Development of Learning Media based on Kinovea Application in Biomechanics Course

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Article Info

Abstract

This study aims to facilitate Physical Education Study Program students with the renewal of learning media based on the kinovea application, especially in biomechanics courses which not only learn theoretically but have elements of measurement and analysis of motion in humans, this study uses research and development methods using bolt and galt designs. 8 stages. The subjects of this study were physical education students in semester 5, the results showed that the level of validation of learning media from material experts and media experts was 4.13 eligible categories and 3.3 eligible categories. The results of the small-scale trial show an average value of 4.1 with the Eligible category. The results of large scale trials show an average value of 3.45 in the appropriate category. Based on the results at the validation stage and small-scale and large-scale trials, this study resulted in a kinovea application-based learning media in the biomechanics course of the Bengkulu University physical education study program.

INTRODUCTION

As one of the educational institutions that focuses on producing future teacher candidates, especially in physical education study programs, it is very important for lecturers to be able to keep abreast of technological and information developments because science moves dynamically with the times, prepare a professional education, a curriculum that can provide the desired competencies, physical education lecturers are lecturers who have been selected and qualified in fields of knowledge related to the science of physical education itself. (Danim, 1995) The physical education study program curriculum includes subjects related to motion science and other supporting sciences. (Prabowo et al., 2020)

One of the compulsory subjects in the physical education study program at the teaching science education faculty is biomechanics. Biomechanics is one of the scientific studies that can help sports practitioners, especially trainers, optimize the performance of a movement and reduce the risk of injury. This perspective means the same as knowing the effectiveness and efficiency of a movement. (Ashley Scarlett, 2020)

The results of observations in biomechanics courses show that some physical education study program students tend to have difficulty understanding the concept of analyzing motion in biomechanics courses, the most visible obstacle is Physical Education study program students are only able to analyze with theory and study from learning sources verbally while minimal media for students to practice direct motion analysis with video forms that they practice themselves.(Fernández-González et al., 2020) Kinovea is a video-based application that is used by sports practitioners in analyzing motion to support sports performance, one of the advantages of this application is the application's ability to create guidelines and display the angles of motion shifts that occur in a sports movement video, but these applications are rare once used as a learning medium in courses that aim to learn to analyze human motion (Elrahim et al., 2016). The era of globalization demands abilities that can compete with civilizations that prioritize mastery of software-based digitalization as well as supporting applications in the learning process(Lev Manovich, 2002) Kinovea is an application that can analyze the motion of the human body in terms of kinematics or joint angles and movements based on video, technological advances have had a big impact on the world of education, but sometimes rapid technological advances become an obstacle for students in keeping up with technological developments alone. (Jariono et al., 2020)

This limitation can be seen from the students' ignorance of the existence of an application to analyze motion related to the output of the biomechanics course itself. Based on these problems, it is necessary to carry out a study that develops teaching media based on the Kinovea application to support the lecture process, especially in the Biomechanics course in the physical education study program, FKIP, Bengkulu University. The focus of this research is to develop learning media based on the Kinovea application in the Biomechanics subject of the FKIP University of Bengkulu physical education study program. The purpose of this research is to develop effective and efficient learning media based on the Kinovea application in the Biomechanics subject of the Physical Education Study Program, FKIP University of Bengkulu. The scope of this research is the learning process related to technology based on the Kinovea

application including lecturers, students and learning outcomes.

Biomechanics is the science that studies the internal and external forces acting on the human body and the effects produced by these forces on sports activities and is a scientific discipline that studies the forms and types of motion on the basis of the principles of mechanics and motion kinematics. (Pangesti et al., 2017). This scientific discipline cannot stand by itself, but is supported by other sciences, including anatomy, physiology, physics and kinesiology, then from these sciences the basics and principles are combined to create a science called biomechanics. (Budiman et al., 2020) The basic emphasis on biomechanics is on the concepts of mechanics and kinetics, but the human body is a more complex and perfect system. (Imran, 2014) Therefore, biomechanics concerns the human body and all living things. Biomechanics is a scientific discipline that studies the forms and types of motion based on mechanical principles and analyzes motion. The scope of biomechanics includes developmental biomechanics, biomechanics of exercise, rehabilitation mechanics, equipment design and sport biomechanics (Nor Adnan et al., 2018)

Media is one of the teaching and learning components. As a component of the media, it must be an integral part and must be by the learning process as a whole, meaning that the use of media is very much needed in the teaching and learning process.(Kim & Downey, 2016). Argues that learning media are devices used by teachers to overcome all learning problems. The importance of using media for teaching is that media can be used to assist students in learning, in order to make the teaching and learning process more effective and efficient (Nopiyanto et al., 2021). By using learning media, difficult material will become interesting and easier to understand. (Juniu, 2011)

Technology and education are two inseparable aspects. Technology is from education that can help solve problems to improve the quality of education. (Demir, 2011)

Technology has entered into human and societal life which makes it an important aspect for daily survival be it social, educational, professional and religious life (Razaghi, 2014). Learning technology has the potential to provide a number of learning opportunities for students and expand cognitive function.(Nurdyansyah & Fahyuni, 2016). Thus, to keep up with the times, technology is really needed to further advance the world of education in terms of science and technology.

