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VIDEO MICRO LEARNING: IMPLEMENTATIONS TPACK IN KINEMATICS LEARNING

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Abstrak

In 21st century learning, students are required to have 4C skills (critical thinking, creativity, collaboration, and communication). One way to practice 4C skills is with physics learning videos that implement TPACK. This study aims to produce learning videos that train 4C skills. The method used in this study is research and development using the Lee & Owens stages. The product feasibility of the results of this study was assessed by experts through a questionnaire instrument. The components of the questionnaire include the characteristics of learning videos, learning video components, learning models, TPACK implementation in learning, and the 4C learning stages, so that media experts, material experts, and learning experts say that physics learning videos are appropriate to use to train 4C skills in students.

Kata-kata kunci: 4C, Learning Videos, TPACK, Kinematics, Lee and Owens.

Abstract

Memasuki pembelajaran abad 21 peserta didik dituntut untuk memiliki keterampilan 4C (*critical thingking, creativity, collaboration and communication*). Salah satu cara untuk melatih keterampilan 4C yaitu dengan video pembelajaran fisika yang mengimplementasikan TPACK. Penelitian ini bertujuan untuk menghasilkan video pembelajaran yang melatih keterampilan 4C. Metode yang digunakan dalam penelitian ini adalah Research and Development dengan tahapan Lee & Owens. Kelayakan produk hasil penelitian ini dinilai melalui instrumen kuesioner oleh para ahli. Komponen kuesioner meliputi karakteristik video pembelajaran, komponen video pembelajaran, model pembelajaran, implementasi TPACK dalam pembelajaran, dan tahapan pembelajaran 4C sehingga ahli media, ahli materi dan ahli pembelajaran menyatakan video pembelajaran fisika layak digunakan untuk melatihkan keterampilan 4C pada siswa.

Keywords: 4C, Video Pembelajaran, TPACK, Kinematika, Lee dan Owens.

PENDAHULUAN

In the 21st century, students are required to have 4C skills [1]. In line with this, students are also expected to have knowledge, skills, attitude development, and learning experience in order to be able to think logically, critically, and creatively [2]. In the learning process, students still lack motivation to learn, which interferes with the formation of 4C skills [3]. The lack of interesting physics learning media will cause problems, namely the low learning motivation of students [4].

These problems can be overcome by using multimedia-assisted learning [5]. Based on observations regarding learning resources and teaching materials, the results show that teachers still

use modules or textbooks in physics learning activities in high school [6]. However, the use of textbooks as a learning resource is considered less attractive and interferes with the formation of 4C skills [7], so teachers need additional learning media besides modules or textbooks to make learning media interesting, especially for kinematics material.

Implementation of TPACK (Technological, Pedagogical, and Content Knowledge) is a framework for designing new learning models by combining three main aspects, namely technology, pedagogy, and knowledge content or material (ontological), which train 4C skills [8]. The integration of Artificial Intelligence (AI) technology in eyeglass learning videos can train 4C skills and increase students' learning motivation [9]. Video is a very effective audio-visual learning medium to support the learning process, both for mass, individual, and group learning [10].

Based on the description above, this article presents the results of research on the development of eyeglass learning videos that implement TPACK on kinematics material.

METODOLOGI

The research method used in this study is the research and development (R&D) method. The model used in this study is the Lee & Owens model. The Lee & Owens model is a model devoted to developing multimedia [11]. FIGURE 1 is a step in the Lee & Owens model.

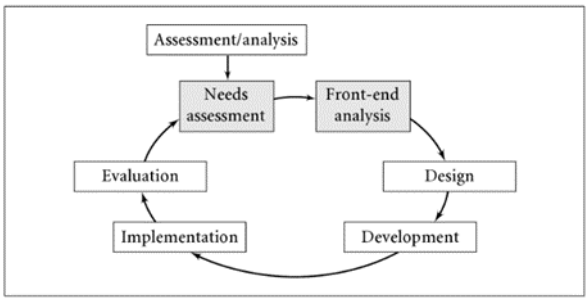


FIGURE 1. The Lee & Owens Development Model

The Lee & Owens method consists of five stages:

1. **Assessment and Analysis** which is divided into two parts, namely a needs assessment, which aims to identify differences between actual and desired conditions, and sets priorities for action, a front-end analysis, which aims to complete information about what will be developed.
2. **Design** contains the stages of making a schedule for multimedia development, designing media specifications to be developed, designing the material structure to be developed in multimedia, and preparing the necessary tools for the expert validation process and audience trials.
3. **Development** this development stage translated product specifications into physical form.
4. **Implementation** contains stages that include a series of audience test activities consisting of small group trials and large group trials.
5. **Evaluation** contains two types of evaluation stages, namely formative evaluation and summative evaluation.

