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Development of Android-Based Interactive Learning Media on Class X Payment Systems and Tools Materials

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A B S T R A C T

Lack of innovation in learning and less than optimal use of learning media cause students to get bored easily, lack focus- and have difficulty understanding the subject matter. This study aimed to test the attractiveness and effectiveness of interactive learning media based on Android on the material of payment systems and tools for class X students of SMAN Pakusari. This study includes development research using the ADDIE, model which consists of five stages: analysis, design, development, implementation, and evaluation. The product trial was carried out on class X students of SMAN Pakusari composed of two groups, a limited group of 12 students from class X-1 and a broad group composed of 36 students from class X-8. The instruments used in this study were interviews, questionnaires, tests, and validation sheets with data analysis techniques using descriptive statistics. The attractiveness and effectiveness test is a data analysis method used. Using descriptive analysis, test the level of product attractiveness. In addition, the Paired Sample T-test was used to evaluate the effectiveness of the product. The limited group has an attractiveness level of 85.33% which is classified as very attractive, and the broad group has an attractiveness level of 90.11%. With a significance value of <0.05, the results of this development research indicate that Android-based interactive learning media are more effective and interesting than previous media. The results of the study showed that the results of the pretest and posttest before and after using this media were very significant, which made Android-based interactive learning suitable for use in learning.

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1. INTRODUCTION

The field of education and learning has undergone significant changes due to the rapid advancement of technology. Integration of technology in learning is no longer an option, but a necessity, so that the teaching and learning process becomes more effective and relevant to the

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times. Technological developments have created a shift in learning activities, where conventional methods are starting to be abandoned and shifting to a more interactive digital approach (Kurniawan & Rachmawati, 2018). This progress requires teachers to not only deliver material, but also to be able to utilize various digital media that can improve students' learning experiences. Teacher creativity in developing learning media is an important factor in increasing the effectiveness of learning, because interesting and innovative media can help students understand the material better (Kuswanto, 2019).

One form of innovation that can be developed is digital-based learning media, e-learning, and interactive multimedia (Marlina & Lautt, 2020). Interactive multimedia combines various elements such as audio, video, graphics, and text, so that it can improve student understanding more dynamically. The main advantage of interactive media is its ability to actively involve students in learning, in contrast to conventional methods that often make students passive in receiving information. Currently, the development of mobile device technology such as smartphones makes it easier to access learning media. According to Wulandari (2020), interactive learning media can be accessed via mobile devices, such as smartphones, which are increasingly used by students in their daily lives.

One of the most widely used operating systems on mobile devices is Android, which has advantages in terms of flexibility, openness, and ease of application development (Fitriyah & Dewi, 2022). Android gives its users, including teachers and educational developers, the freedom to create learning applications that suit students' needs. In addition, because of its free and easily accessible nature, Android is the right choice for developing interactive learning media. The application of Android-based learning media can increase students' motivation to learn, because this media can be used anytime and anywhere, thus creating a more flexible and enjoyable learning experience (Handayani & Rahayu, 2020). Android-based interactive learning media must have attractive characteristics to increase students' motivation to learn. The appeal of Android-based learning media can be seen from the ease of access, attractive display design, and effective delivery of material (Kurniawan & Rachmawati, 2018). Therefore, the use of more interactive media is very necessary so that students are more motivated to learn.

However, in practice, many teachers still use conventional learning media that are less interesting for students. The phenomenon that occurred at SMAN Pakusari shows that teachers still use PowerPoint (PPT) as a tool in delivering material, but students feel that the use of PPT is still less interactive because it contains too much text without any visual elements or features that support conceptual understanding. As a result, students easily get bored, are less motivated, and have difficulty understanding the material, so that the effectiveness of learning is not optimal. This problem is further exacerbated by the low involvement of students in the learning process because the media used does not provide an active and interactive learning experience.

To overcome these problems, the solution offered is the development of Android-based interactive learning media that can provide a more interesting, interactive, and easily accessible learning experience anytime and anywhere. This media is designed with more varied features than PPT, such as animation, learning videos, interactive exercises, and digital quiz-based evaluations. Thus, Android-based learning media will not only increase student engagement in learning but also help them understand the concept of the material more effectively.

In addition to being attractive, Android-based interactive learning media must also contain effective elements to achieve learning objectives optimally. The elements of effectiveness in learning media include aspects of material clarity, ease of understanding, and active student involvement in the learning process (Lubis & Ikhsan, 2015). Effective media not only facilitates access to materials, but is also able to increase student involvement in the learning process. The phenomenon that occurs shows that the average value of the use of PPT learning media in class is still considered less effective in achieving learning objectives. This

is due to the presentation of materials that tend to be passive, where students only receive information without any interaction that encourages deeper understanding. In addition, displays that are too static and filled with text make it difficult for students to understand complex concepts, so they tend to lose interest in learning. Therefore, it is necessary to develop more interactive, dynamic, and modern technology-based learning media, such as Android applications, which can increase learning effectiveness with features that allow students to participate actively, understand the material better, and achieve optimal learning outcomes.

