# The development of Android-based learning media using Kodular in making suit patterns subject

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## ARTICLE INFO

## ABSTRACT

This research aims to produce Android-based interactive learning media by utilizing the Kodular application for learning materials for making suit patterns for XII grade students of Fashion Management Vocational Schools. This research uses the research and development model of the Puslitjaknov Team, which consists of five development stages, namely: (1) Analysis of the product produced; (2) Making the initial product; (3) Expert validation and revision; (4) Small-scale trial; and (5) Large-scale trial. This study collected data through observation, questionnaires, and documentation. The test subjects in this development research were students of class XII of Fashion Management of SMK Negeri 2 Godean, with a total of 10 people for small-scale trials and 27 people for large-scale trials. In this study, quantitative descriptive analysis was used to analyze the data. Based on the assessment of material experts and media experts, small-scale trials, and large-scale trials, the findings of this study reveal that the learning media for making Android-based suit patterns are considered valid and practical for use in the classroom. This media is feasible to use to improve students' thinking skills and support students in learning independently, as well as flexible in its application. This media functions well and provides relevant information to students regarding suit pattern making, increasing students' interest in learning, creativity, and learning motivation. The Android-based suit pattern making learning media developed is more efficient than traditional learning media because it can improve learning outcomes by improving the quality of student learning and making it more fun.

## INTRODUCTION

Learning media is a channel or method to convey a message from sender to receiver. Learning media, such as games and technology-based tools, play an important role in facilitating the delivery of educational material and enhancing student understanding and engagement (Miranda et al., 2022; Riyani et al., 2023). In order to prevent COVID-19 and efforts to maintain the continuity of the learning and teaching process, the Indonesian Ministry of Education implemented Distance Learning (PJJ), where teaching and learning activities are transferred to online meetings (e-conference) using digital media.

Learners complained about difficulties understanding job sheets, handouts, and modules during PJJ, especially in the Costume Made Clothing Making (PBCM) course on suit pattern-making material. The media on the material of making suit patterns are considered to be less eligible as

learning media, resulting in poor learning quality. As a result, students become bored and pay less attention to the material presented (Musdalifah et al., 2023) as well as the lack of focused assistance due to long distances and the absence of face-to-face interaction because it is considered boring, many students are less involved and less enthusiastic about lecture learning techniques in conveying knowledge (Gustia & Nelmira, 2023). Therefore, an alternative learning media that can help students learn independently and is flexible in its use, anytime and anywhere, is needed.

There are several alternative learning media available to help students make patterns. One example is modules, which are often hands-on and require physical interaction and attention. Pattern making is the ability to create patterns by developing templates that can be used to sew clothing and craft items (Linet et al., 2021). Modules also include procedures for pattern-making and development. Methodically organized modules will assist students in developing their pattern-making skills. Learning videos are another type of media that can help students make patterns more easily (Yosanti, 2019). Learning videos convey information, describe processes, explain complex concepts, teach skills, shorten or lengthen time, and influence attitudes. Learning videos illustrate a procedure correctly and can be viewed repeatedly if needed (Ginting et al., 2022), encourage and increase motivation, and instill attitudes from other affective aspects.

Teachers or educators create instructional videos, which are then shown in class and made available online. Hopefully, this will allow students to rewatch and retain knowledge more effectively to learn at their own pace (Cavanagh & Peté, 2017). There is much interest in adopting and using YouTube for learning purposes in practice and research. YouTube is a great learning resource for individual learners due to its huge volume of learning content, which allows them to engage in on-demand learning in school, work, and daily life at an affordable price and with great flexibility in terms of location and time (Zhou et al., 2020). Due to the popularity of YouTube for learning, YouTube is investing more to help producers who create instructional videos. Academic and professional educators have also been using YouTube videos as a dynamic component in course instruction to enhance information transfer and skill development (Copper & Semich, 2019).

