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Development of Android Application-Based E-Learning Learning Media Using the Borg and Gall Method

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Abstract

The problems of this study are twofold. Namely, the need for the development of learning media with a student-centered learning model (Student Centered Learning), because the traditional learning process is inefficient and very difficult to apply to current training participants. The research method is needs analysis, using an industry-based development model (Borg and Gall) where research findings are used to design learning products, which are then systematically tested in the field, so that specific products can be produced and the effectiveness of the product can be tested. The results of the validator evaluation for e-learning learning media are 79.00% which can be interpreted as quite effective to use; for the evaluation of the benefits of e-learning learning media as learning materials, the results obtained are (1) 81.00 The results of the practicality test evaluation from the display aspect are 86.08% which can be interpreted as practical to use. The results of the effectiveness test evaluation from aspects (1) 87.77% and (2) 87.38% can be interpreted as Very Good to Use, because the effectiveness value of e-learning learning media as a learning resource is 87.60%. The development of e-learning media has become a major focus in schools, especially in SMK Negeri 7 Kota Serang, which is a learning aid that is in accordance with the learning needs of the school. Therefore, a well-structured e-learning media was created.it can be seen on correlation result where factor Education facility has the highest negative correlation value is -0.526.

Keywords: E-Learning, R and D, Brog and Gall, feasibility testing.

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1. Introduction

The development of the Industrial Revolution 4.0 has made human work activities easier. Most (75%) of all activities now utilize technology, math and science, the internet, and humanized learning. The Industrial Revolution 4.0 is a combination of digital, physical, biological, and cyber-physical system-based domains.(Sadikin & Hakim, 2019)

In today's globalized world, the development of information technology (IT) is unstoppable. This development has a significant impact on the field of education, which produces quality resources, changing the world of education from old traditional and monotonous methods to new modern methods that incorporate various technologies. The presence of technology has triggered a trend of shifting from traditional face-to-face meetings towards more open education, characterized by the birth of the concept of electronic learning. (Amijoyo et al., 2023). The biggest challenge today is to make students able to compete with other countries in the world of science and technology. Entering the Industrial Revolution 4.0, the Millennial era, the education system needs to improve itself in all aspects, starting from management, learning methods and strategies, and the media used in the learning process. (Rahim et al., 2019). E-learning is any form of teaching and learning in which learning content is delivered through electronic circuits (CDs, interactive audio/video, LAN, WAN, Internet) In the use of e-learning, to further improve the quality and sustainability to achieve educational goals, the use of e-learning requires a clear design of the use of learning media can arouse desire and interest, arouse motivation and learning stimuli, and even bring psychological influences on students. This is an interesting topic and can contribute to improving the quality of education. (*Skripsi Dieng AJ*, n.d.)

The existence of the internet has brought many conveniences to the world of education. This is proven by the number of websites in circulation that provide learning media that are increasingly interactive and easy to learn, the internet is

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like a world library and websites are like books. Websites are not only used as information media, but also various learning systems, such as artificial informatics learning, can be done on the Internet. (Jahiri et al., 2023)

Learning is the media, metodik and a technique that is used as an intermediary communication between a teachers and students in order the more playing an effective communication and interaction between teachers and their students in the process of education teaching in schools (Kuswanto et al., 2021). Today, the Internet is not only used as a means of communication and information retrieval, but also as an educational medium for e-learning in some areas in Indonesia and abroad. Internet accessibility and the increase in the number of Internet access users in Suran today are very reasonable compared to a few years ago, and Internet access users are not only those living in urban areas, but also those living in rural areas, who can access the Internet. (Rizal & Walidain, 2019)

Similarly, learning methods continue to evolve day by day. Starting with classic methods, new methods are now emerging, incorporating creative ideas from the education community. Simple and fun learning methods can increase the effectiveness of interactive communication and increase interest in learning. The effectiveness of learning affects the absorption of the knowledge provided. (Jenita et al., 2023). Of course, there are several aspects that influence how a quality learning process can be produced, namely the way of teaching, the use of interesting and varied learning methods that stem from student learning behavior, conducive learning conditions and atmosphere, and the use of innovative learning media that support the teaching and learning process itself. (Affandi et al., 2020)

