



Development of physics learning in vector addition theory with android-based blended learning models for class 10th grade in Airmadidi state 1 high school

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Abstract

This research was conducted to produce an android application on physics learning based on an Android model of blended learning for class 10th grade in airmadidi state 1 high school that is feasible and practical. This research is an R & D research with ADDIE design which has been divided into five stages, namely Analysis, Design, Development, Implementation, and Evaluation. The developed application was tested on 34 students of MIPA 5 10th grade in airmadidi state 1 high school. Data collection is carried out by providing validation sheets to material experts, media experts, physics teachers, and peer reviewers to assess product eligibility and student questionnaire responses to provide input on developed products. The results of this study produce that the product of the results of media development is said to be Very Good based on expert judgment, physics teacher and peer reviewer as well as student response questionnaire with Very Good classification.

Keywords: android application, blended learning, physics learning

Introduction

The development of life which is increasingly making various midwives also develop, one of them is in the education sector where teachers are required to be aware of any developments in this field of education. An educator or teacher is required to have skills in terms of teaching and learning, one of which is to have skills in making a learning medium. Learning media is an object of learning that is used by a teacher or educator to learn both in the classroom and outside the classroom. As a professional teacher the teacher is required to be able to master technology. This is an encouragement for teachers to take advantage of learning that uses useful technology, namely mobile phones.

Mobile is used as a means of communication both in the form of oral and written, to convey information or messages from one party to another. Mobile is not only easy to get, it can also be used anytime, anywhere. Especially now mobile phones have entered the age of smartphones. A smartphone is a smart phone that has been designed so that it has the ability to be like a computer. Smartphones come with some interesting specifications that can make it easier for users, in addition to being used for communication Smartphone also presents advanced features, internet and the ability to read electronic books.

Science is a natural science, one of which is physics. Physics is always associated with phenomena that occur in the natural surroundings. Physics learning is always related to the phenomenon. One material that is mostly done is vector addition. Students still have difficulty in understanding the concepts of physics and their lack of interest in learning vector addition material. The learning media is intentionally made to complement the lack of learning media in schools that can hinder learning activities. According to the Pre-survey conducted in class X MIPA in Airmadidi 1 High School with a total of 34 students, overall

have had a smartphone or cellphone and most of them use an android smartphone with a network that is currently trending now, namely the 4G network. In SMA Negeri 1 Airmadidi has not provided a learning media that utilizes smartphones or cellphones for the physics learning process. Therefore, the more students who have smartphones as well as those who use them, the greater the chance of using technological devices in education. A learning media application that utilizes a smartphone that is learning media in the form of an application that is learning physics on android-based vector addition material using blended learning models.

Blended learning is a learning that combines the application of face-to-face learning or traditional learning in the classroom with online learning or learning using technology. Blended learning allows students to be more effective learning carried out wherever and whenever, and further increases interaction between students and teachers so that it does not depend on space and time.

According to the potential and the problem, therefore the researcher intends to conduct or carry out research with the title: development of physics learning in vector addition theory with android-based blended learning models for class 10th grade in airmadidi state 1 high school

Research Method

This research is a research and development. Development research is a research method carried out to provide or produce a particular product, and test the feasibility of the product (Sugiyono, 2017) ^[4]. The products produced in this research are application products in the form of physics learning applications on the vector-based summing material of android blended learning models. This study uses the ADDIE development design which includes five stages, namely: Analysis, Design (Design Phase), Development

(Development Phase), Implementation (Implementation Stage), and Evaluation (Evaluation Phase) (Sugiyono, 2017) [4].

This research is driven by the design of ADDIE development which includes five stages, namely: Analysis, Design, Development, Implementation, and Evaluation (Sugiyono, 2017) [4].

The study was conducted at Airmadidi 1 High School in the odd semester of the 2019/2020 school year. The subject of the study was students of class X MIPA 5

Data analysis technique

Qualitative data that has been divided from suggestions / comments for the physics learning application assessment sheet by the validator, physics teacher, and peer reviewer were analyzed descriptively qualitatively using three channels namely data reduction, data presentation, and verification according to Miles and Huberman in (Utomo, 2016) [6].

For quantitative data on the product assessment sheet by experts, physics teachers, and peer reviewers are arranged to analyze the feasibility of the product and quantitative data on the student response sheet is arranged to analyze the practicality of the product. Data from assessment by material experts, media experts, physics teachers, peer reviewers and students' responses are analyzed with the first step calculating the average score obtained from the android app evaluation sheet by material experts, media experts, teachers and peer reviewers (Sugiyono, 2017) [4]. The second step converts the average score obtained into a qualitative scale value of four according to the assessment criteria (Lukman and Ishartiwi, 2014) [1]. The third step based on the second step can be developed criteria of validity (Lukman and Ishartiwi, 2014) [1]. The fourth step of the Android-based physics learning that was developed was stated to have a proper qualification, if the assessment data of experts, physics teachers and peer reviewers showed good minimum criteria.