Multimedia is a combination of various media. Multimedia uses different media types, such as text (alphabetical or numerical), symbols, graphics, photos, audio, video, and animation, to enhance learning or memory (Alshaya & Oyaid, 2017). As stated by Munir (2012), multimedia is preferred to complement learning stimuli, including audio and visual merging stimuli. The use of multimedia provides benefits to the learning process. Multimedia technology offers features such as integration, diversity, and interactivity, allowing one to transmit information or ideas using digital and printed elements. In this case, digital and print elements refer to multimedia-based applications or devices that transmit information to individuals to improve concept understanding (Abdulrahaman et al., 2020). Interactive multimedia applications provide learning materials with a more attractive and useful display, designed to help and increase students' interest in learning (Winwin Wiana et al., 2018).

Interactive multimedia can help overcome learning obstacles, increase students' learning activities that have yet to be maximized and improve student learning outcomes. However, this needs to be supported by learning practices in educational institutions. Teachers who apply interactive technology as learning media in the classroom are still rare due to the need for teacher expertise in interactive multimedia, especially in pattern-making. Teachers and students can benefit from interactive multimedia in the learning process (Ampera, 2017). Because researchers develop computer-operated learning media, the presentation of suit pattern development subjects can be made as interesting as possible by adding videos or animations so that the material for developing suit patterns is given to students with a more effective, efficient, and interesting approach.

Learning media development has become wider and more diverse over time, as have the types of learning media. Information and communication technology (ICT) has significantly impacted the development of learning media. One of the developments in learning media is Android-based media as a choice in the teaching and learning process. Android-based learning media allows students to access materials flexibly (Apsari & Budiastuti, 2021). According to a Cambridge International survey, 81% of students in Indonesia use smartphones to do assignments, and 67% use smartphones in teaching and learning activities (Zulfa & Mujazi, 2022). Android is the most widely

used smartphone operating system in Indonesia. Android-based application development is the most feasible method to be utilized in education.

There are several Android-based learning multimedia developments in the fashion field, such as research conducted by Sholikhah et al. (2023), which focuses on designing the material, Apsari and Budiastuti (2021) with material for making suit collars, and Jannah et al. (2022) with making games patterns. Of the three relevant studies, no Android-based learning multimedia contains material for making suit patterns.

The author uses the Kodular application, which has never been used before in making learning media in the fashion field. The use of Kodular is a new thing in the development of learning media in the fashion field because, based on the author's search, most of the Android-based learning multimedia development in the fashion field uses Adobe Flash software (Ampera, 2017; Musdalifah et al., 2023; Purwaningsih et al., 2020). Kodular is an App Developer Website with features similar to MIT App Inventor to develop Android applications using Block Programming. Kodular-assisted Android-based interactive learning media can combine several aspects into one application. Comprehensive stages are also offered through this media in performing complex activities such as suit pattern making, where traditional models such as job sheets can support learning through practical methods less.

Research conducted by Pratiwi (2012) states that Android-based learning media can be used for individual and classical classroom learning. Furthermore, this program is designed as a tool for teachers in the learning process in order to create creative and innovative learning (Pratiwi, 2012). Research conducted by Putri (2019) states that Android-based interactive media can create two-way communication where students can take action, be active, interconnected, and reciprocate. Students not only search for knowledge on the internet and then write it back but also actively participate in the learning process (Putri, 2019). Research conducted by Syarisma (2019) stated that Android-based interactive media is an interesting media that increases student attention and concentration, where students' interest and attention to learning, as well as the experience gained by students, are things that influence and can improve student learning skills (Syarisma, 2019).

Based on this description, several problems can be identified in learning activities, namely: (1) There are still many students who find it difficult to understand the material provided through Learning Media job sheets, handouts, and PowerPoint without direct guidance; (2) The implementation of distance learning causes students to lack intensive guidance, and difficulties in understanding the material; and (3) Learning media in the form of books, handouts, LKS, student worksheets and PowerPoint are less supportive in improving students' understanding and competence. The purpose of this research is to create Android-based interactive learning media by utilizing Kodular to make suit patterns for XII-grade students of Vocational Fashion Management and test the feasibility of Android-based interactive learning media that has been made.