The concept of learning through e-learning media is not solely focused on the teacher who delivers the subject matter, but with the presence of electronic devices connected to the internet network allows students to actively participate in the teaching and learning process.(Henderi et al., 2013) The use of e-learning media can also be used anytime and anywhere by accessing the system used online. (Haryadi et al., 2021)

The learning process using electronic media and devices is expected to increase the effectiveness and efficiency of learning, a concept known as e-learning. In its application, e-learning media can be presented in the form of offline and online media.(Afrianti Rahayu & Surya Laksana, 2023)

Advances in technology, information and communication are felt in urban areas. In Suran, one of the district capitals, the availability of facilities such as internet access is very pronounced. In the school environment, for example, its existence is a supporting factor that is highly considered. (Solissa, 2023)

Inappropriate use of information technology can lead learners to negative behavior. Negative behavior can harm the learners themselves and even harm others. Therefore, teachers and instructors need to supervise, direct and guide learners to use information technology media, especially gadgets, wisely. Nowadays, learners cannot escape from their devices. (Wahyono, 2019).

Therefore, the world community focuses on teacher professionalism as one of the priority areas in the function and development of education.(Izzati et al., 2024) Its main components are defined as basic education, competence, creative initiative, professionally appropriate personal qualities and a tendency to The main components are defined as basic education, competence, creative initiative, professionally appropriate personal qualities and a tendency to lifelong learning cumulatively. This is the trend of lifelong learning cumulatively. An effective combination of these determines the level of teacher professionalism. Improvement.(Gluzman et al., 2018)

Learning media cannot be separated from the learning process, because learning media is an intermediary between teachers and students in the transfer of knowledge.(Henderi et al., 2011) With the development of technology, teachers must be able to innovate to introduce learning media that is adapted to the times. (Firmadani, 2020). Similarly, SMKN 7 Kota Suran continues to change and make breakthroughs along with technological advances. In the process of teaching and learning activities, this school still uses traditional methods. That is, it still uses book and blackboard media which is considered very limited in providing learning material and can reduce student interest in learning. Therefore, a new learning model is needed as a form of improving performance and providing more information in the teaching and learning process. Therefore, with the above problems, this research designs an information system in the form of a web-based E- Learning application to support the learning process at SMK N 7 Serang City. This system will be designed using Research and Development (R&D) methodology with Borg and Gall model. Research and development (R&D) is a series of processes or steps to develop new products or improve existing products.

The purpose of this research is to develop a learning media that allows students to follow the course more easily. To ascertain whether the learning media is feasible before being applied to students; to provide students with practicality in using the learning media; to provide students with knowledge on how to use the learning media; and to provide

students with knowledge on how to use the learning media. To provide students with learning benefits from the use of learning media.

2. Method

This study used a research and development (R&D) approach. According to. Borg & Gall (2003:772), development research is research-oriented research to develop and validate products used in education. This is. In this study, a product in the field of education was developed in the form of an android-based map.

The following is the process of research and development of the RnD method in Figure 1.

Figure 1. R&D Methode

The media was developed and validated by several experts.Validation was carried out using Research and Development procedures. According to Borg and Gall (2003: 570), research and development involves 10 stages as follows: 1) Research and information gathering, 2) planning, 3) initial product development, 4) initial field trial and testing, 5)operational, 6) main field testing, 7) operational product revision, 8) operational field testing, 9) final product revision final product revision; 10) dissemination and implementation.(Mardatila et al., 2021).

The steps for research and development of the Borg and Gall method in Figure 2.

