



## Design of Culture Based Physics Mobile Learning Media on Circular Movement Materials for Class X SMA Students

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### ABSTRACT

The Covid-19 pandemic has affected almost all aspects of life, including the education aspect. To break the chain of spread of the Covid-19 pandemic, the learning system that was originally offline switched to online learning. In addition, the current swift currents of globalization have caused the erosion of cultural values. Therefore, we need media that can restore cultural values, especially Minangkabau culture in students' lives. This study aims to produce an android-based supporting mobile learning media on circular motion material for high school students in class X. This application is contextual and integrated with Minangkabau culture so that students will be more interested in studying physics. The method used in this study, namely the Four D research and development (RND) method includes Define, Design, Develop, and Dessiminate. The resulting application is one of the contributions to the development of learning media which is expected to be one of the right Physics learning solutions towards the golden Indonesia 2045.

**Keywords:** Mobile Learning Media, Culture, Animation, Physics

### 1. INTRODUCTION

A valuable moment in the history of the Indonesian nation occurred in 2045, because Indonesia entered the 100th anniversary of its independence. There is a great hope that in 2045 Indonesia will be filled by a generation that has a large number of productive ages (Abi, 2017). In addition, in 2045 Indonesia also faces a good moment called the demographic bonus. Demographic bonus is the condition of a country where the number of productive age population is greater than the population of non-productive age. So that this opportunity needs to be managed so that youth can grow into human beings with character, intelligence, and competitiveness.

The high rate of transmission of Covid-19 has made the world restless, including Indonesia. The Covid-19 pandemic has affected almost all aspects of life, including the education aspect. To break the chain of spread of Covid-19 where students can act as spreaders of the disease without symptoms, almost all countries in the world have eliminated activities in schools and replaced them with online learning. As of April 2020, more than 400 million students worldwide are required to study at home (UNESCO, 2020). In Indonesia, learning is also transferred to the online system in accordance with the Circular Letter of the Minister of Education and Culture of the Republic of Indonesia number 3 of 2020 concerning Prevention of Corona Virus Disease (Covid-19) in Education Units.

Online learning makes students bored quickly, because they cannot study together with their friends and teachers. Aulia Luqman Aziz, an Education Expert at Brawijaya University (Kasih, 2020) <https://journals.insparagonsociety.org>

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argues that good learning is learning that is carried out face-to-face with the teacher and his friends. Based on data from a rapid assessment survey conducted by the COVID-19 task force (BNPB 2020) shows that 47% of Indonesian children feel bored studying at home. Meanwhile, 35% feel worried about missing lessons, 15% children feel insecure, 20% children miss their friends and 10% children feel worried about the family's economic condition (Kompas, 2020).

Physics learning is one of the subjects affected by the pandemic. This is because of its nature which requires an understanding of the process systematically and its application in real life. Coupled with online learning in a boring pandemic era and the mindset of students who consider physics a difficult subject (Guido, 2013). Physics subject requires strong logic and some basic knowledge of mathematics, based on content, analysis and synthesis.

On the other hand, in the current new normal era, the swift currents of globalization have resulted in the erosion of cultural values. Students are more proud of foreign cultures than their own nation's culture. This is evidenced by the presence of a greater sense of pride in oneself when using foreign products, compared to using local products. This needs to be a concern, especially schools as formal institutions that lay the foundation of education for higher levels (Adnyana, 2014).

Indonesia is a country rich in culture. One of them is Minangkabau culture. The Minang tribe is an ethnic group originating from the Minang realm whose kinship system is based on maternal lineage. The main philosophy of Minangkabau culture is Alam Takambang Becomes a Teacher. That is, nature is a real teacher for humans, because through nature wisdom is obtained. One of them is through local wisdom. However, global technological developments have begun to erode the values of local Minangkabau cultural wisdom. Therefore, we need media that can restore Minangkabau cultural values in students' lives.

Based on these problems, the authors are interested in developing interactive learning media in the form of cultural-based physics learning applications. This application can help students understand the concept of physics in the midst of the Covid-19 pandemic. And can introduce Minangkabau local wisdom, in the form of culture-based mobile learning media. The final phase of this application is the implementation phase, the application will be practiced to students directly. This culture-based physics mobile learning media has the potential to be an applicable product that can be used by physics subject teachers and class X high school students. The product's contribution to the field of science and technology as an IT-based learning media to support Indonesia is golden 2045.

## 2. EXPERIMENTAL

Culture-based physics mobile learning media was developed using the Four D research and development (RND) method consisting of Define, Design, Develop, and Dessiminate. However, in this research, the data displayed is only up to the design stage.

### 1. Define

In the define stage or called the needs analysis stage, there are five stages that are passed, namely: (1) Front end analysis, conducting initial analysis such as analyzing statistical data on smartphone users and learning effectiveness using Android; (2) Learner analysis, studying the characteristics of students, such as: ability, learning motivation; (3) Task analysis, analysis of the main tasks that must be mastered by students in order to achieve basic competencies; (4) Concept analysis, analyzing the concept of the material to be taught; and (5) Specifying instructional objectives, formulation of learning objectives. Based on reports and survey results from the Indonesian Internet Service Providers Association (APJII) regarding internet users in Indonesia in 2017, the number reached 143.26 million out of a total population of 262 million people. As shown in Figure 1.