## RESEARCH METHOD

This research is a research and development (R&D) project. According to Sugiyono (2016), R&D research is research used to produce products and test the effectiveness of these products. The research model of the Center for Policy Research and Innovation (Puslitjakov) Team was used in this R&D research, which simplified the Borg and Gall model (Tim Puslitjaknov, 2008). The result of this research is an APK-formatted program. Tim Puslitjaknov's model consists of five main stages: (1) product analysis; (2) initial product development; (3) expert validation and revision; (4) small-scale field trial and product modification; and (5) large-scale field trial and final product (Tim Puslitjaknov, 2008). The subjects of this research were students of class XII of Fashion Management of SMK Negeri 2 Godean, and the research was conducted from August to December 2023. The small-scale media trial was conducted by selecting 5-10 students who represented the population (Sadiman et al., 2018). In the large-scale trial, the research sample was 27 students, in line with the theory of Arikunto (2002) in determining the number of samples obtained, 10-15% or 20-25% of the population or more. The purpose of this research is to create interactive learning media. Respondents included media experts, material experts, and potential users.

The non-test data collection approach used in this research includes documentation, observation, and questionnaire techniques, using the Guttman Scale on the media expert and material expert questionnaires and the Likert Scale with four answer options on the user/student questionnaire. Content validity was verified using Judgment Expert conducted by instrument experts to measure the validity of the research. Cronbach's alpha Reliability Test was applied in this study. Furthermore, because this research is descriptive quantitative, it uses the Descriptive Statistical Data Analysis Technique. This study used qualification criteria rules based on Mardapi's (2012) theory, as shown in Table 1.

Table 1. Media Eligibility Criteria Guidelines

| Interval's Value | Feasibility |
|---|---|
| X < 0.40 x Highest Score | Unworthy |
| 0.60 x Highest Score > X ≥ 0.40 x Highest Score | Less Viable |
| 0.80 x Highest Score > X ≥ 0.60 x Highest Score | Proper/Feasible |
| X ≥ 0.80 x Highest Score | Very Decent |

## FINDINGS AND DISCUSSION

### Research and Development of Android-Based Interactive Learning Media Material for Making Suit Patterns

There are five procedures in building the Puslitjaknov Team model, which are as follows: (1) Analysis of the product to be developed; (2) Initial product development; (3) Expert validation and adjustment; (4) Small-scale trial and adjustment; and (5) Large-scale trial and final product. This sub chapter will explain the product analysis stage to be developed and the initial product development.

*Analysis of the Product to be Developed*

Analysis of the product to be developed is the initial stage of research, which aims to determine the needs of learning media. Implementing learning before and during the COVID-19 pandemic was handled differently at SMK Negeri 2 Godean. The fundamental difference between teaching and learning activities is the learning facilities used. Students learn online using e-learning platforms such as Google Meet, Google Classroom, Zoom Meeting, and other online learning forums. In distance learning, students study with two schemes: fully online for theoretical courses and morning and afternoon shift schemes for practical learning. Time constraints significantly impact the learning process, especially amid the COVID-19 pandemic.

In addition, the learning approach used is less interesting for students because it combines lecture and demonstration methods. In addition, students need more participation and even look passive in conducting learning interactions during teaching and learning activities, both in face-to-face learning and online classes. Lack of concentration on the given subject or being engrossed in playing with themselves, friends, or play devices creates a less conducive condition, making the classroom atmosphere less pleasant. When the teacher allows students to ask questions, students tend to be less active in asking questions, but when given the task of making patterns, many students need help or make mistakes.

Further observations are intended to identify the type of learning media used. The implementation of learning to make women's suit patterns at SMK Negeri 2 Godean could be better, and this is due to the use of inappropriate learning media. Media use is limited to written demonstrations, job sheets, handouts, and PowerPoint. This media is one-way, causing students to fail to understand the material. This method seems less relevant to the learning demanded by K13 as the blackboard demonstration is monotonous and ignores the benefits of technological transformation. Because the media is considered monotonous and uninteresting, students need clarification on the information provided.

