Development of Learning Media for Android-Based Budget Accounting

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Abstract. The purpose of this paper is to develop learning media for Android-based Budget Accounting; and testing the feasibility of learning media developed based on validation or assessment from media experts and students. Media feasibility validation was conducted by the learning technology lecturer and was tested on 50 students at the Accounting Study Program of one of the campuses in North Sumatera. In broad outline, the results of the validation of the media from the material and media aspects were classified as Very Feasible (VF) that is 89.06% and 89.88%, as well as the results of the validation of student trials from aspects of validity of concept, material preparation and implementation potential are Very Feasible (VF), that is 85.12%, 87.90% and 81.55%. The learning media products that are produced are files in the android package (apk) format.

Keywords: learning media, budget accounting, android

1. Introduction

   Nowadays, the emergence of innovation in various fields is driven by the rapid progress of Information and Communication Technology combined with high human knowledge. A mobile phone is one product that is affected by technological development. In Indonesia, people who use this technology have increased significantly. Android is one of the operating systems and programming platforms as tangible evidence of major advances in mobile technology. It supports the changing function of mobile phones to meet both business and educational needs. The development of hardware and software specifications with design features that can increase user interest and achieve market excellence carried out by Android device manufacturers is made possible through an open and customizable Android architecture [1].

   Since the start of the 4.0 industrial revolution in 2018 which was implied by the emergence of cyber-physical systems, many industries have begun to connect to cyberspace in the form of humans, machines and data connectivity known as the Internet of Things (IoT). To deal with the industrial revolution 4.0, various preparations are needed, including appropriate methods of educational learning.

   The learning process is a reciprocal communication between teachers and students, which is a two-way relationship [2]. Appropriate media are needed in the delivery of learning materials from instructors to students to produce effective and at the same time support efficiency in learning [3]. Therefore, the importance of learning about the media is related to the function of the media to support communication and to optimize the learning process.
In the education sector, especially at the university level, the large use of cellular technology is triggered by advances in technology and Information Communication and Technology [4]. This type of learning through mobile phones that allows authentic learning without being bound by time and location has been shown to significantly improve student performance in terms of motivation, enthusiasm, focus and involvement [5]. However, based on the findings in the field in the Budget Accounting learning class, it was found that the level of mastery of several materials such as the Raw Material Budget and Overhead Budget was still low. The low learning outcomes in Budget Accounting are caused by the emergence of several obstacles in the learning process encountered, including 1) The students often forget how to calculate Cost of good sold, 2) The conventional model applied in the learning process is difficult to understand by students, 3) Lack of understanding related to the overhead budget process by students.

Based on the phenomena and previous research, we tried to develop an Android-based application with an APK format related to learning budget accounting to facilitate the user in understanding and learning it. This android application development will be designed using thunkable. Thunkable supports making their own applications for Android or iOS through websites that provide online application creation. Thunkable is quite easy to use because it does not require coding and can support a variety of interesting program functions and application designs. Thunkable can be accessed via the website https://thunkable.com/#/.

2. Literature Review

2.1. Learning Media Concept

According to reference [6] the media as an intermediary for delivering information between the sender and recipient. The function of the media is to convey information from the sender to the recipient so that the ultimate goal can be to stimulate the attention, feelings, effective and efficient communication thoughts [7].

Learning media is a means to convey messages to recipients using several channel sources [8]. In general, instructional media are a source component for learning in the form of instructional materials that are able to create stimulation for students to study such as books, video cameras, slides (picture frames), films, video recorders, graphic images, computers, photographs and television [9].

Reference [10] provides an explanation related to the benefits of learning media, such as:
1) Increased student enthusiasm for learning as a result of increased student interest in the learning process.
2) More detailed and focused meaning on learning materials encourages students to increase understanding.
3) Variety of teaching methods so that students are not bored and not saturated.
4) Students who do more learning activities, are not limited to listening to lecturers' explanations, but can also observe, do, demonstrate.