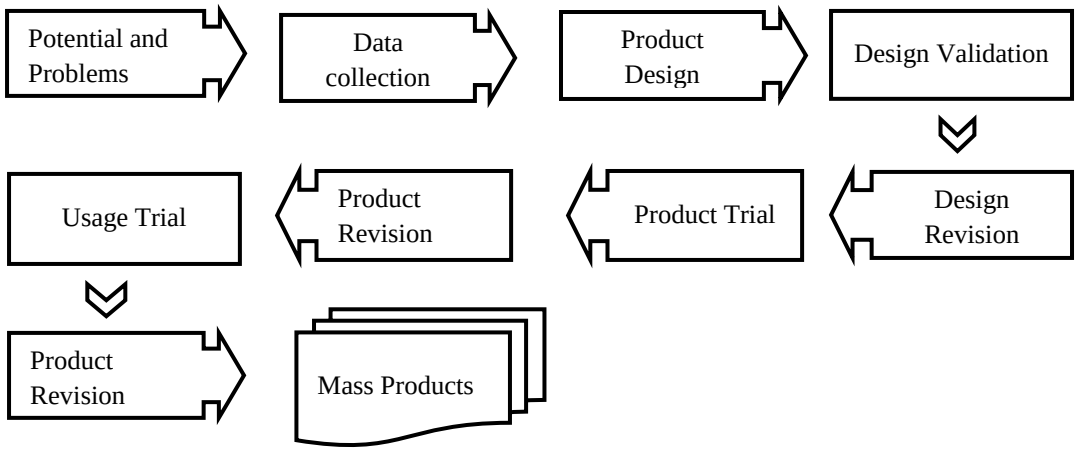

Figure 2. Steps for using the Method (Borg and Gall)

2.1. Research Flow

The research flow refers to the research from beginning to end: there are three main stages in the development and production of e-learning media in 2D animation subject: preparation stage, development stage, and evaluation stage.

2.2. Preliminary Stage

The preliminary phase is the stage of the development research methodology conducted to identify potential problems and needs. The preliminary phase consists of analyzing the needs of 2D animation materials and the e- learning development phase.

The needs analysis stage of 2D animation material is the initial stage of the research. This stage is carried out to identify the needs of teaching materials that allow students to learn independently and are used as a reference for making e-learning learning media.

The stage of making e-learning learning media is the second stage of making e-learning learning media. This stage is done to develop the framework of e-learning media so that it can be implemented. (Yunus & Friwati, 2018)

2.3. Stage of Manufacture

The manufacturing stage consists of information gathering and product manufacturing. This stage consists of making e-learning media and validating e-learning media. The e-learning media manufacturing stage aims to make e-learning media based on the design of the previous stage. The validation stage of e-learning learning media at this stage of e-learning learning media is validated by expert lecturers from the Information Technology Education Department and teachers from the Multimedia Department.

2.4. Evaluation Stage

The evaluation stage is a stage that aims to determine the assessment of teachers and students on the quality of e-learning learning media as a learning resource for 2D animation subjects. The evaluation stage consists of limited trials, distributing questionnaires, analyzing questionnaire data and finding preliminary conclusions about the quality of e-learning learning media.

2.5. Data Retrieval Technique

The type of data used in this research is primary data. Primary data is in the form of validation results of e- learning learning media by validators. The second type of data comes from the implementation of e-learning trials. E- learning trials in the form of (1) observations of the implementation of e-learning learning and (2) student responses to validated e-learning learning media. (Huda, 2022)

The validity instrument is used to determine whether the e-learning learning media designed is valid. In other words, all measuring instruments designed were first validated to determine the validity level of the measuring instruments. After the validators stated that the scales were valid, then some of the scales were used in the utility test. The instrument used in the utility test is a utility questionnaire. The validity questionnaire is used as a way to test the effectiveness of e-learning media as a learning resource. The questionnaire is given after students go through the learning process by using e-learning media as a learning tool.

$$\mathrm{NP} = \frac{\mathrm{R}}{\mathrm{SM}} \times 100$$

Information:

NP : The sought or expected percent value
R : Raw scores obtained by students
SM : The ideal maximum score of the test in question
100 : Fixed Numbers

The validity test shown on Table 2.