Based on the documentation study conducted by the author, out of 29 students in class XII of Fashion Management at SMK Negeri 2 Godean, 8 out of 29 students scored below the Minimum Completion Criteria (KKM), which is below 80. At the same time, four children have met the KKM, with an average class score of 66.2. Based on this, developing learning media that allows students to learn independently anywhere and anytime, not only in the classroom, is very important.

The need for learning media development is then explored as a result of the observations that have been made. Based on the results of observations, SMK Negeri 2 Godean follows the 2013 curriculum. Thus, the learning media products must meet the demands of K13, namely the development of students' potential in terms of knowledge (cognitive), attitudes (affective), and skills (psychomotor). In addition, material analysis is carried out by analyzing jacket-making material at Vocational High Schools through syllabus analysis, Core Competencies-Basic Competencies (KI-KD), and Learning Device Plans (RPP).

Furthermore, the Competency Achievement Indicators of the KD are needed to formulate the material. The third step is to develop learning objectives before reviewing the product design. Based on the product design search, Vocational High School students, especially at SMK Negeri 2 Godean, have a Generation Z personality that is very familiar with technology, especially smartphones and laptops, and have an independent attitude. Based on these considerations, the developed media model is Android-based in applications. The application must have values in accordance with technological advances currently present in students' lives, one of which is the use of expressive components with new design features.

According to Mandernach (2009), learners have limited working memory and need a consistent visual design with simple and clear navigation. Color variations can show the buttons' functions (Susanto & Akmal, 2019). In the media created, there are color differences in the Start and Home buttons, indicating that the buttons have different functions. The application buttons are placed consistently in the same location, making it easier for users to find and operate the application. The researchers applied a complementary combination of yellow and purple colors, which psychologically affects the app users Pujiriyanto (2005). Yellow, which is the first color recognized by the brain, can stimulate optimism, hope, and overall balance, so it is very good to be applied to the classroom, and purple has the meaning of attracting attention (Damayanti et al., 2020). Combining these two colors creates a pleasant learning atmosphere. It attracts students' attention so that they remain engaged and believe that the material for making suit patterns is simple and fun.
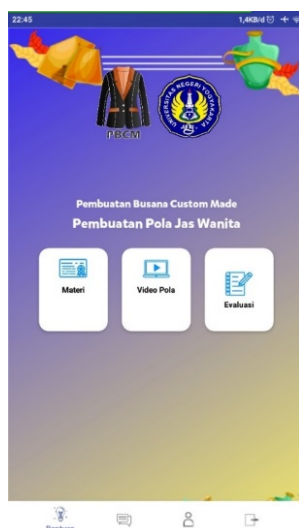


Figure 1. Product Main Page Display

Technically, this application is designed following Student Active Learning Design principles or student-centered learning. Users can learn the material and conduct material evaluation tests independently (Susanto & Akmal, 2019). The results showed a tendency to look from the top left, often used in image observation. This has implications for determining the image field or

application layout and how students understand the arrangement of lines (Munir, 2012). In this study, the author positioned the material menu on the left, the video in the middle, and the evaluation on the right, as shown in Figure 1, so that students will consciously start with the first menu, namely material. This placement is also based on the principle of the order of learning materials.

*Early product development*

Initial product development was carried out through the following stages: (1) Pre-Production (consisting of making flowcharts and storyboards); and (2) Production (the resulting application has details of each page as follows: (a) Home page which contains: header in the form of application logo and UNY logo; and (b) Main menu options, namely; material, learning video, and evaluation. The material menu contains KI-KD, Competency Achievement Indicators (IPK), learning objectives, pattern-making materials, and Learner Worksheets (LKPD), displayed using a side layout menu according to Figure 2.