2.2. Android Concepts

Android allows hardware and software customization by manufacturers through an open source system [11]. Android is described as a combination of OS, middleware components, and applications as a complete solution stack with a hardware abstraction layer in the form of the Linux Kernel 2.6 [12].

One of the advantages of using Android is that users have the possibility to install various launchers to change the interface and set the background as desired by the user[13].

In its development, android has released several versions which can be seen in table 1 [14].
### Table 1. Android version

| Name          | Version | Release date |
|---------------|---------|--------------|
| Cupcake       | 1.5     | April 27, 2009 |
| Donut         | 1.6     | Sept 15, 2009 |
| Eclair        | 2.0 – 2.1 | Oct 26, 2009 | |
| Froyo         | 2.2 – 2.2.3 | May 20, 2010 | |
| Gingerbread   | 2.3 – 2.3.7 | Dec 6, 2010 | |
| Honeycomb     | 3.0–3.2.6 | Feb 22, 2011 | |
| Ice Cream Sandwhich | 4.0 – 4.0.4 | Oct 18, 2011 | |
| Jelly Bean    | 4.1 – 4.3.1 | July 9, 2012 | |
| KitKat        | 4.4 – 4.4.4 | Oct 31, 2013 | |
| Lollipop      | 5.0 – 5.1.1 | Nov 12, 2014 | |
| Marshmallow   | 6.0 – 6.0.1 | Oct 5, 2015 | |
| Nougat        | 7.0     | Sept 2016 |
| Oreo          | 8.0     | August 2017 |
| Pie           | 9.0     | August 2018 |
| Q             | 10      | Sept 3, 2019 |

3. Methodology

This research includes Research and Development (R&D). This research was designed to produce a product and proceed with testing the effectiveness of the product [15]. In its development, this research uses the ADDIE Model which is a framework in supporting development and learning programs by conducting examinations, creation and implementation [16]. The model was developed in 5 (five) stages, (1) identification and analysis of problems, (2) product design, (3) product development, (4) product eligibility validation, and (5) product evaluation and modification.

3.1. Time and Research Location

This research was conducted at the accounting study program of one of the campuses in North Sumatera, starting from individual trials and field trials. Validation of individual trial will later be given from Media Expert and Material Expert, then for limited and field trials will be applied to undergraduate Accounting students.

3.2. Research Subject

Media validation and trials are the subjects in this study. Experts in the material and experts in the media are two people each and one person is used to do the subject of media validation. Product trials are field trials. Students who take Budget Accounting courses in the current semester as many as 50 people are used as subjects of field trials in this study.

3.3. Procedures and data collection

The design of the learning media product is done using one of the online builders open-source available in cyberspace and cloud-based named Thunkable. The steps taken in this research are (1) identification analysis and problem analysis stages (literature review, field findings, student character analysis), (2) product design (making flowcharts, storyboards, material scripts, evaluation questions, and collecting pictures, sounds, and music), (3) product development, (4) product feasibility validation by media experts, and (5) product evaluation and modification (field trials).
### Table 2. Media Expert Assessment Instrument

| Aspect                | Indicator                              | No of question item |
|-----------------------|----------------------------------------|---------------------|
| Interface Consistency | Easy to understand                    | 1                   |
|                       | Clear instructions                     | 2                   |
|                       | Navigation Presentment                 | 3                   |
|                       | Layout appearance                      | 4                   |
|                       | Clarity of color, font dan text        | 5                   |
|                       | Interface quality                      | 6                   |
| Multimedia            | Image compatibility                    | 7                   |
|                       | Appropriate combination of elements    | 9                   |
|                       | Multimedia presentment                 | 10                  |
|                       | Accuracy of content                    | 11                  |
|                       | Display elements in one screen         | 12                  |