Table 2. Expert Test Validity

No	Average value	Rated aspect
1	90%-100%	Very Valid
2	80%-89%	Valid
3	65%-79%	Fairly Valid
4	55%-64%	Not Valid
5	≤ 55%	Invalid

3. Results and Discussion

According to (Murad & Fitria, 2013), A use case diagram is a state diagram that shows a set of use cases and actors (special types of classes).

A use case diagram is a state diagram that shows a set of use cases and actors (a special type of class). Use case Use case diagrams describe the relationship between actors and the system. A use case diagram is. Use case diagrams are used to understand what the system does and who can use the system. Using the system. (Perdana et al., 2023). The work of the two candidates is as follows:

a. Prospective students who implement e-learning applications where students access home, teaching materials, exercises, goals, exit, and so on from an application on a system made by researchers or teachers.
b. Prospective teachers teaching students while implementing the e-learning application.

The analysis results can be displayed in the figure 2.

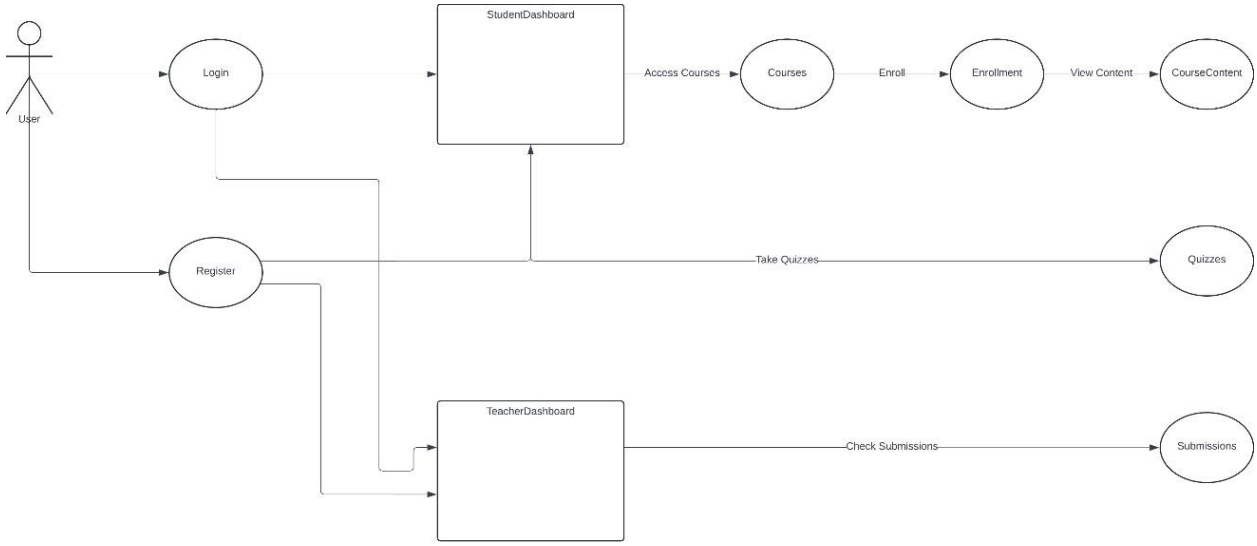

Figure 2. Use Case E-Learning based Android

3.1. Initial Display Design

The initial display design is very important in creating an app. Therefore, the display design should be easy for students to understand so that they can use it effectively. The login button serves to enter the next view into the application.

3.2. Home View Design

The homepage design is the main page at the heart of the app, with functions and icons that allow users to navigate from one menu page to another by clicking the button they wish to use.

3.3. Quiz View Design

The quiz display design is a page that contains practice questions to assess student learning outcomes when participating in learning and providing assessments to students. It has the ability to measure students' learning abilities, students can do exercises according to what is determined by the teacher, students can find out the value they get and use it as an assessment material in their learning, and teachers can take grades from the e-learning application.