Android-based interactive learning media was developed for economics subjects, especially on payment systems and payment instruments. Based on the Merdeka curriculum, this material is included in the learning achievement stage E which is implemented in class X of high school. In this learning achievement, students are expected to be able to understand the concept of payment systems and identify various types of payment instruments used in economic transactions. Along with the development of technology, the payment system is not only cash-based, but also includes digital transactions such as e-wallets and QR codes. Therefore, the use of Android-based learning media can help students understand this material more interactively, interestingly, and easily applied in everyday life.

Indicators of the attractiveness of Android-based interactive learning media include 1) Android-based interactive learning media is easy to use, 2) Android-based interactive learning media uses communicative language, 3) Android-based interactive learning media increases understanding of system material and payment tools, 4) text-based material and videos can be studied independently, and 5) the media display is packaged attractively. In the meantime, student learning outcomes are used to gauge the efficacy of Android-based interactive learning materials through pretest and posttest activities. The results are then analyzed using a paired sample t-test to determine whether there are any differences in student learning outcomes between the pre-and post-use of Android-based interactive learning materials.

The Dick & Carey development approach, specifically the ADDIE paradigm, is used to create Android-based interactive learning media, but only at the implementation stage. The ADDIE paradigm was chosen because of its orderly steps and its suitability for developing learning tools. Android-based interactive learning media is the right need to overcome learning issues in class.

2. METHOD

This study uses a type of research and development method or Research and Development (R&D), which aims to develop a product that will be tested for quality. The research and development method is a research approach that aims to test the validity and develop a product to be more optimal (Sugiyono, 2015). This study develops interactive learning media based on Android on the Payment System and Instrument Material for Class X at SMAN Pakusari.

The development model used in this study is the ADDIE development model, which consists of five stages, namely, analysis, design, development, implementation, and evaluation. This study uses the One Group Pretest-Posttest Design research design. According to (Creswell 2016: 230) one group pre-test post-test includes one group that is observed, the group is given a pre-test which is then continued by providing treatment and given a post-test to find out the condition after being given treatment.

The population in this study were all students of class X of SMA Negeri Pakusari. The sample selection process used purposive sampling technique. The purposive sampling technique is a technique for determining and taking samples determined by researchers by considering certain considerations (Sugiyono, 2015). Classes X-1 and X-8 were chosen as research samples because both have similar characteristics, namely obtaining almost the same average daily test scores.

There are four data collection techniques, namely: (1) Interview sheets, given to teachers and students for needs analysis, (2) Questionnaires, used for assessing learning media, which contain assessment statements regarding the learning media developed, (3) Tests, in the form of pre-test and post-test questions given to students, and (4) Validation sheets, given to teachers or lecturers to assess the quality, suitability and validity of the product or learning media developed.

The data analysis technique used in this study is descriptive statistical testing, which is used to evaluate the validity and practicality of the media. Descriptive data analysis is carried out on the data from the questionnaire responses of educators and students regarding the media developed. Meanwhile, to test the effectiveness of the media using parametric statistical tests, namely paired sample t-tests if the data is normally distributed and homogeneous.

The ADDIE development approach, as alluded to by Dick and Carey in 1996 (Sugiyono, 2015), is applied in the development of Android-based interactive learning media. This development is carried out only up to the implementation stage. Product trials were carried out twice, namely on a limited group and a wide group, which were carried out after a validation process by a team of validators, material experts, language experts, and design experts. Limited group trials were carried out in class The broad group test was carried out in class X-8 which was taken based on the criteria for the lowest class average score. The purpose of the product trial is to evaluate the degree of attractiveness and effectiveness of interactive learning materials based on Android.

Data collection techniques use student response questionnaires and tests. Student response questionnaires are used to collect data related to media attractiveness. The test is used to collect pretest and post-test data, which will be tested for media effectiveness using SPPS program analysis with a paired sample t-test. The following are the formulas and criteria for the feasibility and attractiveness of Android-based interactive learning media (P=F/N x 100%); P= Percentage; F= Frequency of respondents' scores; N= Number of respondents.

Table 1. Percentage of Eligibility and Attractiveness Criteria

Percentage (%)	Criteria	Description
0 – 20	Very lacking	Needs revision
21 – 40	Lacking	Needs revision
41 – 60	Enough	Needs revision
61 – 80	Good	No need for revision
81 – 100	Excellent	No need for revision

Source: adapted from Riduwan (2015)

3. RESULTS AND DISCUSSION

3.1 Result

3.1.1. Analysis

The analysis stage is carried out to identify the needs and requirements in the development of Android-based interactive learning media. At this stage, researchers conducted interviews and initial observations of teachers and students to understand the challenges faced in learning. The results obtained include performance analysis, needs analysis, and concept analysis. Here is the explanation:

Performance Analysis

The results of interviews with teachers and students show that the methods used in class X economics lessons were conventional methods or lectures and discussions with the help of

printed books and PPT media. According to the teacher, during the learning process, students often talk to themselves and play on smartphones. Another problem raised by students is that the learning media used when learning economics is still monotonous and less interesting, causing students to feel bored, unfocused, and less interested in the learning process.