### Table 3. Trial Assessment Instrument

| Aspect                               | Indicator                                      | No of question item |
|--------------------------------------|-----------------------------------------------|---------------------|
| Validity of Concept                  | Clarity of Learning Objectives                 | 1                   |
|                                      | Validity of Concept from the scientific aspect | 2                   |
|                                      | Use of Language                               | 3                   |
| Material preparation                 | Conformity of Material                         | 4                   |
|                                      | Profundity of materials                        | 5                   |
|                                      | Contextuality                                  | 6                   |
|                                      | Completeness of substance                      | 7                   |
|                                      | Supporting Materials                           | 8                   |
| Implementation potential             | Understandability easiness of material         | 9                   |
|                                      | Clear Logic Flow                               | 10                  |
|                                      | Interactivity                                  | 11                  |

The questionnaire is used as a data collection method. The instrument for media validation consists of a media validation questionnaire of media experts by 1 (one) instructor in learning technology.
A trial questionnaire is an assessment questionnaire by students that is used in the classroom test on the quality of learning media. The instrument of validation and assessment of the feasibility of the media adopted the instrument that has been used [17].

The validation instrument will then use a Likert scale [21], by calculating the average instrument obtained from the questions item score.

\[ x = \frac{\sum x}{n} \]  \hspace{1cm} (1)

then, the formula for calculating the percentage of media worthiness is carried out with the formulation:

\[ \text{appropriateness percentage(\%)} = \frac{\text{score of observation result}}{\text{(ideal score)}} \times 100\% \]  \hspace{1cm} (2)

The percentage results are then adjusted to the Likert scale category. The Likert scale stipulation is as follows:

| No | Percentage                  | Interpretation       |
|----|-----------------------------|----------------------|
| 1  | 0 % - 20 %                  | Very not feasible    |
| 2  | 21 % - 40 %                 | Not feasible         |
| 3  | 41 % - 60 %                 | Pretty feasible      |
| 4  | 61 % - 80 %                 | Feasible             |
| 5  | 81 % - 100 %                | Very Feasible        |

4. Results And Discussion

Based on the results of the stages of information gathering steps, such as conducting literature studies, field surveys, and character analysis of students. It was found that most of the students wanted renewal in the learning process so that the improvement in student academic performance would be helped. The ease of access to learning materials by users, namely lecturers and students, results from the use of information technology development so that learning media become attractive. Students expect the availability of media that can facilitate students in learning. The media must also explain the material and be accompanied by evaluations designed in a more interesting form.

The topics covered in the media are budget accounting material about sales budget, production budget, inventory and raw material budget, overhead budget, labor, and capital budget, and cash budget.

Flowchart and storyboard are roadmap designs in development at the product design stage of this study [19]. The flowchart in this research is designed to adjust the navigation flow in operating Android learning media. Storyboard describes in detail the display on the screen in learning media, including the arrangement of images, writing, animation, effects and other components on the learning media display screen.
The product development of Budget Accounting learning media executed by using the Thunkable application assisted by Corel Photoimpact. Output of product development in the form of files with apk extension and can be installed on the Android mobile phone.

The scope of sub-material that will be displayed in the Research and development of the Android-based budget accounting learning media includes: 1) Material menu I - sales budget; 2) Material menu II - production budget; (3) Material menu III - inventory budget and raw materials; (4) Material menu IV - overhead budget; (5) Material Menu V - labor budget; and (6) Menu VI - exercise questions.
Figure 2. Main Menu Display

Figure 3. Exercise/ Quiz Menu Display

The practice and examination menu contain practice questions that are contained in multiple-choice question types. Before the user continues to follow the exercises, the user must log in first by entering the name and student identification number that will be used in this session.

At the product validation testing stage by the media expert, a product modification is also carried out by the media expert's recommendations. Product validation is done using 2 (two) aspects, interface and multimedia aspects. Evaluation by media experts on products from the interface aspect produces
an average value of 89.06% and multimedia aspects with a value of 89.88% with the details presented in Figure 4 below, so that it can be categorized as a result of media expert assessment of the application is very feasible.

![Media Expert Validation](image1)

**Figure. 4 Media experts validation results**

![Trial Assessment](image2)

**Figure. 5 Trial assessment results**

Trial assessment with students on the Android product is carried out in 3 (three) categories: aspects of validity of concept, aspects of material preparation and, aspects of implementation potential. In this trial phase also produced a value of 85.12% of the aspects of the validity of concept, 87.90% of the material preparation aspects, and 81.55% of the implementation potential aspect, so it can be said the final results of the trial categorized with very feasible results, the details of the trial evaluation results appear in Figure 5.

