KONSTAN
JURNAL FISIKA DAN PENDIDIKAN FISIKA
Volume 7, Number 2, December 2022
E-ISSN : 2460-9129 dan P-ISSN : 2460-9110
http://jurnalkonstan.ac.id/index.php/jurnal

Android-Based Work and Energy Physics Mobile App (WEPMA) Development

Nugroho Prasetya Adi[1,*)], Muhammad Zaini[2]

[1)]Physics Study Program, Universitas Sains Al-Qur'an, Wonosobo, Central Java, Indonesia
[2)] Physics Tadris Study Program, Universitas Islam Negeri Mataram, Mataram, West Nusa Tenggara, Indonesia

*Correspondence e-mail: nugroho@unsiq.ac.id

Article Info:

Sent:
June 24, 2022
Revision:
Dec 27, 2022
Accepted:
Dec 27, 2022

Keywords:

Development, Work & Energy Physics Mobile Apps, Android

Abstract

This research aims to produce WEPMA on feasible work and energy materials in terms of materials, media, and educator responses. The research method used is research and development (R&D), using the 4D model (Define, Design, Develop, and Disseminate). The product developed is a mobile phone-based physics learning media on business and energy material which consists of 6 main components: homepage, competency, material, simulation, quiz, and profile. The results showed that WEPMA could be used as a teaching medium in the physics subject of work and energy based on expert judgment with outstanding categories for media, materials, and educator responses.

INTRODUCTION

In Indonesia, the COVID-19 pandemic at the end of March 2020 paralyzed all areas of life except education. The most apparent impact faced in education is the shift in the learning paradigm from offline to online. The tsunami of shifting the learning paradigm did not only occur in Indonesia but in all countries affected by the co-19 pandemic[1]. The competence of educators in carrying out online learning is highly tested to carry out teaching and learning processes during the pandemic. Educators' readiness in choosing learning components is the key to the success of online teaching and learning activities. A significant influence on the learning process can occur during the online learning process if the use of learning media is wrong[2].

Using media in the learning process is a step for educators to convey material and teaching objectives to students[3]. However, the facts show that educators have not fully mastered the suitable media for online learning. Educators still have difficulty determining which media suits the virtual-based learning process during the Covid-19 pandemic[4]. Another problem is that the media is only available in printed form or is static[5]. for this reason, educators can't apply media in online processes. Media innovation is needed to overcome the problems that arise.

An innovation that can be developed is compiling media for mobile-based electronic learning processes that can be used anywhere and anytime by combining developing technologies[6]. The development of science in this modern era is experiencing very rapid changes. One of these developments is marked by technological advances that cannot be stopped. This technological advancement is characterized by the various products produced based on electronics, one of which is the cell phone. The change in the function of the mobile phone as a communication medium has

developed into a medium that can access various information spread worldwide. This change partly makes the cell phone transform into a smartphone [7].

Based on survey results, smartphone users reached 130 million people in Indonesia[8]. Smartphones based on the Android operating system are widely used products, with product sales coming at 37.19%, with the trade product brand being Samsung [2, 8]. A large number of smartphone users in Indonesia will have an impact, especially in the world of education, so educators must be able to direct students to be wiser in their use. The development of smartphone technology encourages the development of mobile-based applications to be applied in the learning process at schools, called mobile learning [5]. The result of mobile learning in learning is deemed necessary to attract students' interest in learning online; besides that, it makes it easier for teachers to convey material specifically in physics subjects.

Media development in the smartphone-based learning process has been extensively developed in previous research, but the effect of smartphone-based media on business and energy materials is still tiny. Several studies that have developed smartphone-based media include research conducted by Syaputrizal & Jannah, which developed mobile learning for dynamic fluid material as a medium in the physics learning process.[9], Vilmala & Mundilarto set an Android-based application on static fluid material as a medium in the learning process[10], Adi & Kurniawan created android-based media on gas kinetic theory material for the learning process [2], Rivai et al. developed android-system media for momentum and impulse material in physics learning[11].

Based on the findings that have been studied, it is necessary to develop mobile-based media in physics learning so that the Work & Energy Physics Mobile App (WEPMA) is produced.

RESEARCH METHODS

The research method used is Research & Development (R&D) with a 4D model. The 4D development model has four essential components that must be carried out. These components are defined, designed, developed, and disseminate[12]. The resulting product is the Work and Energy Physics Mobile App (WEPMA), a medium for the physics learning process for work and energy materials based on an android application. WEPMA consists of 6 main components: homepage, competency, material, simulation, profile, and quiz.

