

Development of Android-Based Learning Media Applications to Determine Validity and Feasibility for Grade VII Middle School Students on Ecosystem Material

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Abstract. The world community has been hit hard by the covid-19 outbreak since 2 years ago until now there are still confirmed cases with a new variant. This also has an impact on the world of education, so that all learning implementers compete to create innovative learning media, easy to apply using mobile phones both online and offline in supporting the process and understanding of student material. The research objective is to develop an android-based learning media application. The development method is using the waterfall process model which is divided into six stages, namely: communication, planning, modeling, construction, and deployment. The assessment aspect observed in the development of learning media is how the media is developed and the teaching materials contained in it. The results of the assessment through filling out instruments on learning media were developed using a scale of 4 from various aspects of observation by experts in their fields, namely: 1) Media expert validators, namely: (a) software engineering aspects 3.75; (b) aspects of learning design 3.71; and (c) visual communication aspect 3.77; 2) Validators of material experts and teachers, namely: (a) aspects of learning objectives 4; (b) aspects of learning materials 3.95; (c) aspects of learning methods 3.5; (d) aspects of learning resources 3.5; and (e) aspects of learning activities 3.75. From this assessment, it can be concluded that the developed learning media has a good predicate and is suitable for use in the learning process.

Keywords: Media Applications, Development of Android-Based Learning, and Ecosystem Materials.

Introduction

The pandemic that hit Indonesia recently has caused disruptions in various fields. One of these areas is education. Education in the pandemic era is carried out in various ways. The first thing to do is distance learning, as the situation develops until now learning is done by blended learning, which is a combination of distance learning and face-to-face learning. Blended or Hybrid Learning has the potential to change student learning methods in the digital era which has a positive impact and combined face-to-face and online (hybrid) learning becomes an alternative to learning in the new normal (Nashir, 2021). A situation like this can be the right moment for the world of education to create new breakthroughs by utilizing advanced technology (Mahmud, 2020).

The results of interviews with teachers at SMP Al Kautsar Kartasura when the covid 19 pandemic was still around did not use technology-based learning media that could facilitate the learning process for teachers and students. The learning process still uses media such as assignments and materials via whatsapp, google classroom, or zoom meet, so learning activities are felt to be less than optimal in the use of learning media (Beruin, 2022). There needs to be careful preparation in online learning from both teachers and students, due to the pandemic which demands learning to be done with online media (online) which can see monitoring student activity and discussion with other friends (Alturise, 2020).

The learning process requires media that can help students learn the material. Media is something that can deliver messages from information sources to information recipients. Various efforts to improve the quality of the learning process have been carried out starting from all educational components, efforts to improve the quality of teachers, teaching materials and learning facilities, learning systems, efforts to improve systems, as well as organizational management and education management (Pitoyo, 2020). Creative use of media can enable students to learn better and in accordance with the goals to be achieved. Interesting and innovative learning media can be realized in interactive multimedia which consists of a combination of text, images, audio, video, and animation (Odewumi, 2020). Applications that are used as learning media in studying the meaning of hadith science in general, so that it is more easily understood and understood by application users (Supriyono, 2014).

The learning media used must be in accordance with the characteristics of the material taken. Learning media is very effectively used as a teaching aid for teachers, especially in conveying learning material, so that students' abilities in learning are more optimal (Nugroho, 2020). One of the materials that can be used in interactive media in junior high school is the ecosystem. Ecosystem material is material that contains environmental concepts, where students are required to understand the material around them. In studying ecosystem material students are invited directly to the environment. However, the current situation is not yet possible due to time constraints. Therefore it is necessary to have a media that can contain ecosystem material so that students can through learning media. The process of learning ecosystem material is inseparable from learning supporting media because according to Arsyad (2020) the media plays an important role in achieving learning goals. The more students use learning media, the more thoughts, and ideas they have.

