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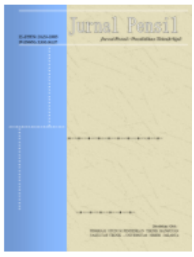

DEVELOPMENT OF PROJECT BASED TEACHING MATERIAL IN BUILDING CONSTRUCTION COURSE

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Abstract

Building Construction is a compulsory subject in the Building Engineering Education Study Program which is expected in this course to have the ability to design systems and infrastructure in the civil engineering field as needed by considering various constraints such as economic, environmental, health, and security constraints. Covid-19 harms life so the world of education also wants to participate in breaking the spread of the Covid-19 virus. The subsidized houses that have been built have met the existing requirements, although they are not perfect, they can still be said to be livable houses. However, a serious problem is that after being given a lot of people added the initial building but did not meet the requirements. This development research produces project-based teaching materials products. This study uses the development of Borg and Gall with the stages of analyzing potential problems, data collection, product design, design validation, design revision, product testing, revision, and reporting. The teaching materials developed contain the characteristics and designs of disaster response houses adapted to the Building Construction course material and are project in nature. The results of the study obtained that the teaching materials developed were suitable for use as teaching materials in the process of learning activities based on the overall average score of the material expert aspect of 3.6 and the media expert 3.6 very good category.

Keywords: Borg and Gall, Teaching Material, Project, Development

Introduction

Entering the beginning of the 21st century which is changing rapidly, the development of science and technology, both in the current educational environment and in the workplace, certainly brings challenges. Through the Merdeka campus activities carried out by the Ministry of National Education, the Ministry of National Education can answer the challenges of the current era. Merdeka Campus is part of the Independent Learning Policy of the Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia which provides opportunities for students to improve skills according to their talents and interests by going directly into the world of work (Fahmi, 2022; Handrianto, 2021; Muslikh, 2020; Sutangsa, 2021; Zainal, 2021). in preparation for entering the world of work. future career. This program can open up great opportunities for students to develop their potential, especially to create breakthroughs in the world of education.

Along with the development of Science and Technology (IPTEK), it is necessary to prepare Human Resources (HR) as agents of change. Therefore, the field of education has a big role, because education is one of the important components that can be used to improve the quality of a nation's human resources. This is by the formulation of the national education goals in the Constitution no. 20 of 2003 which states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students can actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble character, and the skills they need. society, nation, and state.

The coronavirus or commonly known Covid-19 virus disease began to spread in Indonesia in March 2020. The global Covid-19 pandemic has affected various sectors. However, many patients are confirmed to have recovered. However, many victims also died from the coronavirus. Some information about the long-term health of Covid-19 patients is still missing. The COVID-19 pandemic not only has an impact on public health, but also has an impact on the economic conditions, education, and social life of the Indonesian people. Based on data from the National Disaster Management Agency (BNPB), the number of positive COVID-19 patients. This pandemic has prompted many local governments to implement Large-Scale Social Restrictions (PSBB) which have implications for limiting community activities, both economic activities, education, and other social activities (Adedoyin & Soykan, 2020; Amalia & Fatonah, 2020; Demuyakor, 2020; Suyadi et al., 2022; Taradisa et al., 2020).

The education curriculum is an important part of achieving educational goals. According to Law Number 20 of 2003, the definition of curriculum is a set of plans and regulations relating to the objectives, content, teaching materials, and methods used as guidelines for implementing learning activities to achieve national education goals (Ministry of Gaeltacht Education and Culture, 2003). Currently, the applicable curriculum at Medan State University has implemented the KKNI-based curriculum into the lecture process. Until now, the procurement of assessment and learning tools has been managed independently by the teachers of the relevant subjects. To unify the vision of achieving learning objectives that are in line with Unimed's vision and mission, a teaching standard has been developed that becomes a reference for all teachers in the teaching process.

The legal basis for the preparation of the RPP which refers to Permenristekdikti No. Article 12 requires teachers to determine and develop semester lesson plans independently or together in groups of scientific and/or technical experts. degree program. The KKNI curriculum standard learning design serves as a reference for all teachers in designing, implementing, and evaluating the teaching process in the classroom. College campuses require

standard tuition fees, although faculty have the authority to regulate them based on the characteristics of their class. If planning, implementation, and evaluation standards already exist, teachers only need to develop them to be applied to subjects.

