

## DEVELOPMENT OF ANDROID-BASED INTERACTIVE MULTIMEDIA ON THE CONCEPT OF CHANGES IN THE FORM OF OBJECTS IN GRADE V ELEMENTARY SCHOOL

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### Abstract

*This research aims to develop Android-based interactive multimedia to take advantage of currently developing information and communication technologies and learning media innovations in elementary schools. The research method used in learning media development adopts the development design according to Borg and Gall, which has been modified by Sugiyono and has six stages: analyzing the problem, designing the product, validating the product design, revising the product design, and testing the product. The data collection technique used in this study was a questionnaire or questionnaire that was used to determine the feasibility of the product and to know the student's responses to the product being developed. The data analysis technique changes the qualitative assessment into a quantitative one according to the scoring rules. The results of this study are in the form of Android-based interactive multimedia on the concept of changing the shape of objects with a feasibility assessment of a team of material experts of 89% and a group of media experts of 91%, so an average feasibility assessment of 90% is obtained with the "very feasible" category. The results of student responses received an average of 93% in the "excellent" category. Based on the results of this study, it can be concluded that interactive multimedia based on Android on the concept of changing the shape of objects developed in class V students is "very feasible" to be used in learning with material changes in the form of things.*

**Keywords:** *Android; Changes in Objects; Interactive Multimedia.*

### Abstrak

Tujuan penelitian ini yaitu untuk mengembangkan multimedia interaktif berbasis *Android* guna memanfaatkan teknologi informasi dan komunikasi yang berkembang saat ini dan juga sebagai inovasi media pembelajaran di sekolah dasar. Metode penelitian yang digunakan dalam pengembangan media pembelajaran ini mengadopsi dari desain pengembangan menurut Borg dan Gall yang telah dimodifikasi oleh Sugiyono yang memiliki enam tahapan yaitu menganalisis masalah, mendesain produk, memvalidasi desain produk, merevisi desain produk, dan menguji coba produk. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah angket atau kuesioner yang digunakan untuk mengetahui penilaian kelayakan produk dan mengetahui respon peserta didik terhadap produk yang dikembangkan. Teknik analisis data yang digunakan ialah dengan mengubah penilaian kualitatif menjadi kuantitatif sesuai dengan aturan pemberian skor. Hasil penelitian ini berupa multimedia interaktif berbasis *Android* pada konsep perubahan wujud benda dengan penilaian kelayakan tim ahli materi sebesar 89% dan tim ahli media sebesar 91%, maka didapatkan rata-rata penilaian kelayakan sebesar 90% dengan kategori "sangat layak". Hasil respon peserta didik memperoleh rata-rata sebesar 93% dengan kategori "sangat baik". Berdasarkan hasil penelitian tersebut dapat disimpulkan bahwa multimedia interaktif berbasis *Android* pada konsep perubahan wujud benda yang dikembangkan pada peserta didik kelas V "sangat layak" untuk digunakan dalam pembelajaran dengan muatan materi perubahan wujud benda.

**Kata Kunci:** *Android; Multimedia Interaktif; Perubahan Wujud Benda.*

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## **Introduction**

Information and communication technology development is a digital revolution that can no longer be avoided. The era of globalization has brought developments in various perspectives on human life. The presence of information and communication technology with an abundance of sophistication and convenience can push humans to a better quality and standard of living system. Various works and innovations in information and communication technology have led us all to a new culture because the latest digital era makes information and communication technology an advantage. One of the developments in information and communication technology that is widely used today is the use of gadgets, or what is known as smartphones.

As a form of utilization of information and communication technology, teachers can create creative and innovative learning media to optimize the achievement of learning objectives. Learning media is a means of delivering messages or information from the origin of the message to the destination of the message. The message conveyed, or the learning material transmitted, is learning material for achieving learning objectives or a series of competencies formulated in such a way that requires media as a carrier of the learning system (Rustandi et al., 2020). Almost the same as the opinion above, learning media, according to (Kibtiah, Hendrapipta & Andriana, 2021), is an auxiliary or connecting device used to transfer teaching materials that can stimulate the curiosity of students. Learning media is an additional device that has functions and uses to facilitate the process of delivering learning materials (Dewi & Yuliana, 2018). Learning activities offer a variety of learning media, including Android-based learning media accessed through devices that are currently popular among school-aged children.

