Android-Based Mobile Learning Development on Fashion Pattern Construction Learning Materials

Musdalifah$^{(\boxtimes)}$, Sitta Khotimatul Mutma'inah, and Sita Nurmasitah

Department of Home Economics, Faculty of Engineering, Universitas Negeri Semarang, Semarang, Indonesia
musdalifahpkk@mail.unnes.ac.id

Abstract. The development of Science and Technology (IPTEK) is growing rapidly in connection to the smartphone's utilization as a learning medium among educators and students. Based on observations towards the Fashion Pattern Construction course at the Fashion Design Education Study Program Universitas Negeri Semarang, the learning media is still limited to *job sheets* and demonstrations on the board which are considered to be inadequate. Many students who have mobile devices; about 97.3% of the 26 students spend approximately 10 h per day on social media. Mobile devices need to be optimized in terms of its usage for learning activities. This study aims to develop Android-based mobile learning media on fashion pattern construction learning materials with the main topic of women's patterns making technique using the *meyneke* system. The development model applied is 4-D (Four D Models), namely: define, design, develop, and disseminate. The data collection techniques utilize observations, interviews and questionnaires, while the data analysis employs descriptive percentage. Based on the suitability assessment by the media validators, it indicates that: the application receives an assessment of 90.53% from media experts and 90.15% from material experts. Whereas the assessment results of the application usage receives 88.6% from students. This indicates that the media is very suitable to be used in the Fashion Pattern Construction learning process on the subject of the *meyneke* system women's fashion pattern making techniques.

Keywords: Media · Mobile learning · Smartphone · Fashion pattern construction

1 Introduction

The development of mobile technology is so rapid at the moment, especially on smartphone devices. As many as 72.9% of global mobile device users use an Android-based operating system and the rest use Apple's iOS or other OSs. Whereas 90% of the smartphone market in Indonesia is dominated by Android and 75% in the world [1]. The Android-based mobile operating system is the most widely used and in high demand by users to communicate and search for information [2].

Information technology development can process, encase, and display information in audio, visual, and audio visual and even multimedia so that it becomes an alternative solution to educational problems as a form of technology-based learning model [3]. Learning is a systematic and systemic process or activity, having interactive and communicative properties between educators and students, learning resources and environment, to create a condition that enables students learning activities, both inside and outside the classroom attended physically by the teacher or not, to master the specified competencies.

Based on the questionnaire given to 26 UNNES students majoring in fashion design education class of 2019, study group 1, smartphone is mostly used to access social networks; thereby it has yet played an important role in education, especially in the fashion study program. Around 97.3% of the total students have an android/iPhone-based smartphone; they have used smartphone for 6–10 years. On average students spend 10 h per day using smartphone; however the usage is mostly for social media only. Even though many applications have been offered to find information, yet there are still many who use smartphones only for social media, therefore its utilization in the field of education is considerably insignificant, especially in fashion patterns construction learning [4].

Referring to the results of survey on the fashion patterns construction course at Fashion Design PKK UNNES, power points and jobsheets are still being used as the learning media and the lecturers are still presenting in front of the class using the classroom board so that learning activities are still being held face-to-face. This is considered to be less than the eligibility standards as a teaching medium for the learning process and results in non-optimal learning quality. Furthermore, students tend to feel bored and pay less attention to the material being presented. The media is reckoned not to meet the qualifying standards of teaching materials according to the Ministry of National Education with 4 aspects, namely content, language, presentation, and graphics. In particular, it can be seen from the interaction, comprehensive information, illustrations, images, photos, and display design therefore students tend to be less interested and motivated in learning. The learning process can be optimized through the use of technological developments.

The development of android-based learning media is very attractive and efficient, with the attractiveness level of around 89.39% in the narrow group and around 92.60% in the large group [5]. Learning using an Android-based Smartphone provides a more noteworthy learning experience for students. Moreover, it strengthens the scientific character of students in the form of curiosity, creativity and thoroughness [6]. The implementation of Android-based mobile learning applications as flexible learning media with the estimated results reaching 95% of users enjoy using Android-based learning applications [7]. Based on aforementioned descriptions, the objective of this study is to create appropriate mobile learning media for students and educators in the learning process.