Standards of teaching materials made must cover aspects of knowledge, skills, and attitudes. Student skills are encouraged in six ways known as 6 homework, namely; Routine activities, critical book reports, critical journal reports, idea development, mini-research, and projects (Asfuri & Ambarsari, 2021; Fautin et al., 2021; Irwanto, 2021; Nasution et al., 2022; Siregar et al., 2022). These six tasks become a new model in the teaching process used by lecturers. There is not a single course that is not appropriate when applying these six assignments. All courses must have sources/literature in the form of books, journals, and related research results.

Teaching materials are all materials used by lecturers in carrying out teaching and learning activities, which can be in the form of written or unwritten materials. The subject matter allows students to learn a skill or basic skill consistently and systematically so that they can master all these skills cumulatively in a holistic and integrated manner. Teaching materials are information, tools, and texts needed by lecturers/trainers to plan and study the implementation of learning. Teaching materials are all forms of materials or materials that are systematically arranged and used to help lecturers or trainers carry out teaching and learning activities to create a conducive learning environment or atmosphere.

In addition to choosing the right learning materials, a lecturer needs to choose the right approach or learning model so that students feel the meaning of the material. One of them is the project-based learning model (PjBL). The project-based learning model is a learning model that offers lecturers the opportunity to direct classroom learning through the inclusion of project work. Project work is a form of work that contains complex tasks based on very difficult questions and problems and guides students in designing, solving problems, making decisions, conducting inquiry activities, and providing opportunities for students (Angraini & Wahyuni, 2021; Chen & Yang, 2019; Purba & Siregar, 2020; Sutrio et al., 2021; Tiani, 2020).

The project-based learning model (PjBL) which involves the active role of students, essentially aims to: (1) increase motivation, (2) higher-order thinking skills, (3) understand the material as a whole, and (4) improve student process skills (Nuri & Rusilowati, 2018; Rahayu et al., 2020). During the learning process, the speaker only acts as a facilitator, motivator, monitor, and evaluator. As a facilitator, the lecturer must ensure the availability of learning facilities and infrastructure needed for students, as a motivator the lecturer always encourages and advises students so that the project can be carried out according to the agreed schedule (Guo et al., 2020; Krajcik & Czerniak, 2018; Krajcik & Shin, 2022; Nollmeyer & Torres, 2022; Pennefather, 2022; S, 2020; Stanley, 2021). At first, the motivation to learn is given by the teacher by visualizing the project subject. Supervision occurs when students work on projects inside and outside the classroom. The instructor's duties include guiding struggling students and recording project progress, actual problem-solving processes, team and individual performance progress, notebooks and research, study contracts, computer use, and reflection (Handayani, 2015). Project-based learning changes the role of lecturers from trainers to facilitators to develop students' critical thinking skills and thinking, requiring teamwork for problem-solving. In project-based learning, students tackle problems similar to those of scientists, mathematicians, writers, and historians when working through research paradigms (Bell, 2010; Carreira et al., 2019; Iranda & Periantalo, 2022; Nuraina et al., 2022; Zega, 2022).

Building Engineering Education is one of the study programs at the Faculty of Engineering that teaches how to design, construct, and renovate a building, bridge, underground aqueduct, landslide support

structure, and others. In the Department of Building Engineering Education, Faculty of Engineering, State University of Medan, the Structural Engineering course is one of the mandatory courses with a weight of 3 credits, the expected achievement in this course is the ability to design systems and infrastructure in the field of civil engineering as needed, taking into account various obstacles such as economics, environment, health, and safety.

There are so many impacts resulting from this pandemic, especially on human health and hampering daily activities (Damilos et al., 2022; Zheming & Yuan, 2020). Even so, the world of education is still trying to break the chain of the spread of Covid-19 in Indonesia through the Building Construction course. It is hoped that the learning outcomes from this are that students can design systems and infrastructure in the field of civil engineering as needed by considering various obstacles such as economic, environmental, and social constraints. health and safety. And have the ability to identify, formulate and solve problems in the field of civil engineering by considering the potential use of local resources.