Using Android devices as learning media has several advantages that other types of learning media do not. These advantages are (1) easily accessible to students from anywhere for learning materials, (2) learning is easily carried out at any time without time limits, (3) learning that initially only utilized books turned into an Android application-based, (4) teaching materials modified so that they can utilize using Android devices, (5) learning activities that modified with additional games will add to the learning experience of students and be more fun (Cahyadi, 2019). Another advantage of developing learning aids in the form of Android applications is that they can provide an increase in learning outcomes, alignment with the uniqueness of students, proper use of learning time, and simplicity in use so that it is easy for students to operate (Ibrahim & Ishartiwi, 2017).

With the advantages offered in Android-based learning media, it will be easier for teachers to achieve the formulated learning outcomes. Learning activities using Android-based learning media certainly have a lot of usefulness, including (1) learning activities becoming more attractive to students' learning interests, (2) can add learning information more quickly and easily, and (3) learning activities will be more diverse. So that learning activities will be created that successfully achieve learning and practical goals (Faqih, 2020). According to the findings of the needs analysis conducted by interviews and observations of learning activities in class V C SDN Serang 3, one of which was the content of natural science material, there are still many students who pay less attention to the material, are not active, and are not eager to learn.

The development of Android-based interactive multimedia is one option to present the concept of changes in the form of objects that can help teachers to concretize the process of changing the structure of things in science learning that can't explain directly. Natural Science (IPA) is a learning content that discusses the surrounding environment by making observations, conducting experiments, research, processing theories, and conveying theories (Munaamah, Andriana, & Syachruroji, 2021). Learning with material changes in the form of objects using interactive multimedia will help students with one media. They can use the senses of vision and

hearing at the same time in writing, sound, images, animation, or video together. By using interactive multimedia, students can watch an event's scene and imitate objects that cannot be met or experienced directly. They also learners use their sense of hearing to identify the impact of the sound issued so that students better understand and understand the learning material. That way, the utilization of multimedia in learning activities for students will further stimulate their curiosity of students in learning activities (Jannah, Hariyanti & Prasetyo, 2020).

Therefore, in this research and development, researchers developed Android-based interactive multimedia. These interactive multimedia are developed using Microsoft PowerPoint, iSpring Suite 10, and APK Builder, which makes it easier for teachers to create learning applications by simply converting PowerPoint files into HTML 5 format and from HTML 5 converted into form (apk) using the Apk Builder Pro application. The selection of Microsoft PowerPoint converted using iSpring and Website 2 apk Builder in developing products in this study because it has many advantages, one of which is simple to use and can use repeatedly. Then, with the combination of iSpring and Website 2 APK Builder, Microsoft PowerPoint becomes more attractive and diverse because it is converted into HTML 5 form. In the state of HTML 5 is the primary material for the Android application. Converting HTML 5 form into an Android application (apk) can be done using the Website 2 APK Builder application. (Handayani & Rahayu, 2020).

The uniqueness of the interactive multimedia to be developed is that it contains a complete menu, namely the learning material menu, which has visual material, and learning videos which contain audio-visual material explanations. These learning games have games that hone students' understanding, E-LKPD, and learning quizzes as evaluations. Some features of this interactive multimedia are developed based on previous research, such as the developer chat feature and the assessment feature, directly connected through the developer's email. This interactive multimedia is also easy to use by students and facilitates students to understand learning materials more easily. Learners can install this interactive multimedia application on their respective smartphones and utilize it in all places without time restrictions. Using an Android mobile device means that learners can study learning materials and study guidelines with learning applications without the limitation of place and time (Faqih, 2020). The use of this interactive multimedia is not limited to face-to-face learning in the classroom. Still, it can use at home as an effort to reduce the use of smartphones on things that are not important such as addiction to social media or online games.