2   Research Methodology

This study will develop mobile learning using media in the form of an android application on the Fashion Pattern Construction material with the subject of meyneke system women's fashion pattern making techniques. This study uses research and development

(R&D) methods. This research method is applied if the researcher intends to create a certain product and at the same time examine the effectiveness of the product [8]. The applied development model is 4-D (Four D Models), namely: define, design, develop, and disseminate.

List of items to be performed at the defining stage are; (1) front end analysis, which is diagnosing problems or deviations between learning objectives and the results of the learning process, (2) student analysis, which is finding out the students characteristics and the difficulties experienced, (3) concept analysis, which is a step to determine the material concept and media to be developed, (4) assignment analysis, which is identifying the material description in accordance with the students' assignments, including analysis of the semester lesson plan on the material to be compiled in the media, and (5) learning objectives analysis, which is formulating learning objectives indicators to be achieved.

List of items to be attended at the designing stage are; (1) preparation of benchmark test, which is establishing tools to measure students' understanding of the material, (2) media selection, which is determining appropriate and relevant media for students for appropriate learning, (3) format selection, which is choosing a media format consisting of media format, RPS (Semester Lesson Plan), learning resources, and display design, (4) initial design, which is undertaking the initial planning that becomes guidance in the development process, including flowchart, navigation flow, and storyboarding. Navigation flow is a structural design or flow of a program that describes the construction between components [9]. Meanwhile, storyboard is narratives and visuals that describe the sequence of components in the media.

The following is a hierarchical/branched navigation structure using the main menu display as the main page with branching pages (Fig. 1).

Designing a *flowchart* as a media program thinking flow should be completed before developing learning media. *Flowchart* is a comprehensive description of the program associated to the sequence of processes within so that the program flow can be clearly illustrated from beginning to end [3] (Fig. 2).

List of items to be conducted at the developing stage are (1) preparing the hardware and software requirements, namely:

1) Softwares

    a. Thunkable
    b. Corel Draw X7
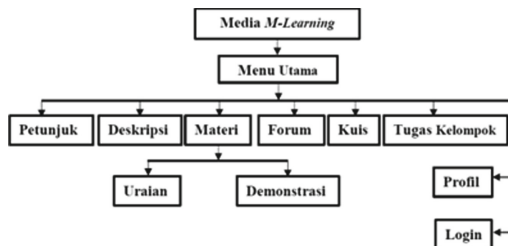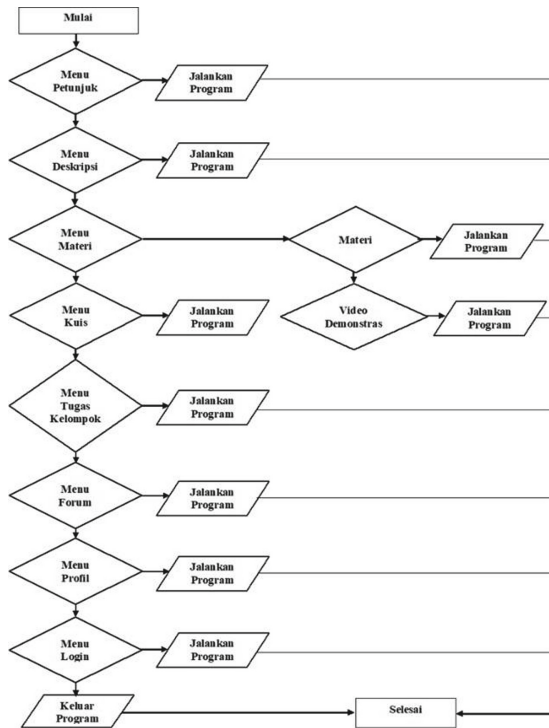

Fig. 1. Application navigation flow

Fig. 2. Application flowchart

    c. Adobe Audition 1.5
    d. Adobe Premiere Pro CS6
    e. Microsoft Office
    f. Paint

2) Hardwares

    a. PC/laptop with the following specifications:

       – minimum RAM of 4096 Mb
       – Intel Core i3 processor
       – Windows 10 Pro-64-bit operating system

    b. Smartphone

       – Android 5.0.2 version
       – MT6752 processor (8 cores 1.7 GHz)
       – 2 GB memory

Afterwards, the researchers create an Android-based mobile learning media using the devices. Lining up next at the development stage are: (2) expert validation, specifically testing the suitability of the media by media experts and material experts continued with revision/improvement, (3) testing, specifically testing the use of the applications (usability) on students as learning media.