Display of User Interface in Figure 3.

3.4. App Visual Display Design Result

The visual representation of android-based e-learning conducted at SMKN 7 Serang City:

3.4.1. Login View

The first login view is the main process part to enter the home page. The functions displayed on the login page are as follows:

a. The titles of the subjects covered by the e-learning application are displayed.

b. The play button links to the home page, teaching materials, profile, basic skills, and exercises.On the login page, researchers updated the display by adding a moving background and animation to keep learners engaged and interested in learning.

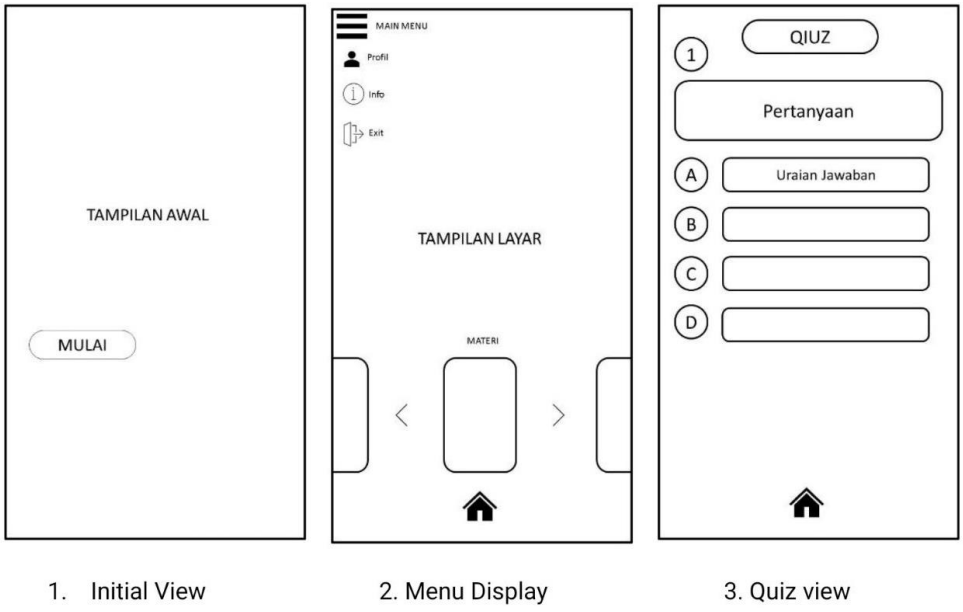

Figure 3. Display of User Interface

3.4.2. Login and Menu View

The menu display in this e-learning application is an update of the first stage of display design, including the structure and layout designed to provide convenience for students when accessing the buttons on each page, and the features on the menu, students can navigate from different pages in the application, this allows students to easily find and access the menus in the application.

Display of Login Menu and Dashboard in figure 4.

3.4.3. Display Material Content

E-learning material refers to learning content and content derived from basic competencies and core competencies provided through the system. The functionality of this part of the material display explains about computer understanding material, computer history and computer generation images. This display has buttons to return to the previous page and forward to the next page.

Display of Animation and Material Learning in figure 5.

3.4.4. Quiz View

Quizzes in e-learning are part of the process where students are given the opportunity to practice and test their abilities and competencies on the material provided.

Users who function to answer questions must check the available options, which according to the user is correct. In this exercise question display, if the user or user answers the question, the result of the answer answered by the user will appear at the end of the exercise, whether it is correct or incorrect.

Display of Quiz View in figure 6.

Figure 4. Display of Login Menu and Dashboard

Figure 5. Display of Animation and Material Learning

3.5. Evaluation of Processing Results in Excel

The e-learning media made will be validated to determine the feasibility of the media. E-learning media will be validated and then Android-based e-learning media will be tested on students in the form of usability and effectiveness trials. The usability trial of e-learning media will be conducted to test the effectiveness of interactive module products. The following will explain each of the practicality trials of e-learning media.