Data on observations of the implementation of the lesson plan are analyzed by the first step calculating the percentage of lesson plan implementation for each meeting or learning activity. The second step analyzes the level of practicality of Android-based physics learning based on the percentage of lesson plan implementation by referring to the practicality

criteria (Yamasari, 2010) [7]. The third step of developing Android-based physics learning is said to have practical qualifications, if the implementation of the RPP is minimal, it reaches good criteria.

Results and Discussion

Android application development model of blended learning in learning physics using the ADDIE model. The ADDIE model has five stages, namely Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model development research is carried out only to the Development stage, because the purpose of this study is limited to producing an physics learning based on the android model of blended learning in valid and practical physics learning to be implemented based on validator and practical assessment based on student assessment. The stages of development research are explained as below:

1. Analysis

The needs analysis phase is carried out by observing physics learning at Airmadidi 1 High School. Based on observations it is known that most students have an android-based cellphone. The cellphone has not been implemented optimally, most students use cellphones to open applications such as games, WA, BBM, and so on when learning takes place. This causes the learning process to be less effective. In the curriculum analysis phase, researchers analyzed the new curriculum that was initiated by the government, namely the revised 2013 curriculum. One of the main subjects taught in the revised 2013 curriculum is Vector Summation. an analysis of the characteristics of students at Airmadidi N 1 High School, especially in the 10th grade of Mathematics and Natural Sciences. Based on this age range it is included in the formal operational stage. At this stage students have been able to understand abstract concepts within certain limits. So that physics learning based on the Android model of blended learning can be used for learning.

2. Design

This study uses Storyboard design which is a process through sketches arranged sequentially according to the flow. So that physics learning based on Android model of blended learning in physics learning can be seen in Figure 1.



HEADER	
<i>BUTTON ACUAN</i>	<i>BUTTON MENINGAT</i>
<i>BUTTON MANFAAT</i>	<i>BUTTON LKPD</i>
<i>BUTTON QUIZ</i>	<i>BUTTON DISKUSI</i>
<i>BUTTON TUGAS</i>	<i>BUTTON KUIS</i>
<i>BUTTON REFERENSI</i>	<i>BUTTON PROFIL</i>

Fig 1: Storyboard

Then the Flow Chart is the operational processes of a system that is presented in the form of symbols so that users can easily understand the exposure spoken. Flow diagram of

physics learning based on an android model of blended learning in physics learning can be seen in Figure 2.

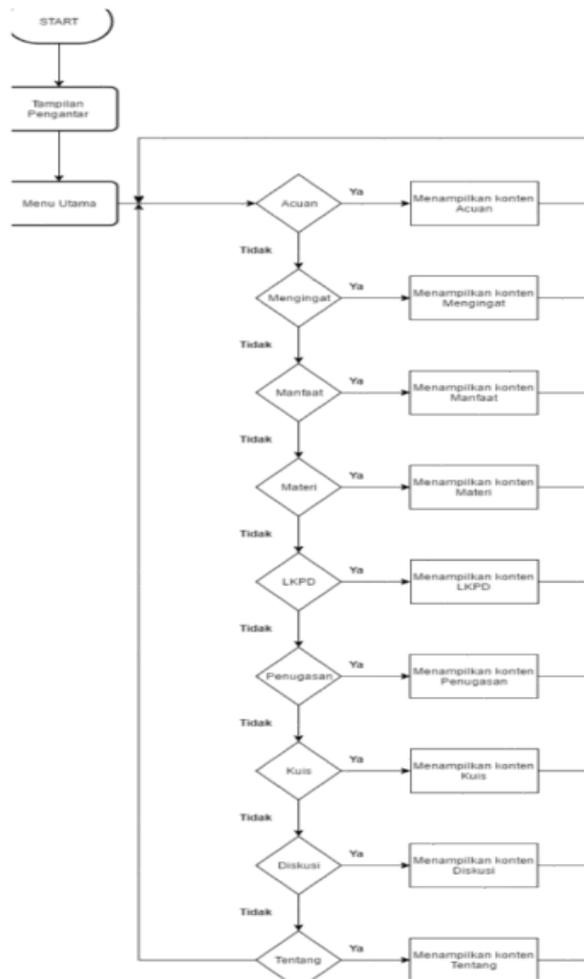


Fig 2: Flowchart

3. Development

a) Preparation of research data collection instruments that include observations of the implementation of lesson plans, lesson plans, product assessment sheets, b) Implementation of programming code that refers to the design stage is in Figure 3.