METHODS

The research design and approach used in this study is by using research and development research, 6 steps designs or research and development. Because of the problems found, one way to solve these problems is to develop a learning media product to support the lecture process in biomechanics courses (Nind et al., 2020). Because this development is in the nature of developing new products, the products developed will be based on an analysis of the needs and problems that occur in the field.

Participants

The population in this study were students of the Department of Education, Physical Education Study Program, Faculty of Teacher Training and Education, University of Bengkulu, but the sample focused on fourth semester students taking biomechanics courses, which ranged from 20-25% of the total 80 of students in the physical education study program.

Sampling Procedures

The data collected related to research subjects related to the development of application-based learning media, data collection using questionnaires and interviews to obtain data related to research subject responses directed by researchers so that they continue to provide responses according to the variables studied. Questionnaires and interviews were given to research subjects regarding the strengths and weaknesses of the media developed and also input for revision of the Kinovea application-based learning media. Then to test the product, a written test was carried out for students to see the practicality and adequacy of the material that had been given through the product resulting from the development of the Kinovea application-based learning media in the biomechanics course of the Physical Education Study Program, Teaching Faculty of Education, University of Bengkulu.

Materials and Apparatus

The research instrument is a tool used to collect research data. The instruments used are objective questions and essays as well as questionnaires that the researcher will distribute(Sugiyono, 2017). The following is a grid of the instrument. For student assessment questionnaires, the components that are assessed are learning, materials, display of learning media, and their use. As for the expert assessment questionnaire, the component material assessed is in the form of learning (learning objectives, delivery of material, and evaluation) and material (relevance and selection of material). Next is an assessment questionnaire by media experts. The component that is assessed is the display of learning media and its use.

Procedures

1. Needs Analysis

In view of the need for the development of science which must move with the times where the need for technology-based learning media is urgently needed to support the lecture process, especially in Biomechanics lectures.

2. Product Development

Kinovea is an application that is oriented towards visual videos that functions to analyze motion in humans and in sports activities, the development of media based on the Kinovea application aims to provide information and learning implicatively in biomechanics courses related to the material of motion mechanics and motion kinematics.

3. Product Validation

The product validation process will be carried out using the expert validation method in which experts who will validate the product include learning media experts, sports biomechanics experts and information technology experts.

4. Product Revision

Product revisions will be carried out after obtaining results and input from experts so that product development will be better and more effectively used as learning media

5. Small Scale trials

A small-scale trial will be carried out with the subject of 5th semester Physical Education students who are taking the Biomechanics course, totaling 32 in the physical education study program, the Teaching Faculty of Education, Bengkulu University.

6. Large Scale Trials

The large-scale trial will be carried out with the subject of 5th semester Physical Education students who are taking the Biomechanics course, totaling 80 people in the physical education study program, the Teaching Faculty of Education, Bengkulu University.

Design or Data Analysis

The data analysis technique used in this study was questionnaire data for material experts and media experts as well as student response questionnaires carried out with five rating scales.(Hanief & Himawanto, 2017) where the highest score was 5 (strongly agreed) and the lowest score was 1 (disagree). To calculate the average total score of each questionnaire, the formula is used: $X = \Sigma X/N$. The score obtained is then converted according to the table below:

Table 1. Category Guidelines

| Value interval	Category
>4,2	Strongly agree
3,9 – 4,1	Agree
3,5 - 3,8	Simply Agree
3,1 - 3,4	Disagree
<3,1	Don't agree

RESULT

The development of Kinovea application-based learning media in biomechanics courses to improve students' critical thinking using the help of the Kinovea application has been tested on 80 Physical Education students taking Biomechanics courses. The results of the distribution of material expert questionnaires, media expert questionnaires, and student response questionnaires show that this kinovea application-based learning media is suitable for use in Biomechanics learning activities. In addition, there were also trials conducted on students, the results of

which showed an increase in students' understanding of Sport teaching material. Biomechanics after using learning media based on the Kinovea application so that students get learning outcomes with a good average score. (Kridasuwarso, 2016)