Needs Analysis
Needs analysis aims to find a solution or something that is needed in learning. The problem that occurs lies in the learning media used, so there is a need for interactive learning media that is packaged interestingly and effectively. Android applications can be develop as media learning because in its creation the features provided are varied and interesting so that it is able to overcome economic learning performance problems.

Concept Analysis

Determine material that is adapted to the class X economics syllabus. After that, develop a series of learning objectives based on learning outcomes or basic competencies. The material used in developing Android-based interactive learning media is Payment Systems and Tools material. This material is material that must be taken by class X students.

3.1.2. Design

This stage includes the initial design or layout of the interactive learning media product named Ecomo. The Ecomo application was developed to facilitate learning of system materials and payment tools with main features such as attendance lists, competencies, learning videos, evaluation questions, assignment submissions, and references. At this stage, the preparation of learning materials, application structure design, and validation sheets are made which will later be used by validators in assessing the feasibility of the product. The final result of this stage is a learning media framework that is ready to be tested and validated before entering the implementation stage.

3.1.3. Development

The development stage includes the creation of Android-based interactive learning media according to the previously designed design to produce prototype 1. This process includes material processing, feature integration, and initial testing of the application to ensure its functionality. After the prototype is completed, product validation is carried out by experts, covering aspects of material, language, and design. The validation results are then used to revise the product, so that the learning media is increasingly optimal before entering the implementation stage.

Creation of Android-Based Interactive Learning Media Products

This stage produces prototype 1 of the developed media that has been created. Figure 1 shows the main display or user interface (UI) of the Android-based learning application being developed. In this image, the main menu of the application is visible, which provides various options for users to access important features. These features include “Home” which is the user's main page, “List of Materials” which allows users to select learning materials, “Tasks” which function to view and collect assignments or work that has been given, and other features such as “Evaluation” and “References”.

Figure 1. Main Menu Display of Learning Media Application

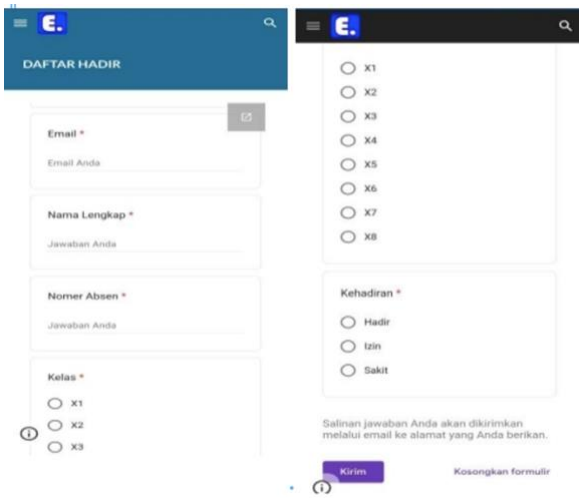

Figure 2. Attendance List Menu View

This display is designed to facilitate navigation and provide an interactive and sharp user experience. In addition, the existing icons also show their respective functions, making it easier for users to find the information and tools needed in the learning process. Figure 2 illustrates the appearance of the attendance list page used to record user attendance in the learning application. This page is designed to facilitate the digital attendance process, allowing users to easily record attendance every time they access learning materials or sessions in the application. Users can fill in the attendance list by selecting the available options, such as selecting the date or session attended, as part of their interaction in the application. This feature supports more structured and transparent learning management, provides more organized teaching, and allows administrators to monitor attendance levels effectively. In addition, this recorded attendance list can be used as part of the evaluation of user participation in learning activities.