Based on the background of the problems described above, the objectives of this study are to develop Android-based interactive multimedia on the concept of changes in the form of objects in grade V SDN Serang 3, to determine the feasibility of Android-based interactive multimedia on the idea of changes in the form of objects in grade V SDN Serang 3, and to determine the response of students to Android-based interactive multimedia on the concept of changes in the condition of objects in grade V SDN Serang 3.

## Research Methods

This research uses the R&D research method, which is research and development that will produce a product. According to (Sugiyono, 2015), the Research and Development (R&D) method is a research method used in research to produce specific outcomes and assess the effectiveness of these products. The products made in this research and development are in the form of Android-based Interactive Multimedia on the Concept of Changes in the Form of Objects in Class V Elementary Schools, which was designed using Microsoft PowerPoint,

iSpring Suite 10, and Website 2 APK Builder applications. In this research and development process, six stages are used, which refer to the development stages modified by Sugiyono. These six stages include analyzing the school problems studied, collecting information or data, designing media, validating and revising media, and conducting media trials.

This research and development occurred at SDN Serang 3, located at Jl. Karya Bhakti II, Sumurpecung, Kec. Serang, Serang City, Banten, in the 2021-2022 school year. The choice of this location is based on the consideration that to the best of the researcher's knowledge, the same research has never been carried out at SDN Serang 3, and based on the needs analysis that the researcher has conducted, SDN Serang 3 meets the requirements as a research site for developing Android-based interactive multimedia.

The data used in this research and development is a combination of quantitative data and qualitative data. Quantitative data were obtained from questionnaire data from material expert tests, media expert tests, and student response questionnaires. While qualitative data was obtained from suggestions, comments, and input from material experts, media experts, and students as users expressed in the form of descriptions.

The data analysis technique for the validation results of the expert team and learner responses is based on data input in the form of a Likert scale with scores of 1, 2, 3, 4, and 5. The criteria for product feasibility and learner responses use the criteria for interpretation categories (Riduwan, 2009) which include types of very feasible, feasible, quite feasible, less feasible, and not viable. The steps of analysis include: (1) converting qualitative evaluation into quantitative evaluation according to the scoring rules, (2) the value obtained calculated using the following formula:

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

(3) The results obtained in percentages are converted back into qualitative form by the criteria for interpretation categories.

## **Results and Discussion**

The purpose of this research is to develop android-based interactive multimedia on the concept of changes in the form of objects in grade V SDN Serang 3, determine the feasibility of android-based interactive multimedia on the idea of changes in the condition of objects in grade V SDN Serang 3, and select the response of students to android-based interactive multimedia on the idea of changes in the form of things in grade V SDN Serang 3. The following describes the results of the development researchers have done to answer the three objectives above.

### **Product Development Process**

The development of this android-based interactive multimedia aims to help teachers and students support science learning, especially in material changes in the form of objects, so that learning is more meaningful and can be received by students. By using interactive multimedia, students can watch an event's scene design and imitate objects that cannot be met or experienced directly. They also use their sense of hearing to identify the impact of the sound released so that students better understand and understand the learning material. That way, the use of multimedia in learning activities for students will further stimulate students' curiosity in learning activities (Jannah, Hariyanti & Prasetyo, 2020). Not much different from the opinion above, (Arindiono & Ramadhani, 2013) explained that elementary school students need attractive learning aids which they contain images, audio, and writing and can operate independently as

desired by each student, with the game learning material will be easier for students to understand, one of which is by using interactive multimedia.

The first stage of the study analyzed the problems at school by conducting a needs analysis. The results of the needs analysis in learning activities, one of which is in the content of natural science material, there are still many students who pay less attention to the material, are not active, and are not eager to learn. Then in the material needs analysis, the content of natural science material is generally contextual. Still, the material is memorized, and the media is only limited to descriptive theme books. The lack of utilization of information and communication technology and the lack of development of learning media is one of the factors causing the above problems.