The dissemination of the media usage in the mobile learning learning process is carried out at the *disseminating* stage. This stage is the final development process. This is intended to distribute media for students and educators to facilitate the process of teaching and learning activities.

In this template, the "Styles" menu should be used to format your text if needed. Highlight the text you want to designate with a certain style, and then select the appropriate name on the Style menu. The style will adjust your fonts and line spacing. Use italics for emphasis; do not underline. To insert images in Word, position the cursor at the insertion point and either use Insert | Picture | From File or copy the image to the Windows clipboard.

2.1 Testing Subject

The testing subjects in this study are 26 students from class of 2019 study group 1 of the Fashion Design education program Universitas Negeri Semarang to obtain assessment from students towards the application usage.

2.2 Data Collection Technique

Data collection techniques in this study utilize questionnaires, interviews, and observations. The instruments utilized in this study are interview guidelines, documentation, and expert validation sheets, specifically for media experts and material experts.

Questionnaires are employed for validation test and students' assessment towards applications usage; interviews are intended to find out initial information associated with problems in learning activities to support data from the observations, whereas the observations are conducted directly towards learning conditions of the Fashion Pattern Construction course. The form of undertaken observations aims to obtain initial data regarding the learning conditions in campus environment, such as: learning process, infrastructure, and obstacles/constraints.

2.3 Data Analysis Technique

The data in this study are analyzed via descriptive qualitative and descriptive quantitative. Qualitative data is in the form of criticism and suggestions for media improvement, while quantitative data analysis techniques are used to process data from numbers into descriptive form.

The data conversion from quantitative to qualitative for media suitability test data and the assessment of application usage tests on students [8] (Table 1).

Table 1. Data Conversion of Media Suitability Criteria

Assessment Percentage	Criteria
76–100%	Very Suitable
51–75%	Suitable
26–50%	Less Suitable
0–25%	Not Suitable

3   Result and Discussion

3.1   Mobile Learning Media Development Results

3.1.1   Define

1. Front end analysis
   The front end analysis is carried out by diagnosing the primary problems experienced by students at Fashion Design education study program Universitas Negeri Semarang class of 2019 study group 1 in the learning process. The techniques employed are observation and interviews. Based on the conducted observations and interviews, one of the problems found in learning activities in the Fashion Pattern Construction course is that the learning media utilized in the activities are still not suitable, monotonous and lack of fun. Besides, the implementation of Android-based mobile learning has not been optimized for learning in the Fashion Pattern Construction course. Therefore, the researchers decide to develop an Android-based m-learning media as a learning medium that can be used in classroom so that it can help students understand difficult material and overcome speed differences on material comprehension occurred in the classical teaching and learning process.

2. Student Analysis
   Student analysis plays a role in adjusting learning methods to the students' characteristics and difficulties. Learning activities using smartphones substantially attract their attention during the COVID-19 pandemic. In addition, it helps students' difficulties in understanding the pattern-making learning material. It becomes consideration in compiling learning materials that will be included in media development. Learning materials are arranged systematically and being equipped with exercises and *meyneke* system basic pattern drawing methods in order to demonstrate more convenient learning process.