The interactive learning media that will be developed is an android application-based learning media on ecosystem material which includes several main features, namely: students can access material in the form of text and images, students can access interactive learning videos, and also take quizzes and view evaluation results along with their scores. The learning media to be developed can be made online or offline, so that students can learn with this media even though they study online. According to Widiensyah (2020), the use of contextual learning media, especially digital media, aims to maximize student understanding of the material taught by the teacher, so that it can foster student interest and motivation. The video combined with learning media will be more interactive and effective thereby increasing student interest in learning (Pakpahan, 2022).

Based on the background above, it is necessary to develop learning media applications that can facilitate students to learn online and offline. The media application developed is android-based BIO ECO on ecosystem material for class VII Middle School. Based on the description of the background, the purpose of this study is to produce an android-based media application that is feasible and ready to be implemented for users.

Methods

The research method used is development research. Development research is a process of gathering the necessary needs and then developing a product to be able to meet these needs (Gall, 2007; Sukirman, 2021; Saputri, 2020). The model that will be used in developing applications is the waterfall process model.

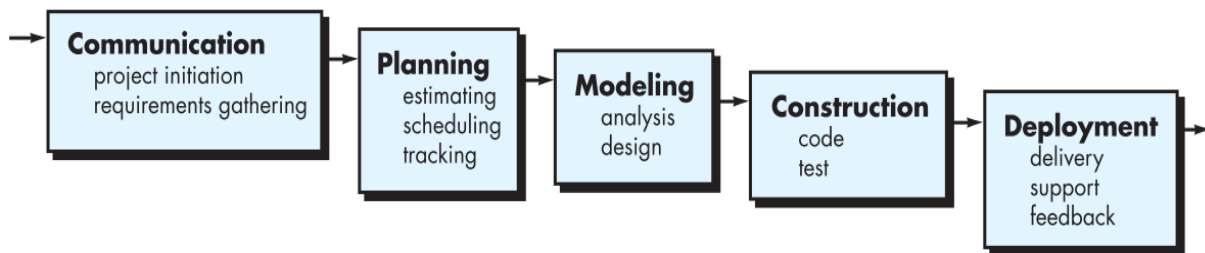


Figure 1. Development Stages of the WPM
(Pressman, 2015)

Based on Figure 1, it can be described the steps or development research methods that will be used by researchers, namely:

1. **Communication**, in the first stage of development, project initiation is carried out to determine what kind of application will be made. This is done by looking at the data that has been collected in the previous stage. In the initiation stage of this project, the application will be made in the "Bio-Ecosystem" application, also known as "BioEcos", which is an Android-based learning media application for junior high school students. Then, in the requirements gathering, the tools used to develop this application are laptops, modular applications, firebase/SQLite, Adobe Photoshop, and Adobe Illustrator.
 - a. At this stage it also produces the main specifications of the media, namely:
 - b. a. Users can access material in the form of text.
 - c. b. Users can access material in the form of videos equipped with audio.
 - d. c. Users can access doing quizzes.
2. **Planning**, the next stage is the planning stage which explains the estimation of the technical tasks to be carried out, the risks that can occur, the resources needed to create the system, the division of teamwork tasks, the work products to be produced, the work schedule to be will be carried out and tracking the process of working on the system.
3. **Modelling**, In this stage, the overall system design is carried out, starting from the data structure design, system workflow, and system interface display.