The next stage is data collection, namely literature study by collecting data such as syllabus, student books, and teacher books for class V theme 7. In addition to book references, researchers also prepare the tools and materials needed to make products, determine designs tailored to the material analysis that researchers have done, and make learning devices that are used during limited product trials in class V C SDN Serang 3.

Furthermore, researchers developed an android-based interactive multimedia product design on the concept of changes in the form of objects acquired in this study in the form of an android application made using three applications at once, namely, the 2019 PowerPoint application, ispring suite 10 and website 2 apk builder. The final product of this interactive multimedia development is an android application in APK format. Product development using PowerPoint, iSpring Suite, and Website 2 APK Builder Pro creates an attractive android application from the appearance and content of the material, besides that the resulting size is relatively small and practical and can use without space and time restrictions (Nurhayati, Rahmawati, & Farida, 2021). This product's development is based on analyzing the field's problems, especially at SDN Serang 3. The developed product has gone through several stages before being tested in the learning process.

This interactive multimedia development process produces Android-based interactive multimedia products with a total of 42 pages, consisting of prologue pages, titles, main menus, instructions, competencies, profiles, materials, games, quizzes, and bibliographies. This multimedia is also directly connected to the developer's contact and electronic LKPD, which can be accessed directly in the multimedia. The following is an image of the appearance of the developed Android-based interactive multimedia.



Figure 1. Screenshots of Android-based interactive multimedia display

After the android-based interactive multimedia product was completed, the first research objective, namely to develop android-based interactive multimedia on the concept of changes in the form of objects in class V SDN Serang 3, was completed. Then the next stage is to test the

feasibility of android-based interactive multimedia successfully developed by a team of material experts and media experts to determine whether the multimedia developed is suitable for testing in class V C SDN Serang 3.

### Product Feasibility Assessment

The feasibility of this android-based interactive multimedia is seen based on the validation test results carried out by a team of experts, both material and media experts. Researchers obtained scores from each team of experts, presented in the table below.

**Table 1.** Average Score of Expert Validation

<b>Validation Results</b>	<b>Persentase</b>	<b>Category</b>
Material Expert Team	89%	Very Feasible
Media Expert Team	91%	Very Feasible
<b>Average Score</b>	<b>90%</b>	<b>Very Feasible</b>

Table 1 shows the assessment results based on the average percentage of the validation test of each expert (material experts and media experts). The table results explain the highest average score obtained from the media expert validation with a percentage score of 91%. Based on the criteria of the interpretation category, the assessment results from the media expert have entered into the “very feasible” category (Riduwan, 2009). The development of this android-based interactive multimedia has met one of the criteria of the predetermined success indicators. However, there are deficiencies in this android-based interactive multimedia of 9%, namely in the graphical aspects such as the title and profile display that does not contain the names of the developer and supervisor, there is no media prologue and bibliography, and there are several buttons that do not have functions. But after getting suggestions and comments from media expert validators, the researchers made improvements or revisions to perfect the advanced android-based interactive multimedia.

The following result is the score from the material expert, with a score of 89%. Based on the criteria for interpretation categories, the assessment results of this material expert have fallen into the “very feasible” category (Riduwan, 2009). The development of interactive multimedia based on Android has met one of the criteria of the success indicators previously set. However, there are still deficiencies in this android-based interactive multimedia of 11%, namely from several aspects of material content and presentation, such as the suitability between the material and the images displayed and the examples given are less understood for elementary school-age children. However, after getting suggestions and comments from material expert validators, the researchers made improvements or revisions to minimize deficiencies in the developed android-based interactive multimedia.

After knowing the feasibility assessment score from the material expert team and the expert media team, the average feasibility assessment of android-based interactive multimedia on the concept of changes in the form of objects is 90%, which, based on the interpretation category, falls into the “very feasible” category (Riduwan, 2009). Seeing the feasibility assessment from the material and media expert team, which is already in the “very feasible” category, the android-based interactive multimedia product on the concept of changes in the form of objects tested in the field, and also the second research objective to determine the feasibility of android-based interactive multimedia on the idea of changes in the condition of objects in class V SDN Serang 3 has resolved. Then the next stage is to conduct limited product testing in class V C SDN Serang 3 to determine the students’ response to android-based interactive multimedia on the concept of changes in the form of objects.