This study collected three types of data: the feasibility of the material, the media, and the teacher's response against WEPMA. The media feasibility data was generated from the expert's assessment of the press being developed, while the material feasibility data was generated from the expert's review related to the material in WEPMA. Data collection is related to using validated instruments to measure the feasibility of media, materials, and educator responses. The results of media feasibility data, materials, and educator responses are sought by adding up the scores obtained and converting the scores into percentages so that the quality of the media and material can be determined. The reference for changing scores into portions is presented in Table 1 below

Table 1. Percentage of change in score

intervals (%)	Category
76-100	Very good
51-75	Well
26-50	Pretty good
0-25	Not good

The specified product eligibility value is Good Enough.

RESULTS AND DISCUSSION

A. Product Development

Work and Energy Physics Mobile App(WEPMA) was developed using the construct 2.0 application, which is an application that produces application-based products on the Android operating system. This product consists of 6 main components: the homepage, competencies, materials, simulations, profiles, and quizzes, which can be seen in Figure 1.

The homepage component contains the appearance of the WEPMA product, and the competency component contains the basic competencies and indicators expected after learning to use WEPMA. The material component contains work and energy material accompanied by pictures so students can more easily understand the material. The simulation component includes the simulation of work and energy material. The simulation is intended to make students understand it related to work and energy material directly with experiments. The profile and quiz components contain developer biodata and several questions related to business and energy.

B. Product Assessment Results

1. Media Eligibility

Media assessment was carried out by three experts in their fields using a validated questionnaire. The intermediate media assessment relates to media design, format, and operations. The conclusion of the evaluation of 3 experts for the feasibility of the media is in Table 2 below

Table 2. Media Eligibility

Aspect	Expert 1	Expert 2	Expert 3	Average	Percentage (%)	Category
Media Design	3	3	4	3.33	83.25	
Media Formats	4	4	3	3.66	91.5	Very good
Media Operation	4	4	4	4	100	

2. Material Eligibility

This stage is carried out by three experts on the feasibility of the media using questionnaires. The assessment of material eligibility is based on material presented at WEPMA. Assessment Indicators related to language, material construction, and material format contained in WEPMA can be seen in Table 3 below.

Table 3. Material Feasibility

Aspect	Expert 1	Expert 2	Expert 3	Average	Percentage (%)	Category
Language	3	3	3	3	75	Well
Material Construct	4	3	3	3.33	83.25	Very good
Material Formats	4	4	3	3.66	91.5	Very good

3. Educator Response Results

The WEPMA product was limited to 10 educators who teach physics subjects in schools. Limited trials are given to educators to determine the feasibility of the product for students before being widely tested. The results of educator responses to WEPMA are shown in Table 4 below

Table 4. Educator's Response

No	Indicator	Average	Percentage (%)	Category
1	The theory in WEPMA is easy to understand	3.2	80	
2	WEPMA makes it easy to understand the material	3.5	87.5	
3	The WEPMA interface is easy to operate	3.5	87.5	
4	Images in WEPMA provide an understanding of the material	3.4	85	Very good
5	The instructions for using WEPMA are clear	3.6	90	
6	The language used in WEPMA is easy to understand	3.7	9.25	

7	The combination of letters and colors in WEPMA can be interesting	3.5	87.5
8	Simulation on WEPMA makes it easy to understand the material	3.5	87.5

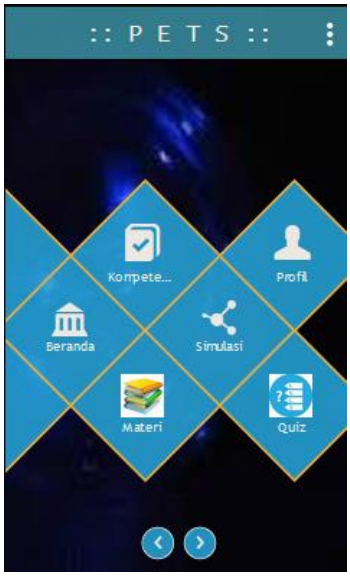

Figure 1. Main Display of WEPMA

The design of WEPMA, consisting of 6 main components, has been validated and revised according to expert input. The WEPMA component comprises homepages, competencies, materials, simulations, profiles, and quizzes. The home view is the main view of WEPMA, as shown in Figure 1. The Competency Component contains indicators, basic competencies, core competencies, and learning objectives. The material component includes a chapter on effort and energy. The simulation display contains a virtual practicum related to action and animation. The profile display consists of the developer's data, and the quiz display has practice questions related to business and energy materials.