Figure 2. Side Menu Product Display

The Video menu contains a video of making a suit pattern, shown in Figure 4, and the Evaluation menu contains ten multiple choice practice questions, shown in Figure 3; and (c) Bottom navigation contains help menu, developer contact page, developer profile, and exit button); (3) Post-production (the post-production stage contains a re-examination of the entire content of the learning media). Furthermore, the media is exported .APK format so that it can be installed by smartphone devices that have Android operating systems, which are then distributed to students.
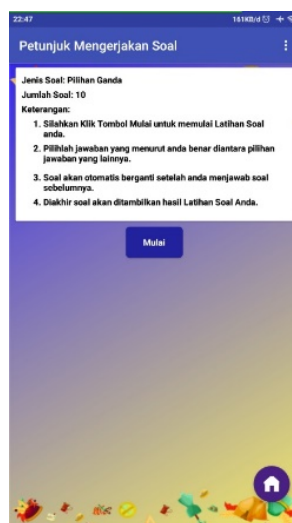


Figure 3. Evaluation Menu Display

Figure 4. Video Material Menu

**Feasibility of Android-Based Interactive Learning Media on Suit Pattern Making Material**

*Expert Validation and Revisions*

Validation was carried out by material experts and media experts. In the assessment by media experts, it is known that the questionnaire consists of 30 statements. It is known that the minimum score is 0 x 30 = 0, and the maximum score is 1 x 30 = 30, with the number of categories = 2 and the length of the interval class = 15. Judging from the assessment of media experts, the feasibility of interactive learning media for making Android-based suit patterns gets an average score of 30 with a percentage of 100%, so the media is categorized as "Feasible," as shown in Table 2.

Table 2. Media Expert Validation Results

| Validators | Score | Feasibility |
|---|---|---|
| Media Expert 1 | 30 | Feasible |
| Media Expert 2 | 30 | Feasible |
| Teacher | 30 | Feasible |
| Average | 30 | |

In the assessment by material experts, it is known that the questionnaire consists of 32 statements containing aspects of learning and material. Based on the results obtained in this study, the minimum score obtained is 0 x 32 = 0, and the maximum score is 1 x 32 = 32, with the number of categories = 2 and the length of the interval class = 16. Based on the assessment of media experts, the feasibility of Android-based interactive learning media in making suit patterns developed is getting an average score of 30.6 with a percentage of 95.6%, so the media is categorized as "Feasible." The results of the feasibility assessment of Android-based interactive learning media in making suit patterns are shown in Table 3.

Table 3. Material Expert Validation Results

| Validators | Score | Feasibility |
|---|---|---|
| Material Expert 1 | 30 | Feasible |
| Material Expert 2 | 30 | Feasible |
| Teacher | 32 | Feasible |
| Average | 30.6 | |

*Small-Scale Trials and Revisions*

The trial was intended to determine the feasibility of the media based on prospective users' responses to the material and media aspects. This data collection stage uses a Likert Scale questionnaire with a suggestion column to accommodate user responses as a reference for future improvements. The statement items in the questionnaire for users are 38 statements. The results of the small-scale trial are shown in Table 4.

Table 4. Small-Scale Trial Results Data

| Aspects | Sum | Average | Ideal score | Percentage (%) | Eligibility Level |
|---------|-----|---------|-------------|----------------|-------------------|
| Media | 747 | 74.5 | 84 | 88.6 | Very Feasible |
| Material | 607 | 60.7 | 68 | 89.2 | Very Feasible |
| | Total | | 152 | 88.9 | Very Feasible |

The instrument items to assess the media aspect consist of 21 statement items with a minimum score of 1 x 21 = 21 and a maximum score of 21 x 4 = 84. The class interval of the media aspect is shown in Table 5. Based on the data in Table 4, the media aspect obtained the "Very Feasible" category because it scored 74.5.

Table 5. Intervals from the Media Aspect

| Interval | Feasibility |
|----------|-------------|
| X < 33.6 | Unworthy |
| 50,4 > X ≥ 33.6 | Less Viable |
| 67,2 > X ≥ 50.4 | Proper/Feasible |
| X ≥ 67.2 | Very Decent |

The instrument items in assessing the material aspect consist of 17 statement items. The minimum score of the material aspect is 17 x 1 = 17, with a maximum score of 17 x 4 = 68. The material aspect interval can be seen in Table 6. Based on the data in Table 4, the material aspect obtained the "Very Feasible" category because it scored 60.7.

