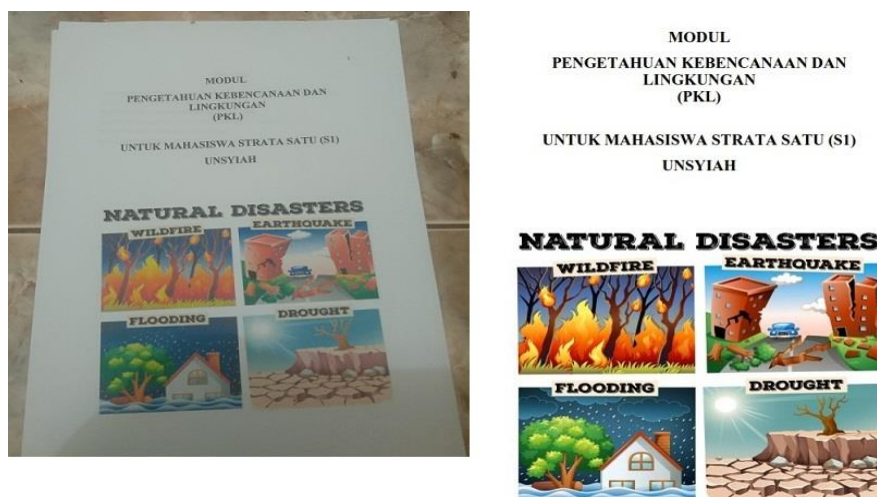


Figure 3. Module as the final product of development

More advanced researchers are also doing research introduction which aims to determine the trends and needs of the deepening of the material specifications that following the scope of the geographic and background behind the vulnerability of disaster in Indonesia, with attention to the deepening of topics of global as changes in climate and the threat of a pandemic (Amri, et al., 2017).

Even though the compilation and revision of the module have been completed, it is necessary to carry out research and deeper exploration of the leverage power of this module on student learning outcomes. With evidence that encourages the strengthening of understanding and improving learning outcomes, it will strengthen the function and role of this module as an inseparable part of the course.

Conclusion

The process of developing a Learning Module for Knowledge on Disaster and Environmental (PKL) courses for undergraduate students at Syiah Kuala University using Dick & Carey's model had successfully created a final product that met the criteria for a good module namely valid, practical, and effective. The module had met the valid rating from the expert and appraised good practicality from the student's perspective. It can be concluded that the developed module is suitable for use with revisions as suggested.

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