Based on the observations of researchers in the field regarding disaster response houses, there are still many houses that do not comply with existing regulations. The houses that have been built have met the existing requirements, although they are not perfect. They can still be said to be livable houses. The problem that is quite serious is that after the house is given, many people add the initial building but do not meet the requirements such as the back wall is integrated with the retaining wall and there are additional buildings built by the community that does not pay attention to security and comfort in the house such as there is an additional house with a shape the roof is triangular but there are no gutters between the houses, this will certainly make the rainwater enter the middle of the house. So from these observations, the researcher concludes that the disaster response house built by the government can no longer be said to be a disaster response house because the security and comfort functions in the house are no longer optimal for the people affected by the disaster.

The housing and settlement area office has the task of carrying out government affairs/authorities in the field of public and commercial houses, special houses, flats, self-help houses, residential areas, infrastructure, public facilities, and utilities as well as assistance tasks. Therefore, the researcher wants to develop project-based teaching materials by collaborating with the North Sumatra Province Housing and Settlement Area (PKP) so that researchers can carry out an analysis based on information obtained from the North Sumatra Province Housing and Settlement Area Office (PKP). will produce a design for disaster response buildings, especially for Covid-19. The results of the design carried out by researchers will be developed into teaching materials for students, especially in the Building Construction course. It is hoped that later students can innovate to create a design that is useful in breaking the spread of Covid-19.

Research Methodology

This research is an educational development research (Educational Research and Development) (Hermawan, 2019; Sugiyono, 2019), this research was carried out at the Department of Housing and Settlement Areas of North Sumatra Province. The results of the research will be developed into teaching materials for building construction courses. The research subjects are students who have taken or are currently taking building construction courses in the Building Engineering Education Study Program. Researchers will conduct an initial analysis at the PKP Office of North Sumatra Province and conduct direct field observations to see the shape of the building that can be used as a reference in developing teaching materials so that teaching materials produced based on research will be more effective because they are made based on direct observations of

researchers in the field so that the resulting theory can be used. synchronized with field conditions and the results are expected to be used directly by the people of Indonesia. This project-based research and development of teaching materials include 7 stages adapted from the 10 stages of Borg and Gall development research (Nuraini & Waluyo, 2021). Potential Problems, namely: Data Collection, Product Design, Design Validation, Design Revision, Product Trial, Revision, and Reporting.

The research and development of this project-based teaching material include 7 stages adapted from the 10 stages of Borg and Gall development research. (Sugiyono, Potential Problems: the impact that occurs due to the existence of Covid-19 in the world of education also wants to contribute to stopping the spread of Covid-19, especially in the field of engineering through the development of project-based teaching materials in building construction courses, which is expected that the purpose of this course can be realized, namely being able to design buildings that suit your needs by considering various obstacles such as economic constraints, environment, health, and safety).

1. Potential Problems: the impact that occurs due to the existence of Covid-19, the world of education also wants to contribute to stopping the spread of Covid-19, especially in the field of engineering through the development of project-based teaching materials in building construction courses, which is expected that the purpose of this course can be realized, namely being able to design buildings that suit your needs by considering various obstacles such as economic constraints, environment, health, and safety.
2. Data Collection: data collection by making observations in the field and looking for information on proper buildings from the Housing and Population Office (PKP) of North Sumatra Province, as well as conducting literature studies on project-based learning and scientific methods. From the data obtained, it is analyzed and used as a reference to make teaching material designs.
3. Product Design: the data obtained is analyzed and used as a reference to make teaching material designs. The products produced in this study are teaching materials that will be used in learning that will be used to improve critical thinking skills.
4. Design Validation: before using teaching materials, it is necessary to know the feasibility by conducting an expert feasibility assessment of teaching materials by responding with criteria of excellent, good, not good, and not good.
5. Design Revision: after the teaching material is validated, a revision is made to correct the errors contained in the teaching material that has been made before.
6. Teaching materials are applied to building construction lectures and observations are made on the implementation of learning. and at the end of the lecture students are given a questionnaire to find out the student's response to the learning carried out. The instruments used to collect data in this study are:
    a) Likert scale questionnaire, consisting of expert validation test questionnaires and student response questionnaires to the learning carried out.
    b) Observation sheet, to observe student activities during the learning process to find out the implementation of the use of teaching materials.
    c) Scientific method mastery instrument to determine the influence of the use of project-based teaching materials in improving the mastery of scientific methods of prospective lecturer students.