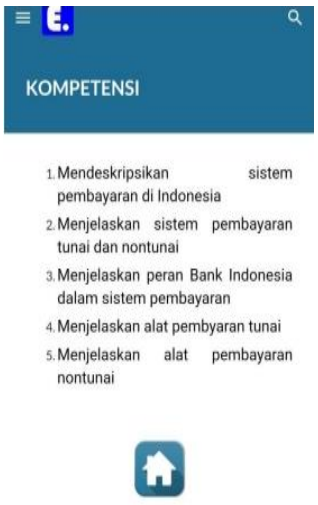

Figure 3. Learning Competency Menu Display

Figure 4. Material Menu - Principles and Components of Payment Systems

Figure 3 illustrates the appearance of a page that displays the competencies or skills that are expected to be achieved by the user after using this application. This page serves to provide clear instructions and objectives regarding what will be learned and achieved during the learning process. Each competency displayed refers to the skills or knowledge that the user is expected to master after completing certain learning materials. This page not only provides an overview of the learning objectives, but also acts as a guide for users to understand the desired achievements. With this competency information, users can be more motivated and focused in following the learning process, because they have a clear understanding of what needs to be learned and achieved. In addition, this competency is also the basis for evaluation or assessment in the application. Figure 4 displays a menu display of materials that provide a comprehensive explanation of the principles and components of the payment system. In the first menu, users will learn the basic principles of the payment system, including important concepts that explain how payment transactions work, such as the process of transferring funds, verification, and the parties involved in the transaction. The explanation is accompanied by visualizations such as images and diagrams to facilitate understanding. Furthermore, this menu also discusses the components of the payment system, which include the tools and technologies used in digital transactions, such as card scanners (POS), digital payment applications, and security systems that support the payment process. The presentation of this material is designed interactively, with the aim of giving users a deep understanding of how the payment system operates, from basic theory to the hardware and software involved. That way, users can understand the relationship between components and their roles in ensuring the smoothness and security of payment transactions.

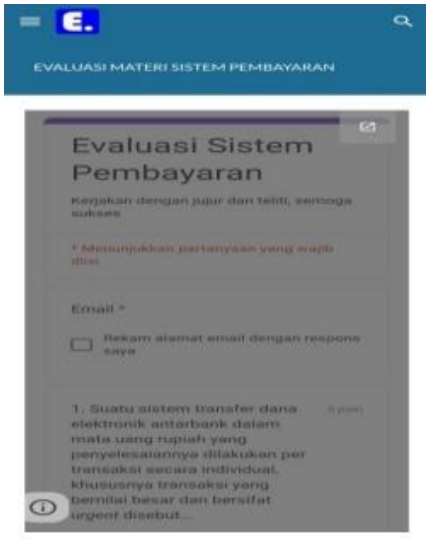

Figure 5. Learning Video Menu View Figure 3.6 Evaluation Menu View

Figure 5 explaining the evolution and development of payment tools and systems that have been implemented and further developed in this application. This page is designed to provide in-depth insight into how payment systems and devices used in digital transactions have evolved over time. The explanations presented cover various innovations and improvements that have occurred in payment tools, from traditional payment systems to the use of the latest technologies such as mobile payments and blockchain-based payment systems. This display also illustrates the steps that have been taken to improve efficiency, security, and ease of access in the use of payment systems. By understanding the development journey of payment tools

and systems, users can see how new technologies can improve the transaction experience and facilitate financial interactions, both in personal and business contexts. It also provides perspective on how payment systems can continue to evolve to meet the needs of society in the future. Figure 6 illustrates the appearance of the evaluation page that functions to measure user understanding of the payment system material. This page contains a number of evaluation questions that must be answered honestly and carefully by the user, which aims to assess the extent to which the material that has been studied is understood. In addition, users are asked to fill in their email in order to receive a response or feedback after completing the evaluation. This evaluation also includes questions related to basic concepts in the payment system, such as the interbank electronic funds transfer system and the individual payment system. The questions asked are designed to challenge the user's understanding and application of the principles and components of the payment system that have been studied previously, with the aim of ensuring that users have a deep understanding and can apply it in a real context.

Figure 7. Assignment Collection Page View **Figure 8.** Reference Menu View

Figure 7 shows the assignment submission page used by users to upload completed work or assignments. This page is designed to allow users to easily submit their assignments in pre-defined formats, such as text documents, presentations, or other relevant file formats. This feature allows users to upload their work directly through the application, ensuring an efficient and organized assignment submission process. In addition, this page can also include instructions or instructions on how to upload assignments correctly, including the submission deadline and the assessment criteria to be used. With this feature, the application not only facilitates learning but also simplifies the evaluation process, because the submitted assignments can be directly assessed by teachers or application managers. This provides a more structured and integrated experience for users in undergoing the learning process. Figure 8 displays a view of the reference menu that provides various sources of material or references that can be used by users to deepen their understanding of the material studied in the application. This menu presents a list of readings, articles, videos, or other relevant and quality sources that can help users expand their horizons beyond the main material. With this reference menu, the application allows users to dig deeper into the topics they are interested in, providing access to a variety of additional materials that enrich their learning experience. This display is also designed to be easily accessible, with categories or filters that make it easy for users to find

materials according to their needs. In addition, this reference menu can also include additional materials that are tailored to a certain level of difficulty or topic, ensuring that users get sources that suit their level of understanding.

So, the image above is the result of making an interactive learning media product based on Android that has produced prototype 1 of the media that has been developed. This application is named ECOMO (Economy Mobile Learning) and is designed to help learn payment systems. The main display of the application displays various menus such as competencies, materials, videos, evaluations, assignments, and references that make it easier for students to access various learning resources. There is also an interactive quiz feature with multiple choices to test students' understanding of the material that has been studied. In addition, this application provides multimedia-based content in the form of learning videos and concept diagrams to help students understand the material more visually and interactively. There is also a task collection feature that allows students to upload assignments directly through the application. Overall, this prototype was developed with a simple but functional design, and presents material in an attractive and easily accessible way for users.