3. Analysis of Assignments, Concepts, and Learning Objectives
   Assignments analysis is carried out by identifying the description of material in accordance with the students' assignments, including analysis of core competencies and basic competencies. Concepts analysis is implemented by determining the materials and media that will be developed according to the Fashion Pattern Construction learning curriculum in making *meyneke* system basic pattern. Afterwards the learning objectives are determined based on the analysis of assignments and concepts. Based on the learning objectives, indicators of student achievement in learning

Table 2. Results of the Analysis of Assignments, Concepts, and Learning Objectives

No	Analysis Sections	Results
1	Core Competencies	Understand and implement logical, critical, systematic, and innovative thinking in the context of science and technology development or implementation in accordance with fashion field of expertise and capable to utilize relevant science and technology within the scope of fashion education to comprehend students' potential.
2	Basic Competencies	Implement fashion pattern construction materials into *meyneke* system women's fashion basic pattern creation technique using application.
3	Materials	Fashion patterns construction with the subject of the *meyneke* system women basic pattern making technique.
4	Learning Objectives	Students have knowledge and skills on fashion patterns, including various systems of basic fashion patterns creation, fashion patterns creation techniques, tools and materials for fashion patterns creation, fashion patterns drawing marks and techniques on how to make *meyneke* system women's clothing basic patterns.

are determined. The results of the analysis of assignments, concepts, and learning objectives can be seen in the Table 2.

3.1.2 Design

At this stage, product designing is carried out as a learning medium in the form of Android-based mobile learning on the fashion patterns construction material in the making of the women basic pattern using *meyneke* system. This designing includes 3 stages, as follows:

1. Benchmark Test Organization
   This test aims to measure students' understanding ability to use Android-based mobile learning. The test is organized based on core competencies and basic competencies as well as competency accomplishment indicators. The benchmark test can be seen in the Table 3.
2. Media Selection
   Based on the analysis at the *defining* stage, the media being developed is Android-based mobile learning of Fashion Pattern Construction learning material for UNNES students majoring in fashion education study program class of 2019 study group 1, with the subject of the *meyneke* system women's basic pattern creation technique.
3. Format Selection
   The selected format is Android-based mobile learning media utilization complying with the suitability criteria according to the Ministry of National Education with 4 aspects, including: content, language, presentation, and graphics. It is intended to

make an optimal learning process by using students' smartphones. The Android-based mobile learning format is as follows.

a) Media
The media is an Android application with the following form of presentation.

1) There are 8 main menus, namely user manual, descriptions, materials, quizzes, group assignments, discussion forums, profiles and logins.
2) The featured materials are in the form of text that can be scrolled vertically, images and videos.
3) Demonstration video in the form of a practical tutorial of *meyneke* system basic pattern creation.
4) The application image icon indicates an abbreviation of the learning material, namely "KBS", coming from *Konstruksi Busana* (fashion construction).

b) RPS - *Rencana Pembelajaran Semester* (semester lesson plan)
The RPS - *Rencana Pembelajaran Semester* (semester lesson plan) is organized in accordance with the RPS of UNNES fashion education study program and being dedicated to materials learning of *meyneke* system women's basic pattern creation technique.
c) Learning Resources
Learning resources of material being featured in the Android-based mobile learning media are Fashion Pattern Construction learning materials related to *meyneke* system women's basic pattern creation technique, which is adjusted to the learning objectives, specifically: books and articles.

4. Display Design
The following is a snippet from some display design results of the "KBS Meyneke" application (Fig. 3).

Table 3. Students Benchmark Tests

| Basic Competencies	Competency Accomplishment Indicators	Questions
Implement fashion pattern construction materials into *meyneke* system women's fashion basic pattern creation technique using application.	Students are able to conceptualize, describe, and apply various systems of basic fashion patterns creation, fashion patterns creation techniques, tools and materials for fashion patterns creation, fashion patterns drawing marks and techniques on how to make *meyneke* system women's clothing basic patterns.	PG: 1 to 20
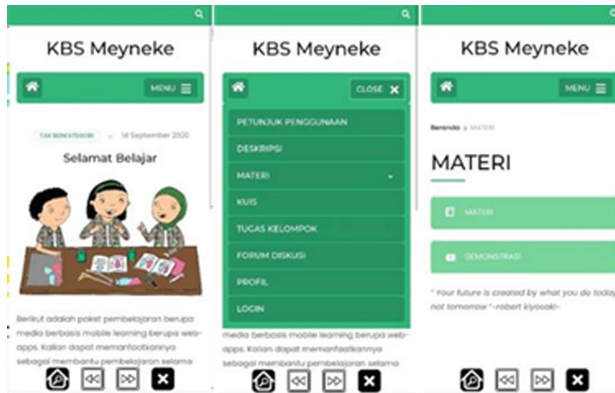
Fig. 3. Results of "KBS Meyneke" Application Display Design