    Qualitative data are analyzed descriptively to find trends that arise at the time of research while quantitative

data are analyzed with statistical tests. Indicators of the success of this study are:

a) The success criteria of the teaching materials that have been developed, if the teaching materials that have been developed in the category are feasible/good to be used without revision or with a slight revision.
b) Get a positive response from students.
c) Students can use teaching materials that have been developed so that mastery of the scientific method increases.

7. Revision and Reporting: After the trial is carried out, it will be analyzed then the results of the analysis will be made in the form of a report on whether the teaching materials are suitable for use or not.

There are three techniques used to collect data in this study, namely using the method of observation, interviews, and questionnaires.

Results and Discussion

Analysis

"The analysis in this study is by observation and interviews obtained: -learning activities - use of teaching materials-curriculum."

Design

"The teaching materials developed consist of 7 chapters, namely: Chapter 1 introduction which contains the initial rationale for developing project-based teaching materials and the expectations that can be generated from the development of these teaching materials, Chapter 2 which contains the characteristics of uninhabitable houses and habitable houses. based on information from the Department of Housing and Settlement Areas of North Sumatra Province, Chapter 3 consists of material on the characteristics of disaster response houses based on previous research that can be a reference for students and lecturers in designing a safe and comfortable building, Chapter 4 consists of the characteristics of healthy homes that become the initial basis for planning a shelter, Chapter 5 consists of analysis and results of research conducted by researchers related to the characteristics of the Covid-19 disaster response house and consists of the results of previous related research conducted by other researchers, Chapter 6 consists of the form of house designs made researcher b Based on the research conducted and previous research that refers to the characteristics of the Covid-19 disaster response house, Chapter 7 concludes the book written by suggesting that the construction of houses should be based on careful criteria and analysis. so that the resulting house is safe and comfortable to live in. Then validated by 2 material experts and 1 media expert."

Development

"Being a reference in breaking the spread of Covid-19 in the world of education and the field of civil engineering."

Implementation

"Teaching materials are designed based on initial analysis and then made based on learning objectives."

Education

"After the teaching materials are made, an evaluation is carried out according to the results of the material and media expert validators."

Material Expert Assessment

The material from the learning media is tested for feasibility by a material expert consisting of two (2) examiners, namely, 1). Lecturer of the Department of Building Engineering Education UNIMED) and 2) Officers of the PKP Provsu Office. This analysis is used to determine the feasibility of the material on the learning media developed based on 5 aspects which include:

1. Self Instruction. An assessment related to learning objectives, materials, and illustrations presented in teaching materials
2. Self Contained. An assessment related to the suitability of teaching materials

and the competence of the material presented?

3. Self Stand Alone. An assessment related to the teaching material presented can be learned by yourself by reading the teaching material.
4. Adaptive. An assessment related to the suitability of teaching materials with the time
5. User Friendly. An assessment related to the use of flexible teaching materials?

The measurement scale used is a Likert scale 4 Scale with categories, Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1.

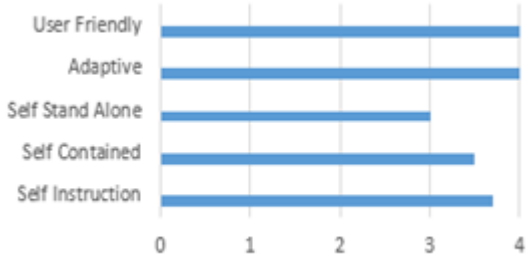

Figure 1. Material expert validation results

Based on the validation results obtained from the questionnaire given to material experts 1 and material experts 2, it can be concluded that the average results obtained by material experts in the Self Instruction aspect are 3.7 aspects of Self Contained and 3.5 aspects of Self Stand Alone of 3 aspects Adaptive of 4 aspects of User Friendly of 4. So that the average result of the validation assessment by material experts is 3.6 which is included in the very good category. So it can be concluded that the teaching materials developed based on the assessment of material experts are included in the "Very Good" category. These results mean that the developed teaching materials function well as teaching materials in terms of material.