Validation of Android-Based Interactive Learning Media Products Phase I

Product validation is intended to determine the assessment of developed media. Validity testing was carried out in two stages. The validity test was carried out by three validators, namely the Economics Subject Teacher at SMAN Pakusari as a material expert, the Indonesian Language Subject Teacher at SMAN Pakusari as a language expert, and the History Education Lecturer at Jember University as a design expert. Validation assessment by the validators for stage I is as follows:

Table 2. Validation Results of 1 Android-Based Interactive Learning Media

Validator	Aspect	Results	Average	Category
Materials Expert	a. The material is in accordance with basic competencies	80%		
	b. There is an introduction to concepts, definitions, case examples, and exercises	100%		
	c. Concepts and definitions are easy for students to understand	100%	91,42%	Very Good
	d. Material includes facts	80%		
	e. There are examples of cases that occur	100%		
	f. Terms are in accordance with terms that apply in the field of science	100%		
	g. Bibliography according to applicable regulations	80%		
Linguist	a. The sentences used are in accordance with Indonesian writing rules	100%		
	b. The sentences used are effective and simple	100%	88%	Very Good
	c. The language provisions are in accordance with Indonesian writing rules	80%		
	d. Spelling decisions are guided by EYD	80%		
	e. The terms used are consistent	80%		

Design Expert	a. The layout is attractive and consistent	80%		
	b. The number of font combinations is not too large	80%	84%	Very Good
	c. Use of letter variations (bold, italic, and capital)	100%		
	d. The media display depicts the material	80%		
	e. Background placement does not interfere with the written material	80%		

Table 2 shows the results of the validation of Android-based interactive learning media products by material experts, language experts, and design experts. In terms of material, this media obtained an average score of 91.42% with the category "Very Eligible", indicating that the material is in accordance with basic competencies, has relevant case examples, and is easy for students to understand. In terms of language, the media obtained an average of 88%, indicating that the use of language is in accordance with writing rules, effective, simple, and consistent. Meanwhile, in terms of design, the media obtained an average score of 84%, with positive assessments of the layout, font combination, use of letter variations, and attractive visual appearance. Overall, this learning media obtained an average score of 87.80% with the category "Very Eligible", indicating that this media has met the eligibility standards and can be used as a learning aid.

At the level I validation, there are some comments and suggestions obtained from member validators. Responses and suggestions of member validators are as follows:

Table 3. Validator Response Results and Suggestions

Member Validator	Feedback and Suggestions	Revised aspects
Material Expert Validator	The interactive learning media application developed is quite good, but there needs to be improvements in the material, especially in concept maps.	Refinement of the concept map in the sub-material of payment system components
Linguist Validator	Writing in media applications is in accordance with linguistic rules, but there needs to be improvement in making concept maps in terms of grouping.	Refinement of the concept map in the sub-material of payment system components
Design Expert Validator	There are suggestions and improvements to Android interactive learning media, including related material sources, videos, and images. There is imperfect paragraph spacing and avoid using bullets.	a. Addition of sources or references to images, videos, and materials. b. Remove the use of bullets and replace them with numbering c. Completion of paragraphs

Table 3 presents feedback and suggestions from member validators on level I validation of Android-based interactive learning media. The material expert validator assessed that the developed media was quite good, but still needed improvement in the concept map material, especially in the sub-material of the payment system component. The language expert validator suggested improvements in making concept maps, especially in the aspect of grouping to be more in accordance with language rules. Meanwhile, the design expert validator provided input related to the addition of sources or references in the form of images, videos, and materials. In addition, it is recommended to eliminate the use of bullets or points, replace them with numbering, and improve paragraphs so that the text display is neater and easier to understand. Android-based interactive learning media products need to undergo stage II validation after

making improvements according to the suggestions given by expert validators to ensure their quality and effectiveness before being widely used in learning.

Product Revision

Overall revised aspects include: 1) improving the concept map to make it more detailed, 2) adding reference sources to the images presented, 3) removing the use of bullets in the application, and 4) improving paragraphs to make them look neater. Based on this small-scale revision, the results of the revision of media products were obtained according to the advice of expert validators. Prototype 2 was created following revisions to the learning materials, and stage II validation was used to get the highest level of feasibility possible, ensuring that the media product was indeed appropriate for use in the testing procedure.