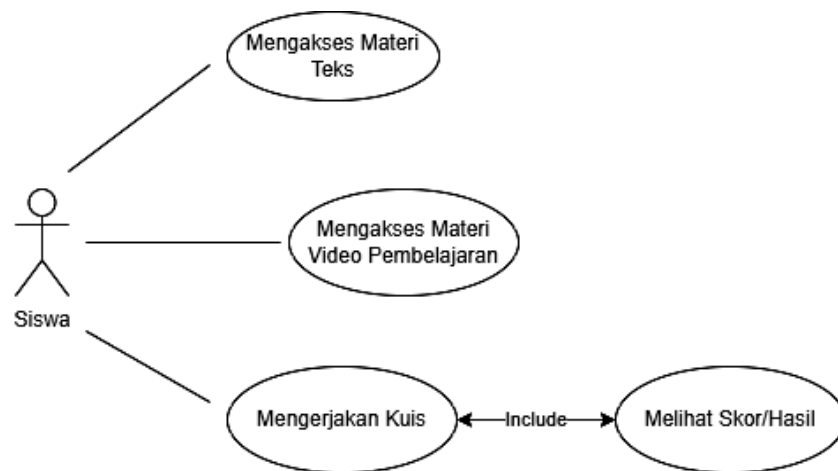


Figure 2. Use Case Diagram in Ecosystem Learning Media

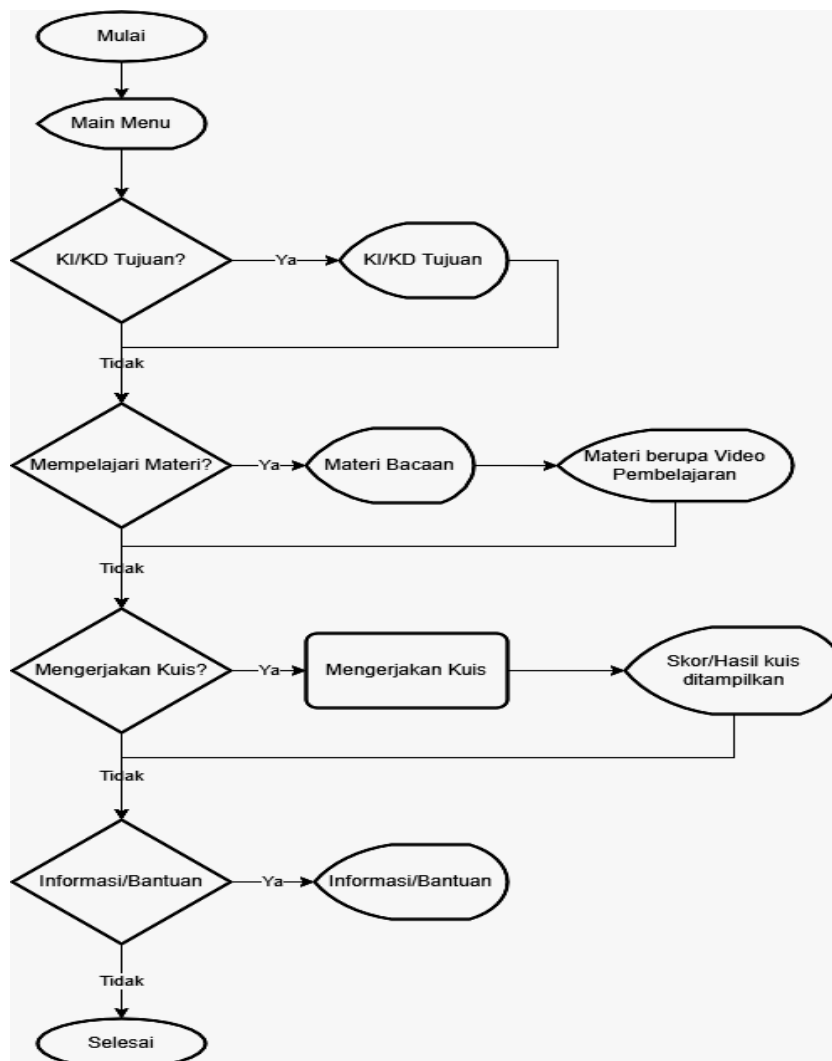


Figure 3. Flowchart for Users

4. **Construction**, is the process of translating a design form into code or form/language that can be read by a machine. At this stage, coding is done using the Kotlin/Flutter language (which will be further analyzed and tested) using the Android Studio software or an editor application such as Sublime. For the construction of the user interface design, the design process uses Adobe Photoshop and Adobe Illustrator applications. The next stage after coding is complete is testing/debugging the system, this is intended to find out the algorithm or logic errors that might occur to be corrected.
5. **Deployment**, the last stage in the waterfall process model is implemented to the customer, periodic maintenance, software improvement, and further development based on the feedback provided. However, before this is done, it is necessary to carry out FGDs and expert validation first, as well as limited trials for users.