Table 1: Android application test results

No.	Validator	Average Rating	Criteria
1.	Material Expert	3.63	Very Good
2.	Media Expert	3.41	Very Good
3.	Physics Teacher	3.8	Very Good
4.	Peer Reviewer	3.73	Very Good
Average		3.64	Very Good

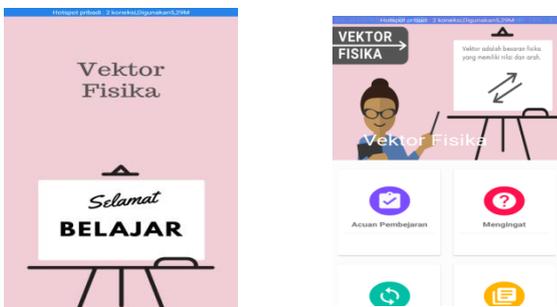


Fig 3: Splash screen page and main menu

The menu page consists of ten icons namely reference, remember, benefits, material, LKPD, assignments, quiz, discussion, reference, and about.

The average overall assessment of physics learning based on the android model of blended learning in physics learning that was developed is 3.64 with the category of Very Good. Thus, physics learning based on the Android model of blended learning is considered to be very good so it is fit to be used as a learning medium.

4. Implementation

The product trial was conducted at SMA N 1 Airmadidi which was observed by an observer. At the implementation stage, researchers also distributed student response questionnaires aimed at assessing the practicality of the product. Student responses were distributed to 34 students from class X who had participated in learning using blended

Learning. The results of the student response questionnaire displayed an average result of 3.5.

5. Evaluation

At the evaluation stage, the researcher made a final revision of the product developed. The final phase of the revision is done by referring to the suggestions and input provided by students and observers during the implementation phase.

Conclusion

Based on the results of research and discussion, conclusions can be drawn

1. This research has resulted in physics based android learning model of blended learning which is said to be feasible by media expert lecturers, material expert lecturers, physics teachers and peer reviewers.
2. This research has resulted in physics learning based on Android blended learning model which is said to be practical by students and peer reviewers.
3. Physics learning based on Android this blended learning model can be used as a physics learning material for vector addition material.

References

1. Lukman, Ishartiwi. Pengembangan Bahan ajar dengan Model MIND MAP Untuk Pembelajaran Ilmu Pengetahuan Sosial SMP. Retrieved Januari 14, 2019, from Jurnal Inovasi Teknologi Pendidikan, 2014. <https://journal1.uny.ac.id/index.php/jitp/article/view/2523>
2. Prastowo A. Pengembangan Bahan Ajar Tematik. Jakarta: Kencana, 2016.
3. Statcounter. Mobile Operating System Market Share Indonesia, 2019. Retrieved Desember 11, 2019, from Statcounter Globalstats: <https://gs.statcounter.com/os-market-share/mobile/indonesia>
4. Sugiyono. Metode Penelitian dan Pengembangan. Bandung: Alfabeta, 2017.
5. Suhartono. (N.D.). Pasca Sarjana Universitas Negeri Malang. Retrieved Maret 03, 2019. from Prosiding Seminar Nasional Pendidikan Jasmani Pascasarjana Um: <http://Pasca.Um.Ac.Id/Conferences/IdEx.Php/Snpj/Article/Viewfile/1012/683>
6. Utomo EP. Strategi Komunikasi dalam Menyerap Aspirasi Masyarakat Adat oleh Anggota Dprd Kabupaten Teluk Bintuni Provinsi Papua Barat, 2016. Retrieved Januari 16, 2019, from Jurnal Ilmu Komunikasi: <http://journal.unhas.ac.id/index.php/kareba/article/view/340>
7. Yamasari Y. Pengembangan Media Pembelajaran Matematika Berbasis ICT yang Berkualitas. Seminar Nasional Pascasarjana X, 2010. Retrieved Januari 16, 2019, from <https://salamsemangat.files.wordpress.com/2011/05/pengembangan-matematika-berbasis-tik.pdf>
8. Zaki B, Putra SD. Aplikasi Bengkel Online Menggunakan Global Positioning System (GPS) Berbasis Android Pada CV. Rumah Otomotif, 2018. Retrieved Januari 16, 2019, from Journal of Information System, Informatics and Computing: <http://journal.stmikjayakarta.ac.id/index.php/jisicom/article/view/64>