
Design Android Mobile Learning Application Using Appy Pie on Temperature and Heat Materials

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Abstract: This study aims to produce android mobile learning application using appy pie software on temperature and heat materials as a valid physics learning media for senior high school. Research was conducted in Physics Education Laboratory of Riau University. This research is a type of research and development using research design adapted from ADDIE instructional model with Analysis, Design and Develop stage only. Data in this research is validation score from validator with research instrument used is validation quisioner. The data collection technique used is observation by using validation sheet with data analysis technique is descriptive analysis. Each component of android mobile learning applications using appy pie software on temperature and heat material is valid if it has an average score > 2.50 which is in high or very high category. The results of this research indicate that the application of mobile learning "Temperature and Heat" obtained a total validity value of 3.49 and is in very high category. Thus it concluded that mobile learning application "Temperature and Heat" is a valid physics learning media and feasible use in the learning process.

Keywords : mobile learning, appy pie, temperature and heat

1. Introduction

Physics as one of the knowledge in the field of science is a subject that is usually studied through a mathematical approach so that it is often feared and tends to be disliked. To understand physics conceptually, learning media are needed that can attract students interest and increase students understanding of physics. So, it is not becomes a scary thing. The learning media must be in accordance with the competencies that will be achieved and modern that is able to present the media with today's technology (Soefandi and Indra, 2009).

One concept of physics is temperature and heat that is still difficult to learn. The concept that is too abstract, so gives students a variety of different thoughts when learning it. Visualization is needed. So, students can more easily understand the concept. For example, the concept of heat which is flowing energy, is understood by students as material or substances that are formed like fluid. The misconceptions that exist in students make student learning outcomes in the temperature and heat materials are low (Eko & Arif, 2012). Siti Shopiyah's research (2015) in Muhammadiyah High School, Purworejo, Central Java showed students test results, there were misconceptions about temperature and heat of 63.7% which included in the criteria of high

misconception, while the mastery of the subject matter of temperature and heat was 36.3 % included in the low mastery category.

Changes in the world are now entering the industrial revolution era 4.0 or the fourth world industrial revolution where information technology has become the basis for human life. Everything becomes limitless with unlimited use of computational and data power, because it is influenced by the development of the internet and sophisticated digital technology as the backbone of the movement and connecting between humans and machines. This era will also change various human activities, including the fields of science and technology and higher education. The development of science and technology entering the industrial era 4.0 is expected to make the learning system in education more innovative by preparing more modern educational infrastructure and facilities to support the quality of education. The learning process is also expected to be able to develop an online teaching system that can be accessed in all conditions. This aims to prepare students who are superior, competitive and able to face global competition. In order to realize a quality learning system, the instructors are expected to be able to create a modern learning process by utilizing various technologies of the present as learning tools or media (Menristekdikti, 2018).

Today, mobile facilities have grown rapidly and the use of mobile technologies such as smartphones is higher than reading books or other activities. Menristekdikti said the number of smartphone users in Indonesia now reaches around 25% of the total population or around 65 million people and school students contribute a percentage of 10% as smartphone users. The use of mobile technology is actually very helpful for the implementation of human needs for information and broad and unlimited access. However, mobile technology has not been able to become a good learning media for students (Menristekdikti, 2017).

On the other hand, learning media that are commonly used in schools are human-based media, namely teachers and printed-based media, namely books and LKPD. Though there are many forms of learning media, namely audio-visual media such as video and film, computer-based media, namely interactive videos, and smartphone-based media, namely learning applications and educational games (Arsyad, 2009). The learning media is not only using the animation, it can use the real image by google earth (Islami, 2018)

To solve these problems, it is necessary to have physics learning media that can increase students' interest in learning physics, especially in temperature and heat material, improve understanding and be able to utilize technology as a learning resource. Learning media that is expected to be created is the latest, modern and easily accessible media. Mobile learning is one of the uses of technology for education that uses smartphones as a means of effective learning and also as a learning resource. Mobile learning is an alternative development of learning media that can be used as a support for learning. Mobile learning allows students to be able to carry out activities in the form of acquiring learning material, direction and learning information wherever and whenever not limited to space and time. Mobile learning is also able to overcome the limitations of time allocation for certain materials which sometimes become the reason for educators to eliminate the material in the ongoing learning process (Cecep & Aris, 2013).