Validation of Android-Based Interactive Learning Media Products Phase II

Table 4. Validation Results II of Android-Based Interactive Learning Media

Validator	Aspect	Results	Average	Category
Materials Expert	a. The material is in accordance with basic competencies	100%		
	b. There is an introduction to concepts, definitions, case examples, and exercises	100%		
	c. Concepts and definitions are easy for students to understand	100%	97,14%	Very Worthy
	d. Material includes facts	100%		
	e. There are examples of cases that occur	100%		
	f. Terms are in accordance with terms that apply in the field of science	100%		
	g. Bibliography according to applicable regulations	80%		
Linguist	a. The sentences used are in accordance with Indonesian writing rules	100%		
	b. The sentences used are effective and simple	100%	96%	Very Worthy
	c. The language provisions are in accordance with Indonesian writing rules	100%		
	d. Spelling decisions are guided by EYD	80%		
	e. The terms used are consistent	100%		
Design Expe	a. The layout is attractive and consistent	80% 80%		
	b. The number of font combinations is not too large	100%		Very Worthy
	c. Use of letter variations (bold, italic, and capital)	100%	92%	
	d. The media display depicts the material	100%		
	e. Background placement does not interfere with the written material			

The validation table of stage II displays the results of the assessment by material experts, language experts, and design experts on the developed learning media. In terms of material, this media received an average score of 97.14% with the category “Very Eligible”, indicating that

the learning content is in accordance with basic competencies, easy to understand, includes facts, and has relevant case examples. In terms of language, the media received an average of 96%, indicating that the use of language is in accordance with Indonesian writing rules, effective, simple, and consistent. Meanwhile, in terms of design and appearance, the media received an average score of 92%, with positive assessments of the layout, font combination, use of letter variations, and an attractive media appearance that does not interfere with the content of the material. Overall, this learning media received an average score of 95.04% with the category "Very Valuable", indicating that this media has met the eligibility criteria and without any revisions from expert validators and can be used in learning.

3.1.4. Implementation

This stage carries out attractiveness tests and effectiveness tests on products that have gone through a validation process. Results of the attractiveness test and effectiveness test of Android-based interactive learning media.

*Results of the Attractiveness of Learning Media (*Limited Group Trial)

Table 5. Results of the Attraction Test in Limited Groups

Indicator	Earned Score	Category
Android-based learning media is easy to use	86,66%	Very interesting
The material in Android-based learning media uses communicative language	80%	Interesting
Android-based learning media increases understanding of the basic competencies of payment systems and tools	80%	Interesting
Text and video materials can be studied independently	95%	Very interesting
The appearance of Android-based learning media is packaged attractively	85%	Very interesting
Average	85,33%	Very interesting

Source: Limited Group Student Response Questionnaire Result Data, 2023

Table 5 shows a limited group trial conducted in class X-1 with 12 students. Android-based learning media received a positive response from students, with an average score of 85.33% and the category "Very Interesting". The ease of use indicator scored 86.66%, indicating that the majority of students felt that this media was easy to use in learning. The indicator of the use of communicative language in learning materials scored 80% with the category "Interesting", which means that most students considered the language in the media quite easy to understand, although it could still be improved. In terms of effectiveness in improving understanding, the indicator of improving basic competencies in systems and payment instruments scored 80%, also with the category "Interesting", indicating that this media was quite helpful for students in understanding the material. Meanwhile, the indicator of text and video material that can be studied independently scored the highest, namely 95%, with the category "Very Interesting", indicating that students felt helped in learning independently through this media. The indicator of media display that is packaged attractively scored 85%, also in the category "Very Interesting", indicating that the design and presentation of the application were quite popular with students.

Overall, the table shows that the students' responses to Android-based interactive learning media on the payment system and tool material are in the "Very Interesting" category, with an average percentage of 85.33%. These results reflect that the developed learning media has been well received by students, both in terms of ease of use, communicative language, attractive appearance, and effectiveness in improving understanding of the material. With this

high level of interest, Android-based interactive learning media can be considered effective in increasing students' interest in learning and supporting more independent and interactive learning. Therefore, this media is considered worthy to be continued to the large group trial stage in order to evaluate its effectiveness on a larger scale and ensure its benefits in supporting the student learning process more comprehensively.

Wide Group Trial

The following is a table of attractiveness results in wide group trials as follows:

Table 6. Results of the Attractiveness Test on the Broad Group

Indicator	Earned Score	Category
Android-based learning media is easy to use	90%	Very Interesting
The material in Android-based learning media uses communicative language	90,55%	Very Interesting
Android-based learning media increases understanding of the basic competencies of payment systems and tools	88,89%	Very Interesting
Text and video materials can be studied independently	88,89%	Very Interesting
The appearance of Android-based learning media is packaged attractively	92,22%	Very Interesting
Average	90,11%	Very Interesting

Source: Data from the Questionnaire Responses of Broad Group Students, 2023

Table 6 shows the results of student responses to interactive android-based learning media on the topic of payment systems and instruments carried out in class X-8. Android-based learning media is considered very interesting with an average score of 90.11%. The first indicator shows that the ease of use of Android-based learning media scored 90%, which means that the majority of students feel that this media is easy to access and use. Furthermore, the use of communicative language in learning materials scored 90.55%, indicating that students feel that the language used in the application is easy to understand. In terms of effectiveness in improving understanding, Android-based learning media scored 88.89%, indicating that this application helps students understand the basic competencies of payment systems and instruments. In addition, students' ability to learn independently through text and video also scored 88.89%, indicating that this media supports independent learning. The last indicator, namely the appearance of media that is packaged attractively, scored the highest score of 92.22%, indicating that the design and presentation of the application are very much liked by students. Thus, these results prove that Android-based learning media is very effective in improving students' understanding of the Payment Tools and Systems course and providing an interesting and communicative learning experience.

