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LEARNING INNOVATION (TEACHING GRANT) INTEGRATED ADOBE FLASH C.S.6 APPLICATION TO IMPROVE CRITICAL THINKING SKILLS

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Abstract :
The activity of students when attending Astronomy and Geophysics Lectures in the physics education study program so far is still lacking. This is because the lecture tools are inadequate, students only listen to explanations from lecturers, and learning through the Zoom application is not very effective for students. To overcome this problem, it is necessary efforts are made to design Learning Designs that are good and adequate so that lectures can improve critical thinking skills. This study aimed to design a Learning Design with Adobe Flash C.S.6 Applications. The developer method of this research is 4-D (Four-D mode). The product development stage in this model is the definition stage, the design stage, the development stage, and the dissemination. From the results of the study, it can be concluded that the learning device is feasible to use.

Keywords: Adobe Flash C.S.6; Critical Thinking Skills; Learning Innovation

INTRODUCTION

The ability to think critically is the goal of 21st-century lectures. Lectures are teaching and learning activities in the context of space and time that use certain models, methods and media to shape changes in views, behavior, development of skills, and understanding of knowledge according to the goals to be obtained. In the lecture process, critical thinking skills are needed to answer the challenges of the times. Teachers need to design lecture activities and provide the best instructions that will determine how to learn and think in lectures, shaping students' character and behavior in modern life (Bagheri, 2015).

One of them is by utilizing technology in the field of education, especially in the lecture process, it should be used, because technology is very important to expedite the lecture process, especially during the Covid-19 pandemic, which is now entering the endemic period, especially Astronomy and Geophysics lectures. In the current endemic era, lectures have been carried out offline and online, where students have carried out face-to-face and partly online lectures. The Astronomy and Geophysics course syllabus is very broad in scope, and this can be seen in the 2017 curriculum of the Physics Education Study Program at the Jambi University FKIP that the Astronomy and Geophysics course syllabus consists of universal gravity, the structure of the earth, the solar system, asteroids and comets, stars and their dynamics, galaxy, and universe. To be able to understand the concept well, apart from learning

theory during face-to-face lectures, students should also be able to carry out simulations and animations related to the material properly and adequately, but the obstacle they face is the unavailability of Learning Design documents (CPL, Syllabus, Worksheets). Student Project Work, Learning Outcomes Assessment Sheets, Astronomy and Geophysics Modules based on Adobe Flash C.S.6 integrated with Project Based Learning) for various materials in complete Astronomy and Geophysics courses based on Adobe Flash C.S.6.

From the results of the author's observations during Astronomy and Geophysics lectures for the 2021/2022 school year in the physics education study program at the Jambi University FKIP, students have used videos related to the material in the Astronomy and Geophysics course. However, learning is not well directed because the video can only display the processes of the galaxy and the universe. Students only watch and do not develop critical thinking skills. To optimize lectures, the authors must design an Astronomy and Geophysics lecture design document based on Adobe Flash C.S.6 integrated Project Based Learning to improve students' critical thinking skills.

RESEARCH METHOD

This study uses the development method with a 4D model. The model applies four stages of product development, namely, defining, designing, developing, and deploying (Thiagarajan et al., 1974). The research design used in this study is shown in Figure 1.

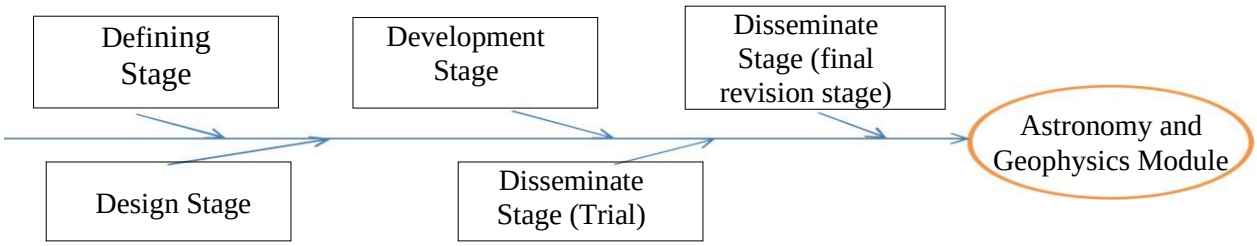

Figure 1. Fishbone Diagram for Astronomy and Geophysics Module Development

The research subjects were two expert validators to assess product feasibility and 5 students for small group trials. Sampling was done by purposive sampling technique. All students use the Astronomy and Geophysics module.

The data in this study were obtained through expert validation and small group trials. Validation was carried out using 39 questions developed from four aspects of assessment, namely Content Adequacy, Presentation Adequacy, Language Assessment, and Approach. Meanwhile, small group tests were conducted using 15 questions to assess students' responses to the practicum guidelines that had been developed.

The research procedure can be explained as follows; (1) Determination Stage. At this stage, we analyze the curriculum, material characteristics, students, and the Astronomy and Geophysics module. In our analysis of students, we examined several characteristics, including their cognitive development and dispositions towards the lecture topic. Material analysis and to identify, describe and develop key concepts requires videos, practical guides and virtual experiments. (2) Design Stage. At this stage, we formulate learning objectives based on the results of an analysis of the previous curriculum, materials, and student characteristics. Application media and learning strategies were determined, and an outline of the instruments used to validate the effectiveness of Astronomy and Geophysics practices and modules was developed. (3) Development Stage. This stage aims to produce Astronomy and Geophysics modules through an expert validation process which includes (a) content validation, (b) construct validation, and (c) language validation. Validation is needed to determine the usefulness of the product between students and lecturers as well as the practicality of the product being developed. In the effectiveness test stage, evaluating whether the product can be used effectively to improve the quality of Astronomy and Geophysics lectures.