DioYudanto's research (2017) shows that implementing mobile learning in learning activities in schools can be the latest learning alternative and be able to improve learning outcomes, in this case for high school students in Yogyakarta on the subject matter of physics elasticity in the medium category with a gain score of 0,54. In addition, research by Setiawati et al. (2012) which creates mobile learning physics in Static Fluid material shows good student response

when applied to the use of mobile learning in high school students in Yogyakarta with a percentage of 91.08%. Mobile learning that has been widely developed today has a high level of validity such as designed mobile learning physics (Astra et al. 2012) has an average score of 83% validation results in the excellent category.

Based on the description, this study aims to produce an android mobile learning application using appy pie software on temperature and heat material as a valid physics learning media. The results of this study are expected to provide benefits for students of senior high school to be able to facilitate access to learning in all opportunities and can improve understanding of physical material, while for teachers is expected to be a guide in order to create interesting learning media and can be applied in the learning process to increase motivation and learning outcomes student physics.

2. Methodology

This research was conducted at the Laboratory of Physics Education FKIP Riau University. This research is a type of research and development using research design adapted from ADDIE instructional models (Analysis, Design, Develop, Implementation and Evaluate). However, in this study, the stages carried out only until the product development process develops according to the research objectives. The research subject is a mobile learning android application for temperature and heat material. Teaching material material refers to the latest curriculum, namely the 2013 revised edition of the curriculum in 2017. The data in this study is the validation score of the validator with the research instrument used is the validation questionnaire adapted from (Muhammad Nasir, 2015).

Data collection techniques used in this study are observation techniques by using the instrument validation sheet to collect validity data of the "Temperature and Heat" mobile learning android application which is validated by as many as 6 user experts namely 3 Physics Study Program Lecturers and 3 Teachers High School Physics. The data analysis technique used is descriptive analysis by converting the data into quantitative data or data expressed in the form of numbers at certain intervals according to the validity value determined by the average score given by the validator during the validation process.

Table 1. Instrument Assessment Categories

Average Value Interval	Category	Validity
$3.25 \leq \text{average} \leq 4.00$	Very High	Valid
$2.50 \leq \text{average} < 3.25$	High	Valid
$1.75 \leq \text{average} < 2.50$	Low	Invalid
$1.00 \leq \text{average} < 1.75$	Very Low	Invalid

To determine the level of media validity obtained the average value interval as in Table 1 based on the score given on the validation sheet by the validator according to the Likert scale. Each component of the assessment of android mobile learning applications uses appy pie software on temperature and heat materials is declared valid if it has an average score of ≥ 2.50 which is in the high or very high category.

3. Result and Discussion

Learning media products designed in this study are a physics learning mobile application "Temperature and Heat" that can be run on smartphones that have an Android platform with an application capacity of 100 megabyte. There are no specific specifications for Android smartphones that can install this application, but the recommended Android smartphone version 4.4.3 jelly bean with a blank space of at least 300 megabytes.

The results obtained from the stage of the research conducted were at the analysis stage conducted a short interview with several high school students in the city of Pekanbaru. Based on the results of the interview, it was found that learning physics is still very difficult for students and the way teachers teach is one of the triggering factors. Therefore, it is necessary to support learning activities, namely using learning media so that information and subject matter are easily understood. Designed learning media should be able to utilize the latest technology. The latest technology that cannot be separated from students, namely smartphones. The learning media designed in this study is a physics mobile learning application "Temperature and Heat" that can be run on an Android smartphone.

Then, at the design stage, the application is made using the appy pie software which can be accessed on appypie.com. The features that will be displayed are selected and designed on the design page provided in the software. Many choices of features can be chosen, but the default is that the design of the feature content display is limited to what has been presented by the appy pie software itself, but can still be arranged as desired. The last stage is the development of products where applications are made to completion and application products are validated by media and material experts. The following is the start page of the "Temperature and Heat" mobile learning application.