Results and Discussion

Research is focused on developing learning applications based on Android, so that they can be used for learning activities both online and offline which can be accessed using Android-based mobile phones. There are several stages or work procedures in applying android-based learning, namely analyzing and organizing material, designing designs, and then applying them to the form of android-based learning media (Kuswanto, 2018). The front design is made attractive with green gradations because in addition to attracting students' attention it is also adapted to the material, namely ecosystems. The front view of the application can be seen in Figure 4.

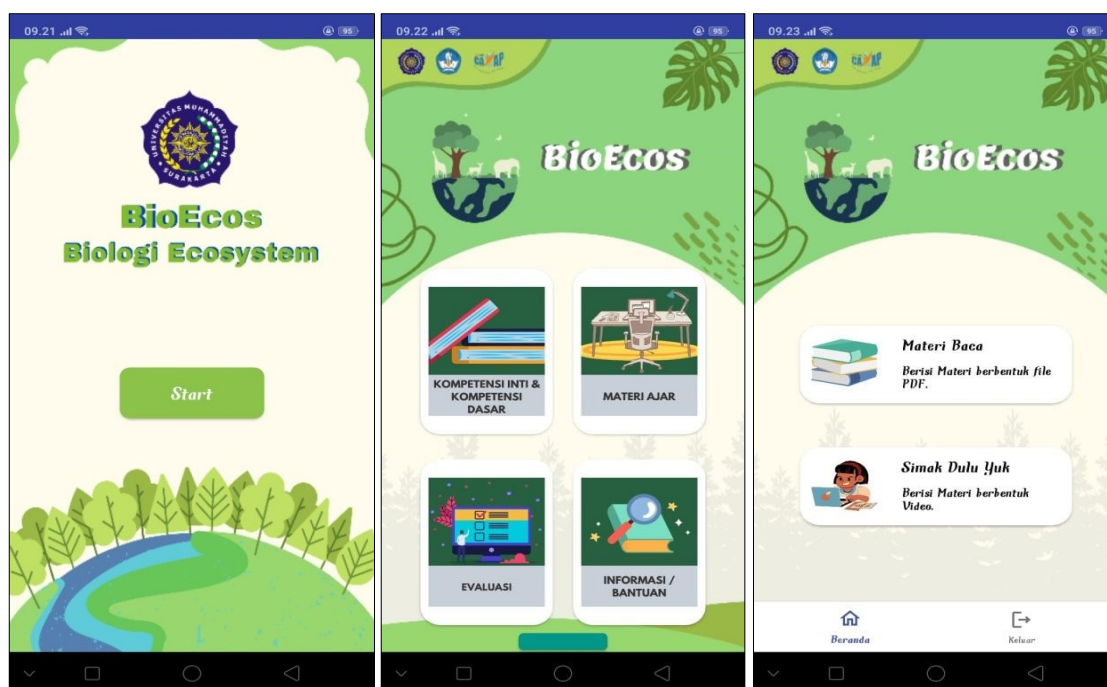


Figure 4. Application of Android-based Learning Media

In Figure 4, there is a "start" menu button that is enabled to enter the learning application. After entering, there are various menu options such as KI and KD as the basis of the material used, teaching materials, evaluation, and information or assistance which can all be "clicked" to enter the next stage. For example, if we select the "teaching materials" menu, we will enter the "reading materials" menu which contains material, and "let's have a look" which contains information about the material in video form.

When we select the "reading material" menu, very complete material and supporting photos will appear. If we choose "let's watch first" then an interactive learning video will come out which makes it easier for students to understand it as shown in Figure 5. According to Ibrahim's research (2017), the development of Android-based mobile learning media during the pandemic really helped students in their learning process, by getting teaching materials and other information about the material being studied. Ramdani (2020), adding interactive learning media has a positive impact on students in increasing interest in learning which can be seen from the evaluation results and good learning activities. Making learning media based on Android, namely prioritizing interesting content containing learning materials so that students are more focused and not bored in using Android-based learning applications.