The following is an explanation of the stages of conducting research using the Research and Development (R&D) method that researchers have carried out. The stages of developing learning media based on the Kinovea application consist of three stages, namely the application installation stage, importing motion videos, creating and explaining motion analysis through the Kinovea application and making learning videos.(Amirah et al., 2017)

First, at the stage of installing the application on the device where the application can be downloaded on the web with the https://www.kinovea.org link, the process of installing the kinovea application is not difficult, it only takes 5 to 10 minutes depending on the specifications of the device used Second, at this stage, the process of importing motion videos will be analyzed directly in the Kinovea application, as shown in the following image:
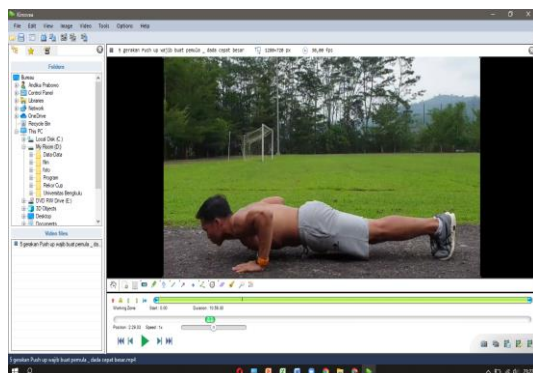
The material validation carried out by the lecturer in the Biomechanics course aims to assess the feasibility of the material used in the Kinovea application-based learning media through a

questionnaire. Before using this questionnaire, CV (content validity) was first calculated where the result was 0.875, which means that this material expert validation instrument can be used. The questionnaire uses a Likert scale with 5 alternative answers where the highest score is 5 (strongly agree) and the lowest score is 1 (strongly disagree). This questionnaire consists of 16 statements which are grouped into 3 aspects, namely the material aspect, the language aspect, and the Benefit Media Implementation aspect. The average results of material expert validation are as follows:

Table 2. Expert Validation

No	Assessment Aspects	Total score	Average Score	Category
1	Material	75	4,3	Very Worth It
2	Language	70	4	Worth It
3	Implementability	73	4,1	Worth It
	TOTAL	**218**	**4,13**	Worth It

DISCUSSION

The research that the researchers conducted showed that the development of Kinovea Application-Based learning media in biomechanics courses is feasible to be used as learning media in Biomechanics courses. This research and development adopts the design popularized by Bolt and Galt which has 8 stages, namely, Needs analysis, Product Design and development, Product Validation, Product Revision, Small-Scale Trial, Product Revision, Large-Scale Trial, and Dissemination. (Kurniati et al., 2015)

The Needs Analysis Stage is the initial data collection stage to look for potential problems in the lecture process according to the topics taken, this stage is related to the results of interviews and giving questionnaires to students who are taking Biomechanics courses, especially in semester 5 students in the physical education study program at Bengkulu University, From the results of questionnaires and interviews, it was concluded that it was important to develop learning media based on the Kinovea application on the grounds of facilitating the process of analyzing human body movements so that the lecture process would be able to achieve the objectives of the course so that it is feasible to develop learning media based on the Kinovea application in biomechanics courses.

The second stage is product design and development carried out by designing the learning media itself by starting a series of downloading the Kinovea application on the laptop device used by the researcher, then the application is installed and operated on the researcher's laptop, after the application can run, the researcher imports videos of human sports activities and starting to do an analysis on the video that has been imported, in this process the kinovea application can directly become a learning medium which can help explain the process of analyzing motion in the human body by making several auxiliary lines at the axis of motion so that it can be seen and calculated. the angle and the length of the distance from the axis of motion which is included in the subject matter of motion mechanics. To simplify and provide practicality to the lecture process, a video explanation of the process of motion analysis was made using the Kinovea application with the help of the Bandicam application so that the results of the motion analysis can be watched again as audio-visual learning media. In this way, it is hoped that this learning media can attract interest and motivation in students to return to study the material that has been presented.

CONCLUSION

Dissemination is the implementation stage of product development results which will be carried out in odd semesters of the 2023/2024 curriculum with the hope of increasing learning outcomes in the biomechanics course in the physical education study program FKIP Bengkulu University. The cognitive stage becomes the initial and basic influence on success at other stages. Because it is necessary for an educator to provide effective and efficient learning at this stage and provide enrichment of knowledge to students by using teaching materials that are up-to-date in accordance with the times. The method to achieve this goal will be carried out by Research and Development from year to year. What is certain is that the Research and Development stage begins with needs analysis, product development, validation, trial and publication. The output target of this research is publication in an accredited national scientific journal.

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