Consistency on the results of this study was also found in research [20] which stated that students' interest in learning and other uses became one of the foundations of success and feasibility in developing android-based learning media.

5. Conclusion

Development research of android media in the learning of Budget Accounting courses has been successfully carried out using the Thunkable application. After several revisions and modifications on
the advice of media experts, the appearance of this android learning media becomes more interesting and can be operated on student’s mobile phones.

In terms of eligibility, both the results of media expert evaluations and trials involving students confirmed that the application of learning media developed in budget accounting courses is very feasible to use and can be used as a source of independent student learning.

References

[1] Gandhewar, N. and Sheikh, R. (2010). “Google Android: an emerging software platform for mobile devices”. International Journal on Computer Science and Engineering, pp. 12-17, NCICT 2010 Special Issue.

[2] Purwanti, B. (2015). Pengembangan Media Video Pembelajaran Matematika dengan Model Assure. Jurnal Kebijakan Dan Pengembangan Pendidikan.

[3] Muhson, A. (2010). Pengembangan Media Pembelajaran Berbasis Teknologi Informasi. Jurnal Pendidikan Akuntansi Indonesia, 8(2). https://doi.org/10.21831/jpai.v8i2.949.

[4] Ahmad, T. (2020), "Student perceptions on using cell phones as learning tools: Implications for mobile technology usage in Caribbean higher education institutions", PSU Research Review, Vol. 4 No. 1, pp. 25-43.

[5] Martin, F. and Ertzberger, J. (2013). “Here and now mobile learning: an experimental study on the use of mobile technology”. Computers and Education, Vol. 68, pp. 76-85.

[6] Mallon, M. (2018). Media Literacy. Public Services Quarterly. https://doi.org/10.1080/15228959.2018.1519405.

[7] Jalinus, N., & Ambiyar. (2016). Media dan Sumber Pembelajaran. Sifonoforos.

[8] Mahnum, N. (2012). Media Pembelajaran (Kajian terhadap Langkah-langkah Pemilihan Media dan Implementasinya dalam Pembelajaran). An-Nida’.

[9] Azhar, A. (2008). Media Pembelajaran. Meedia Pembelajaran. https://doi.org/media pembelajaran.

[10] Hafid, H. ab. (2011). Sumber dan Media Pembelajaran. Jurnal Sulesana.

[11] Android developer (2012), “Android compatibility”, available at: http://source.android.com/compatibility/index.html.

[12] Shibly, Ahamed. (2016). Android Operating System: Architecture, Security Challenges and Solutions, 10.13140/RG.2.1.4966.3126.

[13] Lazarela Lazareska, Kire Jakimoski. (2017). Analysis of the advantages and Disadvantages of Android and iOS Systems and Converting Applications from Android to iOS Platform and Vice Versa, American Journal of Software Engineering and Applications. Vol. 6, No.5, pp. 116-120. doi: 10.11648/j.ajs.

[14] Fantastic. (2020). Tabel Tingkatan Versi Android.

[15] Sugiyono. (2016). Metodologi Penelitian Kuantitatif, Kualitatif, dan R&D. In CV Alfabeta. https://doi.org/https://doi.org/10.3929/ethz-b-000238666.

[16] Mayfield, M. (2011), "Creating training and development programs: using the ADDIE method", Development and Learning in Organizations, Vol. 25 No. 3, pp. 19-22.

[17] Lee, L., Chen, D. T., Li, J. Y., & Lin, T. Bin. (2015). Understanding new media literacy: The development of a measuring instrument. Computers and Education. https://doi.org/10.1016/j.compedu.2015.02.006.

[18] Likert, R. (2017). The method of constructing an attitude scale. In Scaling: A Sourcebook for Behavioral Scientists (pp. 233–243). https://doi.org/10.4324/9781315128948-23. Use the "Insert Citation" button to add citations to this document.