3.1.3 Development

The development stage carried out is building the "KBS Meyneke" application using Thunekable software, Corel Draw X7, Adobe Audition 1.5, Adobe Premiere Pro CS6, Microsoft Office, Paint, Paint 3D and other programs. Then proceed with the validation process by media and material validators to determine the level of media suitability using an assessment sheet in the form of a questionnaire with aspects that have been adjusted in accordance with Ministry of National Education. Once the media is considered to be suitable and the revision (improvement) is completed, the application is being tested by users and gets easiness and usefulness assessment by students via an assessment sheet in the form of a questionnaire.

3.1.4 Dissemination

After the mobile learning media reaches adequate points in the suitability test and is confirmed to be user friendly and beneficial for students, the media can be distributed to be used in fashion pattern construction learning activities with the subject of meyneke system women's basic pattern creation technique. The application can be circulated and downloaded via share it, whatsapp, USB flash drive, or DVD (Digital Versatile Disk).

3.2 Testing Results

The final product of the mobile learning media development is an android application serving as a learning package for Fashion Pattern Construction material with the subject of meyneke system women's fashion basic pattern creation technique consisting of one basic competency, namely: applying women's fashion patterns construction materials in the making of meyneke system women's fashion basic pattern using applications with Thunkable software. The android application is presented in the form of an android package (apk) file that can be installed on an android-based smartphone. The media can be used by users, especially students for learning process. This application is called "KBS Meyneke".

The "KBS Meyneke" application consists of 8 main menus, namely: (1) the user manual contains descriptions of button icons, navigation, and their functions; (2) the description contains information on basic competencies and learning objectives; (3) the material contains a summary of the material and a video tutorial demonstration of making meyneke system basic pattern as a supporting content; (4) the quiz contains 20 multiple choice questions; (5) the group assignment contains 1 essay question to be completed manually in groups and uploaded in the form of a pdf file; (6) the discussion forum contains a page for questions and answers between students and educators if there are things to be asked; (7) the profile contains the developer's identity information and (8) the login contains the educator's login access to edit materials in the application and to view result points obtained from answering quizzes.

The media is tested for its suitability to measure the quality of the media in terms of media and materials. The media suitability data collection was obtained from the assessment by a media validator consisting of: 3 media experts and 3 material experts via a questionnaire. The parameters to measure media quality using 4 suitability requirements according to the Ministry of National Education, namely: content, language, presentation, and graphics modified with ISO (International Standards Organization) quality standards, and the usage test by students through assessment sheet in the form of questionnaire.

Based on Table 4, it shows that the overall validation results from media experts are 90.53% and belongs into very suitable category. Furthermore, the results of material expert validation can be seen in Table 5 which shows the percentage of suitability of 90.15% and belongs into very feasible category. After the media is tested for its suitability, improvements are made and the media is ready to be tested for its usefulness to students.

The percentage of the application usage test by students is presented in the following table.

Based on Table 6, it indicates that students consider the mobile learning media in the form of an android application to be very good and suitable to be used in the learning process.

The findings are in accordance with the previous study which develop media in the form of android applications that are suitable to be tested in the learning process with different features in mobile learning media, in the form of exercises or practice

Table 4. Media Experts Assessment Results

No	Validator	Scores
1	Media Expert 1	79
2	Media Expert 2	87
3	Media Expert 3	73
Total Scores		239
Maximum Scores		264
Suitability Percentage		90,53%
Criteria		Very Suitable

Table 5. Material Experts Assessment Results

No	Validator	Scores
1	Material Expert 1	74
2	Material Expert 2	77
3	Material Expert 3	87
Total Scores		238
Maximum Scores		264
Suitability Percentage		90,15%
Criteria		Very Suitable

Table 6. Application Usage Assessment Results

No	R	Aspects	P(%)	Total	Criteria
1	Students	System	90,06		Very Good
		User	88,84	88,6%	
		Interaction	87,5		

Descriptions:
R: respondent.
P: percentage.

questions [10]. This study provides an exercise feature or practice questions in the form of multiple-choice questions with 5 answer options. This study also adds a discussion forum feature as communication platform between students and educators.