Data collected from validation were analyzed using descriptive and statistical analysis techniques. Quantitative data is processed to find out the shortage of materials and media, so that it can be revised. Scores can be classified once the intervals are identified. The following formula is used to

determine the scale range, where we use a Likert scale which has a minimum score of 1 and a maximum score of 4.

By using equation 1, score the results of validation by media experts and categorize them based on intervals, as shown in Table 1.

Tabel 1. Klasifikasi Skor Validasi Ahli

Interval Score	Category
1.00 – 1.75	Bad
1.76 – 2.50	Fair
2.51 – 3.25	Good
3.26 – 4.00	Excellent

Using the validator's suggestions and comments, we analyze bad or very bad data and find weaknesses in the practicum manual. In validating interactive learning media, the following score is given for each item with alternative answers; 4 = Very Good, 3 = Good, 2 = Not Good, 1 = Very Poor.

RESULTS AND DISCUSSION

Needs analysis is the process of gathering information about needs that is systematic and ongoing in designing materials to meet needs. Then a literature study was carried out, namely digging up information from various writings such as books, journals and others according to the research theme. The product developed in this study is an Astronomy and Geophysics course module integrated with Adobe Flash based on Project Based Learning. The format of the Astronomy and Geophysics course module is integrated with Adobe Flash based on Project Based Learning which is produced in printed form so that it can be used easily. The Astronomy and Geophysics course module integrated with Adobe Flash based on Project Based Learning was developed by the research team. After this module is developed, it is expected that students can use the module.

The Astronomy and Geophysics course module integrated with Adobe Flash based on Project Based Learning which was developed is a learning innovation when viewed from the progress of information and communication systems in the current era. With innovation in the development of these modules, it is ultimately hoped that students will be able to properly carry out Astronomy and Geophysics lectures. Astronomy and Geophysics course modules integrated with Adobe Flash based on Project Based Learning can be used by students who are studying Astronomy and Geophysics. From the results of observations that have been made, it turns out that so far students are still having difficulty finding teaching materials for Astronomy and Geophysics courses. The result of this innovation is one of the research team's contributions that can be given to Astronomy and Geophysics students and teachers so that the module can be optimized properly so that students can feel the benefits of this tool in understanding Astronomy and Geophysics material.

The advantage of this module is that it is integrated with Adobe Flash and learning videos to help understand Astronomy and Geophysics material. Besides that, there is a worksheet in the form of Project based learning at the end of each chapter. The advantages that have been achieved in this product cannot be separated from several revisions made in accordance with suggestions, comments from the validator and improvements made by the research team. To produce modules that are used during small group trials, as well as through material expert validation and media expert validation.

In the material validation stage by the first validator with aspects that are classified as very good. In the validation stage by the second validator, the product being developed is given approval to proceed to the small group trial stage with good criteria. Whereas at the media validation stage by the first validator the description of the results of the validator's assessment with the media aspects which are classified as very good. The comments and suggestions are to complete the appearance of this product design before the small group trial media. In this study the module trials were conducted on 5 physics education students. The purpose of testing this module is to find out student responses when using the module. Based on user responses that users have a very good response to the use of the module. Users have responded very well to the module that has been developed. The following shows the modules for the Astronomy and Geophysics course that have been designed.

Figure 2. An example of developing learning tools

Lecture tools designed include CPL, Syllabus, RPS, Student Project Worksheets, Learning Outcomes Assessment Sheets, Astronomy and Geophysics Course Modules based on Adobe Flash C.S.6 integrated with Project Based Learning.

Tatap Muka	Tujuan Pembelajaran	Bahan Kajian	Metode	Waktu	No. Ref
1	Mahasiswa harus dapat : 1. Menjelaskan teori geosentris dan heliosentris 2. Menginterpretasikan hukum Kepler dan Gravitasi Newton, serta penerapannya pada gerak dan fisis benda	**Gravitasi Universal** 1. Teori Geosentris dan Heliosentris 2. Hukum Keppler dan Hukum Gravitasi Newton	Pemaparan materi, diskusi kelompok, presentasi makalah	2 X 50’	1 – 6
2	Mahasiswa harus dapat menjelaskan pengaruh gravitasi terhadap bentuk elipsoida bumi dan perbedaaan gaya gravitasi yang bekerja pada dua benda	**Gravitasi Universal** 1. Bentuk Elipsoida Bumi dan Perbedaan gaya Gravitasi 2 benda	Pemaparan materi, diskusi kelompok, presentasi makalah	2 X 50’	1 – 6
3	Mahasiswa harus dapat : 1. Menjelaskan gerak semu harian dan tahunan matahari 2. Menggambarkan gerak edar bulan terhadap bumi dan matahari, serta penampakan bulan dari posisi yang berbeda terhadap bumi 3. Menjelaskan dan menggambarkan perbedaan antara gerhana matahari dan bulan dan pengamatan yang dapat dilakukan pada saat peristiwa gerhana terjadi	**Gerak dan Posisi Benda Langit** 1. Gerak semu harian dan tahunan matahari 2. Fase - fase bulan 3. Gerhana Bulan dan Matahari	Pemaparan materi, diskusi kelompok, presentasi makalah	2 X 50’	1 – 6

CONCLUSION

From the presentation of the results and discussion, it can be concluded that innovative research products have been produced from the research results in the form of Astronomy and Geophysics course modules. Based on the results of the validation and testing of small groups conducting lecture activities using the Astronomy and Geophysics module, they received a very good response from users, so it can be concluded that the Astronomy and Geophysics module is feasible to use.

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