Figure 1. Internet User Data in Indonesia

In 2018, most Indonesians were no longer able to break away from internet-based activities. Since the beginning of the Indonesian government developing internet infrastructure, the number of internet users continues to increase every year. As Figure 2 shows.



Figure 2. Internet Growth Data in Indonesia

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The rapid development of the internet in Indonesia has a significant impact on various aspects of life. The development of increasingly sophisticated information technology also makes it easier for everyone to carry out various activities, one of which is in the educational aspect. In the field of education, especially learning, smartphones are used to help educators and students find various lesson information. The facility that is often used is the internet. Through internet facilities, educators and students can easily get lesson information. However, if explored more deeply, smartphones have other facilities, such as learning applications.

Learning applications are new learning media breakthroughs that provide absolute freedom for students to operate them. Basically, learning applications have the benefit of making it easier for students to learn certain materials. Hake (in Cahyadi, 2003) explains that programmed applications as supporting media are able to make learning more effective according to their intended use.

The application of the policy of learning from home has an impact on the psychology of students. The number of tasks given by the teacher makes many students feel stressed in undergoing online learning (Chaterine, 2020). The number of tasks given by the teacher is also considered burdensome and the processing time is short, so that it makes students confused in completing their assignments (Raharjo & Sari, 2020). With the many assignments given, students can spend time from morning to night just to complete various online tasks. Previously, this condition did not occur when teaching and learning activities were still carried out in schools.

## **2. Design**

The steps in the design and modeling stage of physics mobile learning media are as follows:

### **2.1 Background creation**

At the stage of making the media background, the team used the Corel Draw application. There are seven main features in physics mobile learning media, namely competencies, materials, simulations, exercises, formulas, creators and instructions.

### **2.2 Object animation**

At the object animation stage, the team created several animations. The animation consists of character objects dressed in traditional Minangkabau clothes to display material features and simulations as well as randai animations on simulation features using the Adobe Flash CS3 application.

### **2.3 Prototyping**

At this stage of prototyping, the team used the <https://www.figma.com/> site. By combining the background design and object animation that has been made previously. Next, the team added content and media content consisting of competencies, materials, practice questions, simulations and formulas that we have summarized from several sources. Then, the team compiles all designs, object animations and media content so that the media display can be visualized for further improvement.

## 2.4 Coding

In this coding stage, the team used the actionscript programming language from the Adobe Flash CS6 application. Adobe flash CS6 is a vector-based program used to create animations. In addition, Adobe Flash also has the ability to create interactive content, such as interactive websites, media advertisements, learning media, online games, and others.

## 2.5 Making Apk

The team converts the media into apk format so that it can be accessed on Android/ Smartphones.

## 3. Develop

At this stage, product design testing activities are carried out, then product revisions are carried out according to the trials carried out.

## 4. Disseminate

At this dissemination stage, several students used the media as users.

## 3. RESULTS AND DISCUSSION

The results of the development in this study, namely Android-based learning media for Physics subjects for high school students in class X using Adobe Flash CS6 by converting it into the android package (apk) format. The physics mobile learning media has 7 integrated parts, which consist of: (1) competencies, (2) materials, (3) simulations, (4) exercises, (5) formulas, (6) creators and (7) instructions. Each section is connected to each other so that users can also get the results obtained from each activity they do through the exercise menu.

The main menu page contains several features which are shortcuts to open the media menu display. The features contained in the main menu are competencies, materials, simulations, exercises, formulas, creators and instructions. The main menu display can be seen in Figure 3.



Figure 3. Main Menu Display

The competency menu contains core competencies, basic competencies, circular motion indicators and references used in the media. Competency menu display as shown in Figure 4.

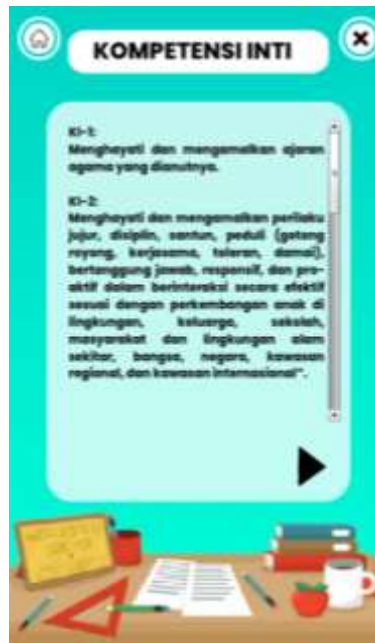


Figure 4. Competence Menu Display

The material menu is a display consisting of six sub-materials, namely circular motion with constant speed, frequency and period, angular velocity, linear velocity, centripetal force and the relationship of the wheels. The following is a display of the material menu and one of the sub-materials in Figure 5.