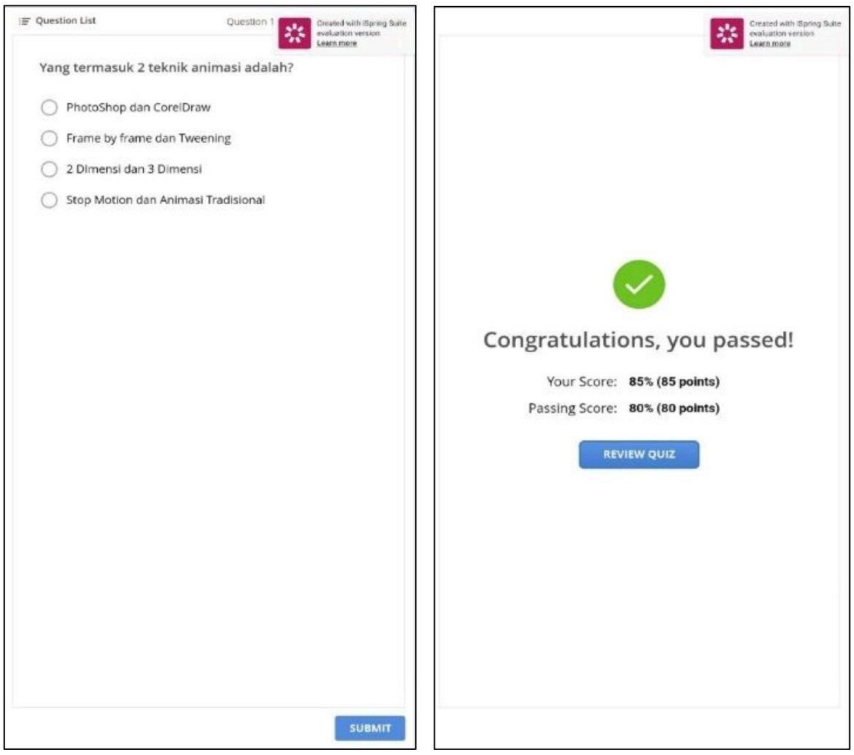

Figure 6. Quiz View

3.6. E-Learning Validity

3.6.1. Validity of E-Learning Media

The result of the assessment of the four validators is 79.00%, which can be interpreted that the feasibility level of e-learning media is sufficient to be used. The results of the validator's assessment and the results of the trial by teachers of SMK Negeri 7 Serang City show that overall the e-learning media developed is good and can be used in the learning process. This shows that the Interactive PowerPoint design is suitable for use in learning.

3.6.2. Practicality Testing of E-Learning Learning Media

The results of the practicality test were (1) 81.00%, (2) 80.75% and (3) 69.125%; overall the practicality of Interactive PowerPoint was 86.08% The results of the trial with students of SMK Negeri 7 Kota Serang showed that the e-learning learning media developed were declared good overall, and feasible to use in the learning process. This indicates the practicality of using e-learning media in development and learning.

3.6.3. E-Learning Media Effectiveness Testing

The overall effectiveness of e-learning learning media as a learning resource is 87.60%, which can be interpreted as a 'very good to use' level of effectiveness. The results of the trial on students of SMK Negeri 7 Serang City show that overall the e-learning media developed is good and can be used in the learning process. This indicates the effective use of e-learning media in development and learning.

4. Conclusion

In the research of developing and making e-learning learning media for 2D animation subjects at SMK Negeri 7 Serang, it is concluded that the development of e-learning learning media is a learning support that suits the learning needs at school and the e-learning learning media has an attractive appearance. It is concluded that the feasibility of each verifier argues that e-learning learning media is made in accordance with the rules, paying attention to the rules. The research has produced e-learning media that is easy to use and neatly structured. The e-learning media made in this study was applied at SMK Negeri 7 Serang City and the trial results showed that the overall effectiveness level reached 87.6% so that it fell into the very good category.

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