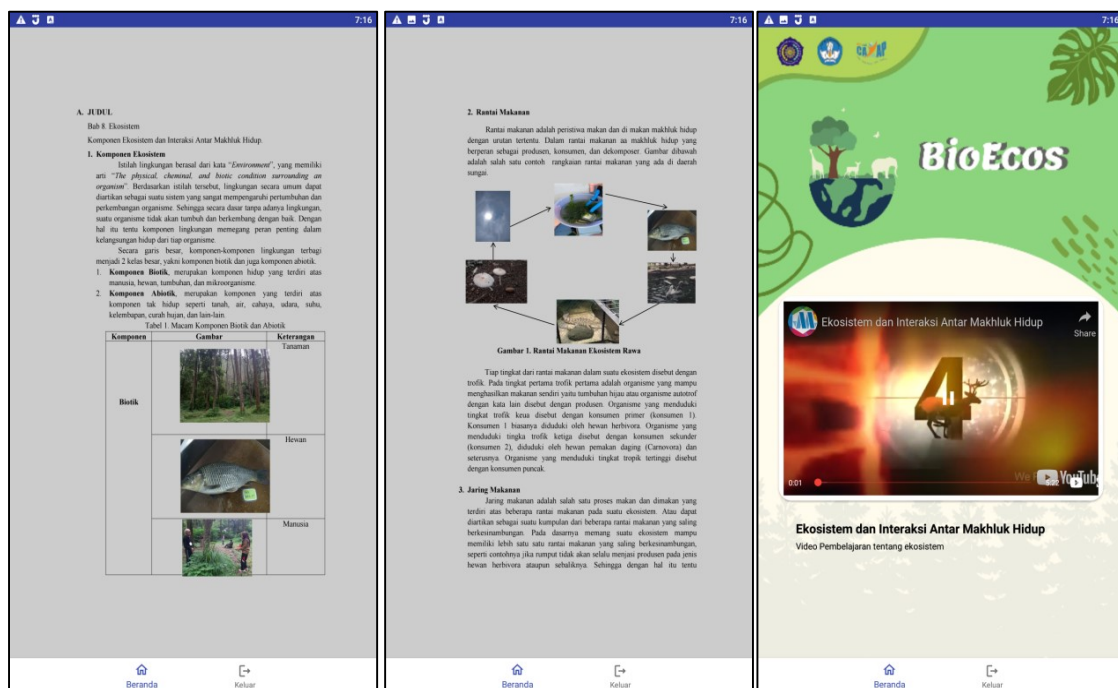


Figure 5. Learning Materials and Videos

Based on Figure 5, there is complete ecosystem material along with easy-to-understand explanations accompanied by pictures that support the material. In addition, there is a learning video that includes other information related to teaching materials, the video also documents the surrounding ecosystem which we cannot see directly.

Ecosystem material is material that contains environmental concepts, where students are required to understand the material around them. However, the current situation is not

yet possible because of the pandemic situation and conditions. Therefore, it is necessary to have a media that can contain ecosystem material, so that students can learn ecosystem material through interactive learning media with this media it is hoped that it will facilitate students in learning ecosystems such as media that has been developed (Sadikin, 2019).

Research with the type or model of developing Android-based learning media applications cannot be separated from an assessment of the media being developed and the material contained in the media. The assessment is carried out starting from the appearance, and content of the material, taking material from various sources, and the appropriate systematic preparation (Nugroho, 2019). The results obtained can be seen as a whole which has been assessed by experts (validators) in their respective fields, including:

1. Validation of Learning Media Experts

The validation of learning media experts was carried out by researchers to obtain an assessment of the Android-based application media developed for learning. Besides that, it can be used to assess the feasibility and get input to correct existing deficiencies before use. The assessment was carried out by giving 4 scale questionnaires to 2 (two) learning media experts. The aspects assessed include: software engineering aspects, learning design aspects, and visual communication aspects, the results can be seen in Figure 6.