Figure 5. Display of Material and Sub-Material Menu Display Wheel-Wheel Relationships

After studying the material, users can improve their understanding by selecting the simulation menu. In this simulation menu, there are two simulations that can be performed, namely frequency and period as well as angular and linear velocity. The following is the display of the simulation menu in Figure 6.



Figure 6. Simulation Menu Display

In addition to the material and simulation menus, users can also hone their skills by selecting the training menu. The following shows the training menu in Figure 7.



Figure 7. Display of the Exercise Menu and Questions

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In this exercise menu, there will be 20 questions that will hone skills and measure the extent to which students understand the material that has been studied. The learning media developed already meet the criteria for good learning media, ranging from appearance, writing, ease of access, and media that are not easy to error. In addition, this media can be accessed on a minimum of Android 4.0 (Jelly Bean) smartphones and requires a minimum of 512 MB smartphone RAM so that this media is practical and easy to use.

#### 4. CONCLUSION

Based on the discussion and results of the development of learning media in this study, it can be concluded that: the development of culture-based physics-based mobile learning media has gone through the define and design stages. At the define stage, the data for the initial/needs analysis has been obtained to develop the media. At the design stage, media has been produced that is ready to be used by students and teachers. Culture-based physics mobile learning media has the potential to be an applicable product that can be used by teachers in physics learning and introduces local culture to the younger generation

#### REFERENCES

- Abi, A.R., 2017. Paradigma Membangun Generasi Emas Indonesia Tahun 2045. *Jurnal Ilmiah Pendidikan Pancasila dan Kewarganegaraan*, 2(2), pp.85-90.
- Akmal, H. & Susanto, H., 2018. Efektivitas Penggunaan Aplikasi Pembelajaran Berbasis Mobile Smartphone Sebagai Media Pengenalan Sejarah Lokal Masa Revolusi Fisik Di Kalimantan Selatan Pada Siswa Sekolah Menengah Atas. *Jurnal Historia*, 6(2), pp.197-206.
- Atiqoh, L. N. 2020. Respon Orang Tua Terhadap Pembelajaran Daring Pada Masa Pandemi Covid-19. *Thufuli : Jurnal Ilmiah Pendidikan Islam Anak Usia Dini*, 2(1), 45.
- Bulkia, S., Herawati, A.S. & Hasanah, N., 2019. Pengaruh Pengetahuan Nasabah dan Kualitas Layanan terhadap Minat Individu Pengguna Internet Banking Banjarmasin. *At-Tadbir: jurnal ilmiah manajemen*, 3(2).
- Chodijah, S., Fauzi, A., & Wulan, R. 2012. Pengembangan Perangkat Pembelajaran Fisika Menggunakan Model Guided Inquiry yang Dilengkapi Penilaian Portofolio Pada Materi Gerak Melingkar. *Jurnal Penelitian Pembelajaran Fisika*, 1, 1–19.
- Muliyati, D., Bakri, F. and Ambarwulan, D., 2018. Aplikasi android modul digital fisika berbasis discovery learning. *WaPFI (Wahana Pendidikan Fisika)*, 3(1), pp.74-79.
- Nengsi, M. I., & Eliza, D. 2019. Pelaksanaan Pengembangan Karakter Peduli Lingkungan Bagi Anak dalam Konteks Alam Takambang Jadi Guru. *Aulad : Journal on Early Childhood*, 2(2), 28–40.
- Novitasari, L., Agustina, P. A., Sukesti, R., Nazri, M. F., & Handhika, J. 2017. Fisika, Etnosains, dan Kearifan Lokal dalam Pembelajaran Sains. *Seminar Nasional Pendidikan Fisika III 2017*, 81–88.
- Oktawirawan, D.H., 2020. Faktor pemicu kecemasan siswa dalam melakukan pembelajaran daring di masa pandemi covid-19. *Jurnal Ilmiah Universitas Batanghari Jambi*, 20(2), pp.541-544.
- Rosadi, P. R. E., Rapi, N. K., & Yasa, P. 2019. *Penerapan Bahan Ajar Sains Berbasis Kearifan Budaya Lokal Untuk Meningkatkan Aktivitas Dan Prestasi*. 9(2), 75–84.



- Suni Astini, N. K. 2020. Tantangan Dan Peluang Pemanfaatan Teknologi Informasi Dalam Pembelajaran Online Masa Covid-19. *Cetta: Jurnal Ilmu Pendidikan*, 3(2), 241–255.
- Syifa, M. and Oktavia, C., 2021. Efektivitas Psikoedukasi Strategi Belajar dan Manajemen Stress pada Siswa SMA Negeri 1 Cerme, Gresik. *Temu Ilmiah Nasional (TEMILNAS XII)*.
- Thiagarajan, S., Semmel, D.S., & Semmel, M.I. 1974. *Instructional Development for Training Teachers of Exceptional Children: A Sourcebook*. Indiana: Indiana University.
- Wahyono, P., Husamah, H., & Budi, A. S. 2020. Guru profesional di masa pandemi COVID-19: Review implementasi, tantangan, dan solusi pembelajaran daring. *Jurnal Pendidikan Profesi Guru*, 1(1), 51–65.