Tabel 6. Intervals from the Material Aspect

| Interval | Feasibility |
|----------|-------------|
| X < 27.2 | Unworthy |
| 40,8 > X ≥ 27.2 | Less Viable |
| 54,4 > X ≥ 40.8 | Proper/Feasible |
| X ≥ 54.4 | Very Decent |

Furthermore, based on the small-scale test percentage data, it is known that the assessment results by ten students obtained results for the media aspect obtained an assessment of 88.6% and the material aspect obtained an assessment of 89.2% (as in Figure 5). Based on this data, Android-based interactive learning media on the material for making Android-based suit patterns can be declared "Very Feasible."
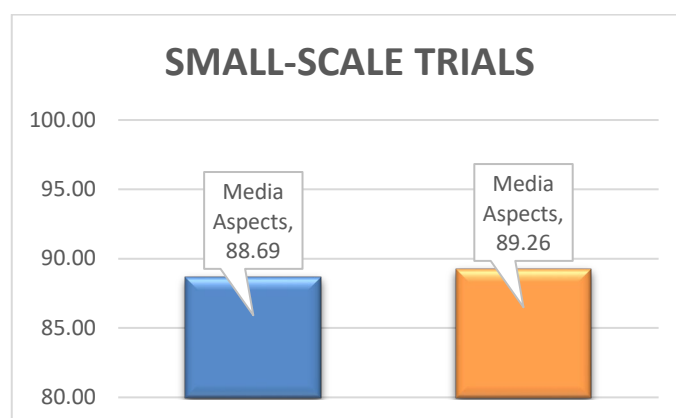


Figure 5. Percentage of Small-Scale Trial Results

*Large-Scale Trials and End Products*

The large-scale trial was conducted on 27 students of class XII majoring in fashion at SMK Negeri 2 Godean. Like the small-scale trial, data collection at this stage used a questionnaire instrument with a Likert Scale consisting of 38 items of statements.

Table 7. Small-Scale Trial Results Data

| Aspects | Sum | Average | Ideal score | Percentage (%) | Eligibility Level |
|---------|-----|---------|-------------|----------------|-------------------|
| Media | 1920 | 71.1 | 84 | 84.6 | Very Feasible |
| Material | 1539 | 57 | 68 | 83.8 | Very Feasible |
| | Total | | 152 | 84.2 | Very Feasible |

The instrument to assess the media aspect consists of 21 statements with a minimum score of 1 x 21 = 21 and a maximum score of 21 x 4 = 84. The class interval of the media aspect can be seen in Table 5. Based on the class interval table, the media aspect obtained the "Very Appropriate" category because it scored 71.1 (as in Table 7). Furthermore, the material aspect assessment instrument consists of 17 statement items. The minimum score of the material aspect is 17 x 1 = 17, with a maximum score of 17 x 4 = 68. The material aspect interval can be seen in Table 6. Based on the results of the large-scale trial (as in Table 7), the material aspect obtained the "Very Feasible" category because it scored 57.
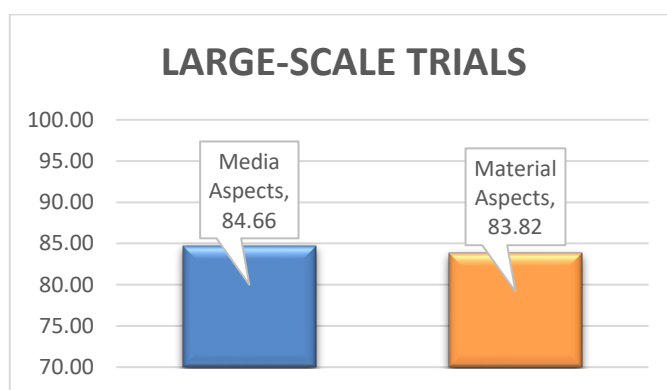


Figure 6. Percentage of Large-Scale Trial Results

Furthermore, based on the percentage data of the large-scale trial, it is known that the results of the assessment by 27 students obtained results for the media aspect obtained an assessment result of 84.6% and the material aspect obtained an assessment result of 83.8% (as shown in Figure 6). Based on the large-scale trial data, Android-based interactive learning media on suit pattern-making material is declared "Very Feasible."