In addition, media development is undertaken in the form of android applications using Adobe Flash software with static content. Whereas this study develops learning media using Thunkable software which is simpler and easier to use featured with dynamic content and allow material content editing. The learning materials organized through media programs will give a clearer impression, being more complete, and attract the student's interest. This learning media development is intended to facilitate students to review materials and to learn missed materials since it can be accessed online anywhere via a smartphone.

Furthermore, this mobile learning media has several advantages and disadvantages. They are obtained from the statements of media experts, material experts, and users (students) via questionnaires and interviews. The advantages of this mobile learning media are: (1) a media product in the form of an android package (apk) with a size of less than 5 MB, (2) the material presentation in systematic and easy-to-operate applications, and (3) the media is interactive so that it is expected to attract students in learning. Besides its advantages, this mobile learning media has several disadvantages, including: (1) the need of connecting internet data to access video content in the application, (2) some image quality is lacking due to limited memory while building the applications.

4   Conclusions

Based on the conducted study in the development of Android-based mobile learning, the following conclusions can be drawn;

1. Android-based mobile learning media can be developed using 4 D (Four D) Models, namely, define, design, develop, and disseminate.
2. The developed "KBS Meyneke" mobile learning application has been validated by media experts and material experts with assessment results of 90.53% from media experts and 90.15% from material experts. This indicates that the developed mobile learning media is very suitable to be tested in learning activities.
3. Based on the application user assessments by 26 students of study group (rombel) 1, PKK Fashion Design study program Universitas Negeri Semarang class of 2019, the mobile learning application receives an assessment of 88.6%. This indicates that the media is suitable to be used in learning activities.

References

1. Permana, K.S.: Ketika Pengguna Internet dan Smartphone Terus Meningkat, Android Dominasi Pasar Indonesia dan Dunia, Tribun Jabar (2019)
2. Setiawan, I.F., Astuti, D.M.: Khairina, rancang bangun game edukasi berbasis android tebak lagu nusantara: senara. Informatika Mulawarman: Jurnal Ilmiah Ilmu Komputer **9**, 24–30 (2016). http://dx.doi.org/10.30872/jim.v9i2.130
3. Darmawan, D.: Mobile Learning Sebuah Aplikasi Teknologi Pembelajaran, Jakarta, Rajawali Pers (2016)
4. Muyaroah, S.: Efektifitas mobile learning sebagai alternatif model pembelajaran. Lembaran Ilmu Kependidikan **46**, 23–27 (2017)
5. Sari, P.R., Djaja, S., Kantun, S.: Pengembangan media pembelajaran berbasis android dengan sistem *APPY PIE* pada materi jurnal penyesuaian perusahaan jasa untuk kelas XI IPS di SMA Negeri 2 Jember. Jurnal Pendidikan Ekonomi: Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi dan Ilmu Sosial **13**, 91–97 (2018). https://doi.org/10.19184/jpe.v13i2.11005
6. S. Fatimah, Y. Mufti: Pengembangan media pembelajaran IPA-fisika smartphone berbasis android sebagai penguat karakter sains siswa. Jurnal Kaunia **10**, 59–64 (2014)
7. Martono, K.T., Nurhayati, O.D.: Implementation of android based mobile learning application as a flexible learning media. Int. J. Comput. Sci. Issues **11**, 168–174 (2014)
8. Sugiyono: Metode Penelitian Pendidikan, Bandung, Alfabeta (2015)
9. Chandra, Y.I.: Aplikasi pembelajaran angka, bentuk, huruf dan warna untuk anak-anak menggunakan metode Computer Assisted Instruction (CAI) berbasis android. Jurnal Ilmiah Komputasi **15**, 7–14 (2016)
10. Lu'mu, L.: Learning media of applications design based android mobile smartphone. Int. J. Appl. Eng. Res. **12**, 6576–6585 (2017)