Data Analysis

The data processing of the eligibility test results in the form of a questionnaire by material experts, media experts, and pedagogical experts uses a continuous scale of 1 - 4 to get the results of the eligibility of video learning media which there are four categories of assessment based on interpretation criteria, which:

TABLE 1. Continuum Scale Interpretation Criteria

No.	Criteria	Score
1	1	Very Bad
2	2	Bad
3	3	Good
4	4	Very Good

The interpretation of the score is calculated based on the acquisition score of each item, with the following equation.

$$\text{Score Interpretation} = \frac{\sum \text{Acquisition Score}}{\sum \text{Maximum Score}}$$

This study uses a continuum scale range of 1 to 4 so that the maximum score is 4, the minimum score is 1, and the total capacity of scores is 4. So, it can be calculated:

$$\text{Score Range} = \frac{\text{Maximum Score} - \text{Minimum Score}}{\text{Number of Score Categories}}$$

Then the eligibility criteria were obtained with a difference of 0.75 with a very low interpretation starting from 1.00 - 4,00, as shown in the following table.

TABLE 2. Eligibility Interpretation Criteria

Mount of Value	Percentage of Score Interpretation	Eligibility Category
$1{,}00 \leq \text{Is} < 0{,}75$	$25\% \leq \text{Is} < 43{,}75\%$	Not feasible
$1{,}75 \leq \text{Is} < 2{,}50$	$43{,}75\% \leq \text{Is} < 62{,}50\%$	Quite decent
$2{,}50 \leq \text{Is} < 3{,}25$	$62{,}50\% \leq \text{Is} < 81{,}25\%$	Worth it
$3{,}25 \leq \text{Is} < 4{,}00$	$81{,}25\% \leq \text{Is} < 100\%$	So worth it

Collection of Data

This research and development was carried out at SMA Negeri 5 Jakarta in the even semester of the 2022/2023 academic year with class XI MIPA and learning video objects as subjects. The data collection methods in this study are as follows:

Questionnaire

In this method, the researcher collected data by distributing a Google Form questionnaire to students of SMA Negeri 5 Jakarta, class XI MIPA, with the aim of knowing their initial problems and constraints.

Literature review

This method is carried out by searching for sources in journals, both national and international, and books related to topics relevant to the research being carried out.

HASIL DAN PEMBAHASAN

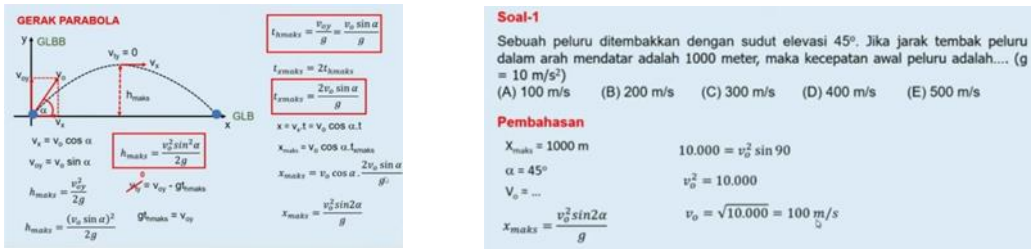
Product

The research and development carried out has produced learning media in the form of physics learning videos that implement TPACK with the advantage of training 4C skills. The stages of the 4C skills contained in the media are as follows:

1. Students critique the initial information to relate the knowledge to be learned with the experience and knowledge possessed, which is part of the FIGURE 2 apperception stage.

FIGURE 2. Apperception section

2. The description of the content, which is part of the answer to the apperception problem, and the sample questions consist of FIGURE 3 kinematics content.



(a) (b)

FIGURE 3. (a) content description; (b) problems example

3. Students carry out experimental activities, then compare experiments carried out individually with other individuals to communicate arguments about the experimental activities carried out.
4. The last part consists of conclusions and self-evaluation.

Eligibility Test Results

The physics learning video for the kinematics material developed is being tested for feasibility. The feasibility test carried out is the feasibility test of material experts, media experts, and learning experts. The following is a table of aspects of the assessment of each validator.

TABLE 3. Material Expert Due Diligence Table

Assessment Aspects	Percentage	Results
Message clarity	79 %	Worth it
Content representation	81 %	Worth it
Average	80 %	Worth it

TABLE 4. Media Expert Due Diligence Table

Assessment Aspects	Percentage	Results
Stand-alone	82%	So worth it
Friendly to the user	80 %	Worth it
Media visualization	79%	Worth it
Resolution qualit	80 %	Worth it
Video duration	78%	Worth it
Ease of use	81%	Worth it
Average	81 %	Worth it

TABLE 5. Learning Expert Due Diligence Table

Assessment Aspects	Percentage	Results
Components of the TPACK approach	78 %	Worth it
4C skills process	77 %	Worth it
Average	77,5 %	Worth it

Discussions

The physics learning video media that implements the resulting TPACK is considered feasible in terms of material, media, and learning. Physics learning video media utilizes audio, visuals, and animation to support the learning process. Pedagogically, learning physics using learning video media that implements TPACK is declared feasible for practicing 4C skills. From tables 3, 4, and 5, it can be described that the developed physics learning videos get an average score of 79,5%, with an average percentage of material experts of 80%, media experts of 81%, and learning experts of 77,5%. Based on the results of the feasibility test, the physics learning video on kinematics material that was developed was declared feasible as a learning resource in high school.

SIMPULAN

The resulting media is in the form of physics learning videos with the implementation of TPACK, which are equipped with Artificial Intelligence technology for students who are considered capable of practicing 4C skills so that they can be used as interesting reference teaching materials for learning and make it easier for students to visualize concepts and motivate students to study independently.

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