Media Expert Rating

The analysis of data from learning media was tested for feasibility by media experts consisting of one (1) examiner, namely, a lecturer in the Department of Building Engineering Education UNIMED. The analysis of this instrument is used to determine the feasibility of learning media, there are 3 aspects which include: 1) the size of teaching materials, 2) cover design, and 3) book content design. The measurement scale used is a Likert Scale with 4 scale categories, Strongly Agree = 4, Agree = 3, Disagree = 2, and Strongly Disagree = 1.

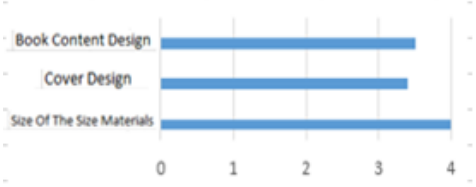

Figure 2. Media expert validation results

Based on Figure 2, it can be explained that the media expert's assessment of the aspect of the size of teaching materials obtained a score of 4 which is included in the very good category, and the ease of cover design aspect obtained a score of 3.4 which is included in the very good category, and the design aspect of the book content obtained a score of 3.5 which is included in the very good category. The total average score of assessment by media experts is 3.6 which is included in the very good category. So it can be concluded that the teaching materials developed based on the assessment of media experts are included in the "Very Good" category. These results mean that the developed teaching materials function well as teaching materials in terms of media.

Hypothesis Study

The statistical hypotheses to be tested in this study are based on the following criteria:

H0 : < 2.5

Ha: 2.5

Then the results obtained from the validator X 2.5 so that the teaching materials developed in this study are said to be feasible to use.

Product Development Results

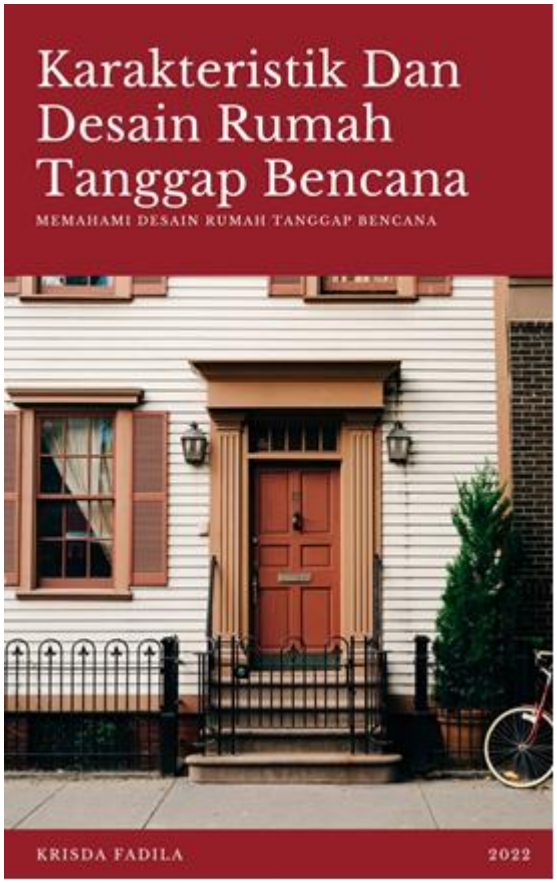

Figure 3. Cover of the book developed for teaching materials

Conclusion

Based on the results of research and discussion on the development of project teaching materials, it can be concluded that this development research produces project-based teaching materials in the Building Construction course. This study refers to the Borg and Gall development method with the stages of analyzing potential problems, data collection, product design, design validation, design revision, product testing, revision, and reporting. The teaching materials developed contain material on the characteristics and design of disaster response houses adapted to the lecture material on Building Construction and these teaching materials project in nature so that they can be used as learning references for students and lecturers. The results obtained indicate that the teaching materials developed are suitable to be used as learning media or teaching materials for lecturers and students in the process of learning activities. Based on the acquisition of the average score of the overall aspect average score by material experts is 3.6 which is included in the very good category, and the average overall aspect score by media experts is 3.6 in the very good category. The research conducted has not yet reached the test of the effectiveness of teaching materials in everyday learning. Therefore, there is an opportunity for other researchers to examine further testing the effectiveness of this project-based teaching material in the learning.

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