**Discussion**

Based on the observation and analysis results, implementing the learning process for making women's suit patterns could be better at SMK Negeri 2 Godean due to the use of inappropriate learning media and the lack of learning media. The development of Android-based media results from a needs study, which reveals that most class XII students majoring in fashion at SMK Negeri 2 Godean own and use smartphones during teaching and learning activities. This suggests that the design of Android-based learning applications has a high potential to assist the learning process. The content designed in this developed application is material for making suit patterns. This is based on empirical data that the average student has difficulty making suit patterns, and the average class score at SMK Negeri 2 Godean still needs improvement.

The materials provided have been developed using analysis of KI-KD, GPA, learning objectives, syllabus, and theoretical studies on suit pattern making. These materials include studying suit design, taking measurements, and making suit patterns. Due to technical constraints on the

Kodular website, the author made adjustments during the production stage. The author used various computer software, including Corel Draw X8 and Wondershare Filmora X. This research is the development model of the Puslitjaknov Team, which simplifies the Borg and Gall development model. Assessing the feasibility of this learning media consists of an assessment of media experts, material experts, small-scale trials, and large-scale trials.

The media expert validation stage is based on the display and programming aspects. The media was declared suitable for data collection by media experts after a revision process. Furthermore, the media expert stated that the Android-based interactive learning media the researcher developed is easy to operate and access, functions well, and is durable. The learning media uses an attractive combination of colors, layout, and appearance. Text, audio narration, procedural images, and videos are appropriate and can support information delivery. The material can be clarified by letter size and shape, image clarity, video display, and audio narration.

In the material expert validation, the aspects assessed are the aspects of learning and material. After being revised, the material on interactive learning media is declared feasible by material experts to be used in Android-based interactive learning media in making suit patterns. The material expert stated that the material on the Android-based interactive learning media followed the KD, syllabus, and learning objectives synchronized with the subjects used in SMK. The material on the learning media is relevant to the learning objectives. There is consistency between learning objectives, material, and practice questions. The material in the learning media is presented in an interesting, complete, and clear manner to help students understand the material for making suit patterns, motivate students to learn, and provide opportunities for them to learn independently.

Furthermore, in the small-scale and large-scale trials, respondents and students in this study stated that the Android-based interactive learning media had an attractive layout design, functioned well, and could be easily analyzed. The existence of a guidebook makes it easier for respondents to operate the application. Respondents stated that the learning media can be used flexibly and has good durability. The media elements in the learning media are well presented, making it easy to read, observe, and listen to. The media can help respondents understand the material because of the complete presentation of the material. The language used in the learning media is easy to understand and clear, with no ambiguous sentences. Respondents are motivated to learn and do tasks independently through Android-based learning media.

In terms of material, this study's findings are from the results of research conducted by Putri (2019), who evaluated two elements, namely the appearance and function of the media, and achieved very good results in both elements. The difference between this research and Putri's (2019) research lies in the size of the media produced. The previously developed media is relatively large with low video resolution. In terms of similarities, this interactive multimedia development research is only limited to feasibility testing and has yet to reach the effectiveness test; this is also in line with media development research conducted by Pratiwi (2012), which does not contain media effectiveness research. Pratiwi's (2012) is different from the research conducted by the researcher, namely in the character aspects studied. Pratiwi's (2012) examined the use of media in forming characters aspired to in learning media, which overall was found to be very effectively fulfilled. Furthermore, Pratiwi's (2012) also stated that character growth only happens slowly but must be done consistently or continuously. The last comparison is research conducted by Syarisma (2019), who used the website builder Appypie. It differs from researchers who developed interactive learning media using Kodular, which has flexible layout and interface design for developers.