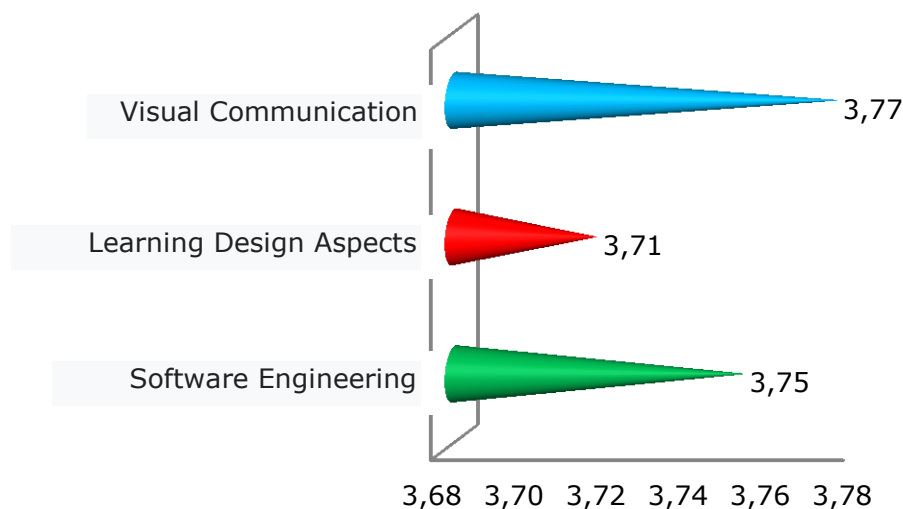


Figure 6. Results of Learning Media Expert Validation

Figure 6 shows the average validation results carried out by two learning media experts. In the software engineering aspect, a value of 3.75 is obtained; the learning design aspect obtained a value of 3.71, and the visual communication aspect obtained a value of 3.77 where the assessment used a scale of 4 which was assessed by two learning media experts validators. So it can be concluded that the development of Android-based learning media applications obtained a decent (very good) predicate and could be continued for the research process.

The validation carried out by media experts was reviewed from several aspects which were adjusted to the research conducted by the researcher. In implementing its

validity, media experts review the aspects of this Android-based learning media, then the validator gives a value. The results of the assessment of each aspect given by the validator are then analyzed for the level of validity and feasibility to be applied in the learning process (Wira, 2021).

These results are supported by the results of Komala's research (2018), learning media that meet the appropriate criteria or good or very good interpretation can then be immediately continued for the research process. Adding an explanation from Komala, even though it has been said to be feasible or good grades have been obtained, it still needs improvement so that it becomes even better according to the suggestions and input from the validator (Nugroho, 2019). The use of project-based contextual online learning media (e-modules) applied in class has the effectiveness of increasing students' applicable abilities (Susilo, 2021).

The results of the study Supriadi (2022) of 2 expert validators of lego hydrocarbon learning media experts stated good results and showed that the validity value was 0.95 and could be directly used in initial field trials. The results of the media validation show that the booklet media has been arranged systematically so that a value of 1.00 is obtained with a very high category so that it is suitable for use as a learning medium (Panjaitan, 2022).

2. Learning Material Validation

Expert validation of learning materials was carried out by researchers to obtain an assessment of the material included in the developed Android-based learning media. Besides that, you can find out the feasibility of the material and get input to correct deficiencies. The assessment was carried out by giving a 4-scale questionnaire to 1 (one) learning media expert. The aspects assessed include aspects of learning objectives, aspects of learning materials, aspects of learning methods, aspects of learning resources, and aspects of learning activities, the results can be seen in Figure 7.