Figure 1. Home Page Mobile Learning Application "Temperature and Heat"

This application consists of competency features, material, sample questions, quiz, LKPD, more info, evaluation, about me and instructions for use as in Figure 1. After the application is complete, the validation process is carried out with the validator consisting of 3 lecturers of the physics education program FKIP Riau University and 3 high school physics teachers of Pekanbaru city. This trial process also assesses whether the media is suitable for use in the learning process. This validation process is carried out by providing the "Temperature and Heat" mobile learning application as well as validation sheets to the validator to then be tested for their use and assessed for their feasibility. The results of the validation of physics learning media on Android mobile learning applications "Temperature and Heat" are as follows:

Table 2. Validation Results of Mobile Learning Applications "Temperature and Heat"

No	Aspects	Value	Category
1	Aspects of Material	3.41	Very High
2	Aspects of Language	3.56	Very High
3	Aspects of Presentation	3.50	Very High
4	Aspects of Technical	3.47	Very High
Average Validity Value		3.49	Very High

The results of the validation in Table 2 show that the learning media of mobile learning applications "Temperature and Heat" is a valid media with a validity value of 3.49 in the very high category. Every aspect of assessment is in a very high category. Judging from these results, the material aspects get good grades because the material in the application has been prepared in accordance with the basic competencies and syllabus attached to the syllabus of SMA / MA subjects (Kemendikbud, 2016). Guidelines for preparing the material have also been complemented by the preparation of the Learning Implementation Plan. For linguistic aspects that get good grades because the language presented is in accordance with the rules of the Indonesian language that are good and right with the right writing.

The presentation aspect gets good value also because the features presented in the application are equipped with video and images and color and writing settings that do not interfere with the user in running the application. An application is considered a system that has interconnected components to facilitate information acquisition. A system must consist of components, system boundaries, interfaces, inputs, outputs, processes, and system objectives (Jogiyanto, 2008). The application produced in this study already has these requirements where the system components in the application are available features with their respective information according to the title given to the application as a system boundary. Then, the interface in this study is a technology that is used to run applications that are smartphones. An application certainly has input, output and process which is the command when making the application itself in the software. The system target in the application is information that will be obtained during the application use process.

The last part, the technical aspect has a very high category for each item is different in the three previous aspects that have each one item that is in the high category. Applications can be accessed easily just by clicking on the desired feature and the user can exit at any time. However, if the validation results obtained for each item in the feasibility aspect are reviewed, there are still items whose value is lower than the other items in one aspect. For the first item on the material aspect, the presentation of temperature and heat material is in accordance with the integration of literacy / 4c (communicative, collaborative, critical thinking and creative).

According to the validator, this item is still not maximal because effectiveness has not been tested to improve literacy activities itself and also this application has not been applied in the learning process, so its effectiveness is unknown. Next item on linguistic aspects about terms used in accordance with the field of material physics of temperature and heat. In the validation process, no validator commented on this item. Then the item on the presentation aspect of the presentation of material encourages students to be actively involved in learning. According to the validator, because the application has not been applied in the learning process, so this item cannot show student involvement. Finally, the technical aspect items related to the "Temperature and Heat" mobile learning application can be used as an effective and modern learning media in the learning process. If it is reviewed, the reason this item also gets a low score, because according to the validator, it has not been applied in the learning process. This media has actually been very good, especially not yet found studies that make similar applications for the Riau region, but it still needs to be tested its effectiveness in the process of teaching and learning activities later.

Apart from the low item value, this mobile learning application has been validated by media and material experts and is considered suitable for supporting the learning process with a total validity value of 3.49 in the very high category with a percentage of 87.25%. Research (Astra, et al, 2012) which developed mobile learning physics applications using Adobe Flash software to get a total percentage of validation results of 83%. This value applies the same as mobile learning physics media created by (Setiawati, et al, 2012) which they design applications using moodle software. This shows that the validation value for mobile learning applications, especially in physics material learning, scores almost the same. When compared to the results of the research listed, the results in this study only have a 4.25% higher difference. This might happen, because the application maker software used is different and certainly has its own uniqueness.

The characteristics of mobile devices such as portability (portability), connectivity (able to access various information anytime and anywhere) and sensitivity (can be used to search real data or simulations) which these characteristics make mobile devices tend to be favored (Churchill, et al., 2015). This mobile device which is a technology today with a variety of features and supports social media access has enabled new access to learning platforms, meaning that these devices are able to meet the pedagogical needs that support various educational contexts (Evans, 2008).

For learning media created in this study, the application is designed using appy pie software which, when viewed from the point of view of making superior applications, is not necessary to master coding. Coding is a programming language used in making an application and tends to be difficult to master. By using appy pie software, one of the obstacles in developing an application can be overcome. However, behind the advantages there are deficiencies namely the application created from this software is an online application that can only be accessed if an internet network is available on a smartphone. This is a major obstacle that cannot be solved due to the limitations of the appy pie software itself. If viewed from the point of view of the application produced mainly in this research, it has the advantage that it does not need to be converted into an application that can be run on a smartphone, because it is already a smartphone application that can be accessed using smartphones of various types of platforms, one of which is android. In addition, the application can be upgraded with a range of 5 times the change without the need to re-install the application and its nature is free with terms and conditions applicable according to the policy of the appy pie software itself.