In the material aspect assessment, it is clear that this application has media flexibility, as evidenced by the ease with which users can access material on the material menu. This application provides maximum opportunities for students to learn the material of making suit patterns and is well absorbed. The adoption of Android-based mobile learning applications as flexible learning media has resulted in around 95% of users feeling happy using Android-based learning applications (Martono & Nurhayati, 2014). This development research also shows that the appearance of learning media can be entertaining and useful, where it can increase student interest in completing the learning process (Musdalifah et al., 2023), as well as increase the acceptance and understanding of knowledge by the findings of research conducted by Mehdipour and Zerehkafi (2013) in Susanto and Akmal (2019).

Learning multimedia can assist classical learning in the classroom or individually and is designed as an educational aid in teaching and learning activities (Pratiwi, 2012). Students benefit from a more memorable learning experience when they use Android-based learning. In addition, using Android-based learning media can improve students' scientific character through curiosity, creativity, and thoroughness (Musdalifah et al., 2023). Evidence from various studies on the adoption of multimedia use in the learning process shows that the use of multimedia in the learning process can increase learning motivation and the effectiveness and efficiency of learning (Winwin Wiana et al., 2018). According to research conducted by Syarisma (2019) and Wiana et al. (2018), Android-based learning media can increase attention and focus and create a pleasant experience for students, thus affecting the development of student learning outcomes and the achievement of predetermined learning objectives.

The advantage of adopting technology into learning activities is that it allows students to use self-learning strategies where they can quickly seek knowledge without the presence of a teacher. In the era of the Industrial Revolution 4.0, improving the quality of human resources will be concentrated on student-centered learning processes with technology-based learning processes, where this type of approach will encourage students to search for as much subject matter as possible through the internet to learn (Tukiyo et al., 2023). Students who use interactive learning media can significantly improve their mastery of subject matter and critical thinking skills compared to conventional learning media (W. Wiana, 2018).

This research on developing Android-based interactive learning media on suit pattern-making for class XII SMK Cosmetology has several research limitations. First, the research was limited to the subjects studied, namely class XII students majoring in fashion at SMK Negeri 2 Godean. Second, the Android-based interactive learning media in this study still has some shortcomings in the features of the evaluation menu, such as the absence of a timer, questions that can be presented randomly or different question packages, and automatic replay for students who score below the Minimum Completion Criteria (KKM), which is a score below 80. Third, the media cannot be operated on Android versions below Android Kit Kat 4.4 (API 19). Fourth, the media requires an internet connection to play videos because the videos are integrated with YouTube to minimize the size of the media and storage space that is too large and maximize the operation of the application. Fifth, research on the development of interactive learning media is still limited to media feasibility tests that need to include empirical use effectiveness tests in the classroom.

**CONCLUSION**

Based on the results of research and discussion, the first conclusion is that the development of Android-based interactive learning media for making suit patterns for class XII vocational schools majoring in fashion is carried out through the following stages: (a) Analysis of the product to be developed; and (b) Initial product development. At this stage, the results are obtained through Android-based interactive learning media products based on storyboards and flowcharts. In addition, there is an instruction manual in pdf form to make it easier for students to operate the application; (c) Expert validation and revision; (d) Small-scale field trial and product revision; and (e) Large-scale field trial and final product. Second, the feasibility of Android-based interactive learning media for making suit patterns for class XII SMK majoring in fashion is declared very feasible based on the assessment by material experts and media experts, small-scale trials, and large-scale trials. The findings of this study indicate that Android-based learning media for suit pattern-making material that has been declared feasible and practical for use in the classroom can encourage students to learn independently and is flexible in its use. The application design allows this application to work well and provide relevant information to users about suit pattern making. The entertaining and useful appearance of the learning media helps to attract students' interest in the learning process. This media can increase students' enthusiasm and creativity and is more efficient than traditional learning media such as books or student workbooks. Finally, teachers and schools should incorporate Android learning media into teaching and learning activities. To overcome the problem of time and space limitations and to be able to learn classically and independently, the use of technology in the media used when learning pattern-making practice subjects should be prioritized. In addition, the researcher

believes that further research should be conducted to explore the use of Android-based media in the classroom, its effect on students' learning habits, and increased motivation and learning outcomes.

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