Overall, the results of student responses in the extensive group trial showed an increase compared to the limited group trial, indicating that Android-based learning media is increasingly well received by students on a wider scale. Overall student responses in the extensive group trial showed a very high appeal, with the category “Very Interesting” and an average percentage of 90.11%. These results indicate that Android-based interactive learning media is not only easy to use, but also effective in improving student understanding and providing a more interesting and communicative learning experience. With the highest score on the attractive media display indicator, it can be concluded that the visual aspects and design of the application play an important role in increasing student interest in the material. Therefore, it can be concluded that Android-based learning media has a very high appeal and has the

potential to be an effective learning tool to improve student learning outcomes in the Payment Tools and Systems course.

Results of the Effectiveness Test of Android-Based Interactive Learning Media

Limited Group Trial

Through paired sample testing in a limited group, the results obtained are as follows:

Table 7. Paired Sample t-Test Results in Limited Group Test

		Paired Differences					T	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	PRETEST - POSTTEST	-24.583	9.876	2.851	-30.858	-18.308	-8.623	11	.000

Source: Data from Pretest-Posttest Analysis with SPSS Limited Group, 2023.

The results of the paired sample t-test of the pretest and posttest data show that there is a significant difference between the two scores. The mean difference is 24.583, with a higher mean posttest score, indicating an increase after the intervention or treatment. The variation in the score difference is indicated by the standard deviation of 9.876, while the standard error of the mean of 2.851 illustrates the uncertainty in the average estimate. The 95% confidence interval ranges from -18.308 to -30.858, which does not include zero, confirming that this difference is significant. The t value = 8.623 > t table = 2.201 indicates a significant difference, as does the significance value of 0.000 < 0.050. So it can be concluded that these results are statistically significant.

The results also show that H_0 is rejected and H_1 is accepted, which means that there is a significant difference between learning outcomes before and after the use of Android-based interactive learning media in the Payment Tools and Systems course. In addition, the calculated t value (8.623) is greater than the t table, which further strengthens that the use of Android-based interactive learning media has a positive impact on improving student learning outcomes. Thus, it can be concluded that the use of Android-based media is effective in improving students' understanding of the material being taught.

Wide Group Trial

Testing the level of effectiveness of learning media on the subject of payment systems and instruments was carried out through a large group trial involving class X-8 with a total of 36 students. This evaluation aims to measure the extent to which Android-based learning media can improve student understanding. Testing was carried out using a paired sample test to see the difference in learning outcomes before and after using the media. The results of the large group trial were obtained as follows.

Table 8 shows that the results of the paired sample t-test analysis showed that there was a significant difference between the pretest and posttest results, with an average difference (Mean Difference) of 28,611, indicating an increase in the posttest score compared to the pretest. The standard deviation of 14,122 indicates that the distribution of the score difference data is quite large, while the standard error mean of 2,354 describes the uncertainty in estimating the average difference. The 95% confidence interval ranges from -33,389 to -23,833,

which does not include zero, confirming that this difference is statistically significant. The t value = 12.156> t table = 2.030 indicates a significant difference, as does the significance value of 0.000 <0.050. So it can be concluded that the null hypothesis (H_0) is rejected, and there is a significant difference between the pretest and posttest.

Table 8. Paired Sample t-Test Results on Large Group Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	PRETEST – POSTTEST	-28.611	14.122	2.354	-33.389	-23.833	-12.156	35	.000

Source: Data from Pretest-Posttest Analysis with SPSS Extensive Group, 2023.

The results show that H_0 is rejected and H_1 is accepted, which means that there is a significant difference in learning outcomes before and after using Android-based interactive learning media in the Payment Tools and Systems course. This can also be seen from the calculated t value which is greater than the t table, thus further confirming that the use of Android-based interactive learning media has a positive and significant impact on improving student learning outcomes.

3.2 Discussion

This development produces interactive Android-based learning media that has gone through a validation process and is considered feasible, interesting, and effective in supporting economic learning on payment systems and payment instrument materials. This media was developed by considering aspects of material feasibility, language, and display design to increase student involvement in the learning process. According to Agustian (2021), the use of technology in learning must be oriented towards effectiveness and efficiency to improve the quality of learning. Android-based learning media is expected to be an innovative solution for increasing student motivation and understanding, especially in facing the challenges of the digital era.

In the first stage of validation, this media was assessed by material experts, language experts, and design experts, with an average value of 87.80%, indicating that this media is in the very feasible category, although it still requires minor revisions. Revisions were made based on validator input, which included refining the concept map, adding source references to images, reducing the use of excessive bullet points, and improving the paragraph structure to be more systematic. According to Telussa et al. (2024), well-structured learning media can increase the effectiveness of material delivery and accelerate student understanding. Therefore, this revision aims to ensure that the media developed can provide a better learning experience for students.