4. Conclusion

Physics mobile learning android application "Temperature and Heat" has been produced using appy pie software to support the physics learning process in senior high school. This mobile learning application can be run on an android type smartphone with an application capacity of 100 megabyte. "Temperature and Heat" mobile learning applications are considered appropriate to be used and become valid physics learning media with validation values in the very high category. This media can be used as an alternative choice of learning media and can be used as a reference for teachers, especially in the field of physics to be more innovative in designing effective learning media and able to utilize the latest technology.

References

- Arsyad. 2009. *Learning Media*. PT Raya GrafindoPersada.Jakarta.
- Astra, Umiatin& Dian Ruharman. 2012. Mobile Learning Physics Application Using Adobe Flash as a Supporting Learning Media. Research and Development Agency of the Ministry of Education and Culture. Jakarta. *Journal of Education and Culture* 18 (2): 178-179
- CecepFurqon&ArisSunandang. 2013. Mobile Learning Application for Introduction to Technology Based on Java 2 Micro Edition. Faculty of Engineering AMIK Garut.Garut.*Journal of Scientific Insights* 7 (12): 1.
- Churchill, D., Lu, J.& Chiu, T. 2015.*Mobile Learning Design : Theories and Application*. Springer. New York.
- DioYudanto. 2017. Development of Mobile Learning Learning Media on an Android-Based App Platform. Inventor as an Independent Learning Source to Improve Student Physics Learning Outcomes of SMAN 8 Yogyakarta.Published thesis.FKIP Yogyakarta State University.Yogyakarta.
- EkoSetyadi&ArifKomalasari. 2012. Misconceptions About Temperature and Heat in Grade 1 Students at Muhammadiyah Senior High School Purworejo, Central Java. Published thesis.FKIP Muhammadiyah University Purworejo.Purworejo.
- Evans. 2008. The Effectiveness of M-Learning in the form of Podcast Revision Lectures in Higher Education. *Computers & Education* 50 (2).p.491. (On line). <https://dl.acm.org>. (Accessed May 29, 2018).
- Islami, N., 2018, The use of google earth as the learning media in geosciences education, *Journal of Educational Sciences*, 2(1), 56-63
- Islami, N., 2018, Demonstration of the Google Earth as a Tool in Learning the Earth Physics, *Journal of Educational Sciences*, 2(2), 66-73
- Jogiyanto. 2008. *Information Systems Analysis and Design: A Structured Approach to the Theory and Practice of Business Applications*. Andi Publisher. Yogyakarta
- Kemendikbud. 2016. Syllabus for High School / MA Subjects. (Online), https://drive.google.com/file/d/0B29pPZdNVag_VDdFc1RNOWJxeGM/view.(Accessed June 28, 2018).
- Menristekdikti.2017. Smartphone Indonesian People.(Online), <https://ristekdikti.go.id/smartphone-rakyat-indonesia/>.(Accessed March 23, 2018).
- Menristekdikti. 2018. Development of Science and Technology and Higher Education in the Industrial Revolution Era 4.0. (Online), <https://ristekdikti.go.id/development-science-and-education-high-in-industrial-revolution-era-4-0/>. (Accessed April 2, 2018).
- Muhammad Nasir. 2015. Empirical Analysis of Analysis of Question Points in Order to Produce

- Good and Quality Questions as a Physics Learning Evaluation Tool. FMIPA Tanjungpura University. Pontianak. *Semirical Proceedings in the field of MIPA West BKS-PTN*. May 5-7 2015.
- Setiawati, Kartika&JokoPurwanto. 2012. Development of Mobile Learning (Moodle-Based M-Learning as the Supporting Capacity of Physics Learning in High School. The thesis is published. FKIP UIN SunanKalijaga.Yogyakarta.
- SitiShopiyah. 2015. The Effect of Computer Assisted Interactive Quiz Media on Student Physics Learning Outcomes on the Concept of Temperature and Heat. Published thesis.SyarifHidayatullah State Islamic University. Jakarta.
- Soefandi&Indra. 2009. *Strategy for Developing Children's Intelligence Potential*. Bee Media Indonesia. Jakarta