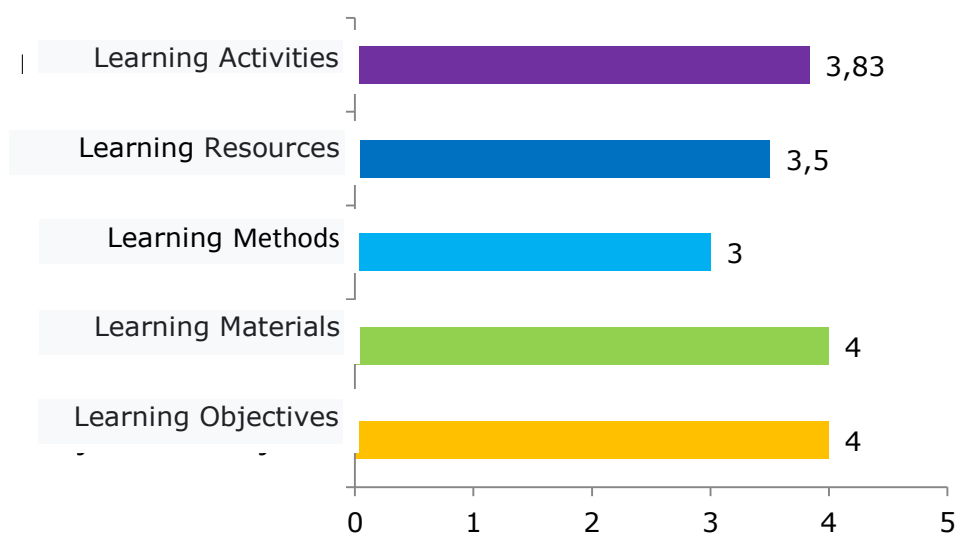


Figure 7. Results of Learning Material Expert Validation

Figure 7 is the result of an assessment carried out by the material expert validator. There are five aspects assessed, namely: the aspect of learning objectives scored 4, the learning material aspect scored 4, the learning method aspect scored 3, the learning resources aspect scored 3.5 and the learning activity aspect scored 3.83. Based on the assessment data above, the material included in the developed learning application can be categorized as proper or get a good predicate, of course still paying attention to the advice of the validator.

The validation carried out by material experts is reviewed from several aspects that have been designed by researchers to be included in this Android-based learning media. In implementing validity and feasibility, material experts review the material in android-based learning media, and then the validator gives value to the aspects in android-based learning media. The results of the assessment of each aspect given by the validator are then analyzed on how appropriate the material is to be applied to the media (Wira, 2021).

The development carried out by researchers is supported by research results from Siregar (2021), learning media that are applied to android applications with good validation and feasibility values, are very feasible to develop and apply to students so that they can improve their learning outcomes. Kuswanto (2020) added that based on good feasibility and validity tests from expert validators and having been tested on a small scale, learning media developed based on Android are suitable for use and even redeveloped to make them even better. Riyan (2021), added that the reviews contained in the assessment by experts can be used as material for evaluating Android-based learning applications which will later be used as considerations for the feasibility of learning applications.

Results of Content Validation by the Material Validator show that all aspects are said to be good and feasible to be tested in the field because from aspect one to aspect four it produces an average of 88% which means it is feasible to use (Arif, 2021). Wahyuni (2022), students' critical thinking skills after using the media increased and included in the moderate category and student responses showed positive responses.

3. Limited Scale Test

In addition to the assessment from the validator, the researcher also took an assessment from a limited scale test which took a sample of 15 students from different classes with the same criteria, namely ecosystems. Limited scale trials or often also called product trials are carried out by researchers to find out whether the product produced, namely the development of Android-based learning media applications, is suitable for use or not, besides that trials are also carried out to see the extent to which the product being developed can achieve the goals and objectives what the researcher wants.

The results of the assessment carried out on a limited scale test will be averaged in order to get a complete result or value. Of course, the treatment in taking scores is using a scale of 4. The aspects assessed include aspects of learning objectives, aspects of learning materials, aspects of learning methods, aspects of learning resources, and aspects of learning activities. The average results of the assessment carried out on a limited scale test can be seen in Figure 8.