### Learners' Response to the Product

Android-based interactive multimedia that has successfully gone through the expert team validation stage and the revision stage based on the comments and suggestions of the talented team, then limited product testing carried out. This trial was carried out to determine the students' response to multimedia that successfully developed from the media and material aspects. In limited testing, students were given a questionnaire sheet consisting of four elements: content/material, language, presentation, and graphics, to find out students' responses and assessments of multimedia.

This limited trial was conducted at SDN Serang 3 in Serang City. The population in this little trial was elementary school students; the sample tested was class V C, with as many as 34 students. This limited trial was conducted for three days on June 13-15, 2022, in classroom V C SDN Serang 3. The little test was carried out for three consecutive days to see students' responses after becoming accustomed to using the android-based interactive multimedia that the researchers had developed. The limited trial was carried out using the Android belonging to each student who had been paired with the interactive multimedia application that the researcher developed.

The average value of students' responses to Android-based interactive multimedia on the concept of changes in the form of objects is 93%, with the interpretation category "excellent." The results of limited trial research on each aspect can be seen in the following table:

**Table 2. Data on Learner Response Results**

Validation Result	Percentage	Category
Content	94 %	Excellent
Linguistics	92 %	Excellent
Presentation	95 %	Excellent
Graphics	91 %	Excellent
<b>Average</b>	<b>93 %</b>	<b>Excellent</b>

Based on the data table of the results of students' responses to android-based interactive multimedia, the final score on the content aspect of the material is 94%, the linguistic element is 92%, the presentation aspect is 95%, and the graphical part is 91%. Based on this data, the average final score is 93%, which, based on the interpretation category, falls into the "excellent" category (Riduwan, 2009). However, there are still shortcomings in this Android-based interactive multimedia of 7%, namely Android-based interactive multimedia cannot be used on Android version 6.0 and below and iOS devices and cannot be published on the Play Store. Thus, this Android-based interactive multimedia product on the concept of changes in the form of objects has been successfully tested on students in class V C SDN Serang 3 and received an "excellent" student response category. With these results, the third research and development objective to determine students' response to android-based interactive multimedia on the concept of changes in the form of objects in class V SDN Serang 3 resolved.

Based on the development results discussed above, the android-based interactive multimedia is "feasible to use in the field" because the results of the calculation of the validation of the team of material and media experts and the results of students' responses have met all the success indicators previously set. The above opinion is supported by the findings of Pratiwi & Suryanti (2020) that the development of android-based media as learning media is adequate for use in elementary school science learning activities and can arouse enthusiasm for learning elementary school students who are in the stage of playing gadgets, one of which is an android device. Furthermore, it is hoped that this android-based interactive multimedia could provide



enthusiasm for students to participate in science learning activities in class V. It is expected to increase the quality of learning and the quality of elementary school education.

The advantages of this interactive multimedia application are that it helps students understand the material, provides a new experience in learning that is different from previous learning, and increases the enthusiasm for students' learning. The above opinion is supported by Munir (2013) that the advantages of using interactive multimedia in learning are (1) the learning process is more attractive, creative, and innovative, (2) teachers are invited to be more creative and innovative in looking for renewal in learning, (3) write, images, sound, music, animation, or video can be combined into one part that helps each other to achieve learning goals, (3) write, images, sound, music, animation, (3) write, pictures, sound, music, animation, or video combined into one part that helps each other to achieve learning objectives, (4) arouse students' interest during the learning process until the expected learning outcomes achieved, (5) able to illustrate and simplify lessons that are difficult to explain in a verbal way or with conventional tools, and (6) train students to be more independent in acquiring knowledge.