A study of research data shows that WEPMA is feasible to use because it is in an outstanding category regarding media, material, and educator responses. The feasibility of WEPMA based on the results of the analysis of experts can be concluded that WEPMA is a media breakthrough in the learning process for physics subjects, work material, and energy that can be used. The development of WEPMA can be an alternative to integrating mobile phone technology into physics learning, which in recent years has massively implemented mobile phone-based media in improving the quality of learning physics in the learning process. The application of mobile phone-based media for the learning process in several studies can increase students' interest [5, 6, 10]

CONCLUSION

Based on the discussion, it can be concluded that WEPMA can be used as a breakthrough learning media for interesting material physics and energy. In addition, WEPMA has also been declared media and material feasible based on assessments by experts in their fields and possibly based on the results of educators' responses.

BIBLIOGRAPHY

[1] Lestiyanawati, R. & Adi, N. P., "Persepsi Orang Tua Terhadap Sistem Pembelajaran Online Siswa SD di Masa Pandemi Covid-19 (Analisis Validitas dan Reliabilitas Instrumen)", Jurnal Pendidikan dan Teknologi Indonesia, vol 1, no. 7, pp. 275-279, 2021. DOI: https://doi.org/10.52436/1.jpti.59

[2] Adi, N.P., & Kurniawan, Y., "Meningkatkan Higher Order Thinking Skills (HOTS) dan Sikap Terbuka Melalui Media Pembelajaran Android", Journal of Komodo Science Education, vol 1, no. 1, pp. 79-94, 2018.

[3] Rohmawati, E. D., "Pengaruh Cara Belajar dan Penggunaan Media Pembelajaran Terhadap Prestasi Belajar Akuntansi Siswa Kelas XI IPS SMA Negeri 2 Bantul Tahun Ajaran 2011/2012", Jurnal Pendidikan Akuntansi Indonesia, vol X, no. 2, pp.157-171.

[4] Handarini, O. I. & Wulandari, S. S., "Pembelajaran Daring Sebagai Upaya Study from Home (SFH) Selama Pandemi Covid-19", Jurnal Pendidikan Administrasi Perkantoran (JPAP), vol 8, no. 3, pp. 496-503, 2020.

[5] Dewi, S. S., Ruhiat, Y., Guntara, Y., & Adi, N. P., "Integrasi Problem Based Learning dalam Pengembangan Mobile Apps Fisika pada Materi Suhu dan Kalor", SPEKTRA : Jurnal Kajian Pendidikan Sains, vol 5, no. 2, pp. 173-177, 2019. DOI: https://doi.org/10.32699/spektra.v5vi2i.110

[6] Cahyana, U., Paristiowati, M., & Fauziyah, S., "Development of Android-Based Mobile Learning Media on Atomic Structure and Periodic Table", presented at IOP Conference Series, 2018.

[7] Thomas, A., "A Physics Based Education Tool: Developed for Android and Windows", Cardiff: Cardiff University, 2013.

[8] We Are Social, "Digital Indonesia", Dateportal (online), available: https://dateportal.com/reports/digital-2018-indonesia?rq=indonesia.

[9] Syaputrizal, N., & Jannah, R., " Media Pembelajaran Fisika Berbasis Mobile Learning pada Platform Android Menggunakan Aplikasi App Investor untuk Meningkatkan Kemandirian Belajar Peserta Didik", Natural Science Journal, vol 5, no.1, pp. 800-809, 2019.

[10] Vilmala, B. K., & Mundilarto, "Pengembangan Media Pembelajaran Fisika Berbasis Android untuk Meningkatkan Hasil Belajar Siswa Ditinjau dari Motivasi", CIRCUIT : Jurnal Ilmiah Pendidikan Teknik Elektro, vol 3, no.1, pp. 61-77, 2019.

[11] Rivai, A. et.al, "Pengembangan Media Pembelajaran Fisika Berbasis Android Menggunakan Appypie dan Videoscribe pada Materi Momentum dan Impuls", Journal of Learning and Instructional Studies, vol 1, no.1, pp. 9-16, 2021.

[12] Thiagarajan, S. & Semmel, M., "Instructional Development for Training Teachers of Exceptional Children", India: Indiana University Bloomington