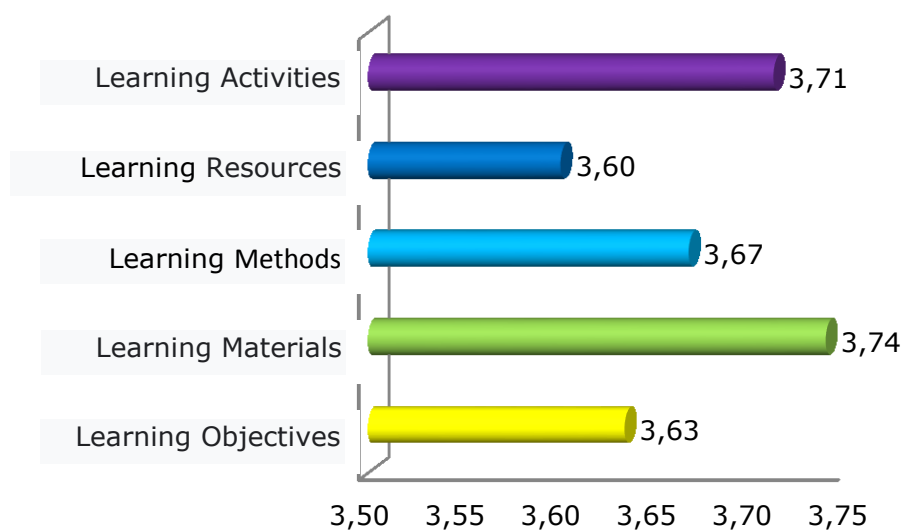


Figure 8. Limited Scale Test Results

Figure 8 is the average result of a limited-scale test conducted by researchers on 15 students in the same school but different classes with the condition that they receive ecosystem material. Aspects that get an assessment are: aspects of learning objectives get an average value of 3.63; aspects of learning materials get an average value of 3.74; aspects of learning methods get an average value of 3.67; aspects of learning resources get an average value of 3.60, and aspects of learning activities get an average value of 3.71. Of all the aspects assessed, the average has good criteria so that the development of Android-based learning media applications is feasible for use in research.

This trial is supported by the research results from Setiawan (2020), the final stage of testing is carried out to measure the feasibility level of the learning media which then also determines the grade scale so that with this treatment the researcher can interpret the calculation results. Putri (2022), the resulting biosong media received a positive response from students and teachers in the trial phase. Biosong can help maximize the use of student gadgets which are usually only used for entertainment and listening to music when they feel bored in the learning process. Nurlatifah (2023), thus it can be concluded that the guided inquiry-oriented google sites that have been developed have the potential as quality learning media to improve students' understanding, especially on acid-base materials. Audio-visual-based learning media on colloidal material is very suitable for use in the teaching and learning process and can increase student motivation and learning outcomes (Pradilasari, 2019). And the chemical bond module product based on multiple representations with the help of AR technology developed can help teachers convey chemical bond material, besides that the product also gets a very good response from students, so the ARCHEMS Chemical Bond module and application can help students visualize and understand the abstract concept of chemical bonding (Apriani, 2021).

Conclusion

Based on the results of assessments by experts in their fields such as media experts, material experts, and teachers (as a limited validation test) regarding the development of Android-based learning media applications using an assessment scale of 4, the score from the results of the assessment is as follows: 1)Media expert validator, namely: (a) software

engineering aspects 3.75; (b) learning design aspects 3.71; and (c) visual communication aspect 3.77; 2) Material expert validators and teachers, namely: (a) aspects of learning objectives 4, (b) aspects of learning materials 3.95; c) aspects of learning methods 3.5; d) aspects of learning resources 3.5; and e) aspects of learning activities 3.75. From this assessment, it can be concluded that the developed Android-based learning media has received a good predicate and is suitable for use in the learning process.

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