Not only that, the selection of Android devices as a medium for distributing interactive multimedia in learning also adds to the advantages and benefits of developed interactive multimedia applications. By using Android devices that are very closely related to students' daily lives, learning does not feel boring because presented in a viral medium with students, namely the use of Android devices. The use of ICT-based learning media with Android devices provides benefits, namely (1) abstract material becomes concrete with the support of images and videos in it, (2) more significant influence of hypertext (compared to books), (3) re-illustration of learning materials and the views of students (4) sharpening the memory of students by learning in multimedia (5) reducing place limitations. Time and energy (6) providing opportunities for students to learn in a variety of ways, time and energy (6) provide opportunities for students to learn independently, according to their talents and abilities, (7) build the same spirit, (8) learning activities are more attractive, (8) learning time shortened, (9) learning is not limited by place and time (Zainiyati, 2017). The advantages of using android mobile devices as learning media are the beginning of science and technology centered on rapid progress, simplicity in use, and uniqueness without changing learning principles. So it is interpreted that using Android-based interactive multimedia without coercion during learning from within students (Surahman, 2019).

Based on the advantages of interactive multimedia applications and the benefits of using Android devices as learning media described above, the development and use of Android-based interactive multimedia on the concept of changes in the form of objects has answered the problems related to the needs analysis. With the development of Android-based interactive multimedia on the idea of changes in things, students become enthusiastic about learning and actively construct their understanding using this interactive multimedia application. Using Android devices as learning media also renews the utilization of information and communication technology in learning. It reduces the use of descriptive book media in education which is very dull for students. Intermediary material conveyors used in learning, such as android-based applications, will also simplify how the learning process runs, especially individually according to the characteristics of students or independent of educators because, in the learning application, there are already material and guidelines for its use that can use without any restrictions and teaching materials have been compacted in such a way as not to be similar to printed books as usual (Supriyono et al., 2014).

This is supported by the opinion (Suryani et al., 2018) that interactive multimedia provides opportunities for students to interact directly with the multimedia by practicing their



skills and receiving reflections on the material presented to minimize student boredom in learning. The advantages of this media contain a combination of writing, graphics, video, and sound, which is undoubtedly more attractive. The participation of students will increase so that students' understanding is more profound, which by the constructivism model, supports the characteristics and learning styles of each student and can have adequate flexibility to expand the conditions of students and to simulate objects that can't be present in the classroom.

In addition to the advantages and benefits of Android-based interactive multimedia on the concept of changes in the form of objects that are presented above, there are also disadvantages of this interactive multimedia application, namely this interactive multimedia application requires an internet connection to work on e-LKPD and learning quizzes, requires an adequate Android device, namely Android version 7.0 and above to be able to pair this interactive multimedia application and cannot be published on the Play Store, so you have to download it via Google Drive. This is also conveyed by Ardiansyah, Sahari & Imron (2021) that the weaknesses of Android-based multimedia are that the battery runs out faster, requires internet access, and requires an android device that supports pairing learning applications.

Based on the explanation above, Android-based interactive multimedia on the concept of changes in the form of objects in grade V elementary school is suitable for use to improve the quality of learning because it has many advantages compared to other types of media needed in education. However, there are still weaknesses that will be a challenge to develop better learning media so that learning media applications can create used on all Android and iOS devices.

## Conclusion

The final product produced in this development research is an android-based interactive multimedia on the concept of changes in the form of objects. The feasibility test on android-based interactive multimedia products on the idea of changes in the condition of objects received a score of from a team of material experts of 89% and a group of media experts of 91%. Based on the acquisition of the feasibility test score from the material expert team and the expert media team, the average feasibility assessment of the android-based interactive multimedia on the concept of changes in the form of objects is 90%, with the interpretation category "very feasible." Hence, the android-based interactive multimedia product on the concept of changes in the form of objects is feasible to test in the field.

Students' responses to android-based interactive multimedia on the concept of changes in the form of objects obtained an average percentage of 93%, which, based on the interpretation category, is included in the "excellent" category. Thus, this android-based interactive multimedia product on the concept of changes in the form of objects has been successfully tested on students in class V C SDN Serang 3 and received an "excellent" student response category.

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