After revision, the validation phase II produced a value of 95.04% without revision, which further confirms that this Android-based learning media is very feasible to be tested on limited and broad groups. In line with Riduwan (2015), if the percentage of feasibility is in the range of 81%-100%, then the learning media is classified as very feasible to be used and can proceed to the product trial stage.

The results of interviews with students after the implementation of the media showed that the use of this media was considered very easy because it can be accessed via Android smartphones, and has interesting content, such as images, videos, and practice questions

available in one application. This is in line with Hasibuan, et al. (2022) who stated that the appeal of the media lies in the ease of use and the integration of various media, both text, images, and videos, so that it produces a colorful presentation that can reduce boredom when studying the material.

Apart from the student's perspective, economics teachers also stated that students were more enthusiastic about using Android-based interactive learning media compared to conventional methods. Teachers observed that when the material was presented in visual and audio form, students were more focused and more easily understood the concepts being taught. This is supported by the opinion of Mayer & Moreno (2005) that multimedia learning presented in the form of words and images can minimize the cognitive load on students. Referring to Ardianti (2022) someone who studies a subject thoroughly is not only with the help of written materials but can understand the material through a combination of media such as images and text so that it does not cause boredom during learning. Therefore, Android-based interactive media in the subject of payment systems and instruments is very interesting.

Furthermore, the results of the study showed that this learning media had a positive impact on student learning outcomes, as shown in the effectiveness test. The effectiveness of learning media can be measured by the achievement of learning objectives and the increase in student learning outcomes after using the developed media (Damopolii et al., 2020). The effectiveness test was conducted on limited groups and broad groups, both of which showed a significant increase in learning outcomes after using Android-based interactive media. The results of the effectiveness test showed a significance score of 0.00 (<0.05), which means there is a significant difference before and after using the media.

This is also supported by research by Putra & Kartini (2020) which states that the use of Android-based interactive media can help students remember and understand the material better, thus having an impact on improving learning outcomes. The effectiveness of this media is also supported by the statement that interesting learning media and using communicative language can increase students' interest in learning, which ultimately contributes to more optimal learning outcomes. Thus, the use of Android-based learning media not only increases the effectiveness of learning; but also helps students to be more motivated and understand the material better.

4. CONCLUSION

Android-based interactive learning media on the material of payment systems and tools for grade X students at SMAN Pakusari has proven to be interesting and effective. Students consider this media to have an attractive visual appearance and interactive features that make learning more enjoyable, so they are more motivated and not easily bored. In terms of effectiveness, there is a significant increase in student learning outcomes after using this media, indicating that Android-based media helps understand the material better than conventional methods. Teachers can also use this media to increase student involvement in economics learning. However, this study has limitations, such as the scope is still limited to one school and there is no long-term impact analysis. It is hoped that further research can test this media in a wider scope and add additional interactive features to improve learning effectiveness.

REFERENCES

Ardianti, Tya R. & Susanti. (2022). Development of Android-based interactive Learning Media for Financial Accounting Subjects in Vocational High School. *Jurnal Ilmu Pendidikan, 4(2),* 2879-2892.

Agustian, U. H. (2021). The Role of Educational Technology in Learning. *Jurnal Keislamandan Ilmu Pendidikan*, 123-133.

Damopolii, V., Bito, N., & Resmawan, R. (2020). Effectiveness of Multimedia-Based Learning Media on Quadrilateral Subjects. *ALGORITMA: Journal of Mathematics Education*, *1*(2), 74–85. https://doi.org/10.15408/ajme.v1i2.14069

Fitriyah, E. A., & Dewi, R. M. (2022). Development of Android-Based Interactive Media for Economics Subjects. *Jurnal Inovasi Pendidikan Ekonomi (JIPE)*, *12*(1), 94. https://doi.org/10.24036/011167790

Handayani, D., & Rahayu, D. V. (2020). Development of Android-based interactive Learning Media Using iSpring and APK Builder for 10th Grade Mathematics on Vector Projection. *M A T H L I N E Jurnal Matematika Dan Pendidikan Matematika*, *5*(1), 12–25. https://doi.org/10.31943/mathline.v5i1.126

Hasibuan,dkk. (2022). *Development of Learning Media and Technology.* Yayasan Kita Menulis.

Kurniawan, M. R., & Rachmawati, L. (2018). Development of Interactive Learning Media Using Adobe Flash CS 6 Application Based on Android for International Trade Subject in 11th Grade Social Sciences at High School. *Jupe*, *6*(3), 282–289.

Kuswanto, J. (2019). Development of Android-Based Learning Media for 11th Grade Biology Subject. *Indonesian Journal of Business Intelligence (IJUBI)*, *2*(2), 65. https://doi.org/10.21927/ijubi.v2i2.1139

Lubis, I. R., & Ikhsan, J. (2015). Development of Android-Based Chemistry Learning Media to Improve Learning Motivation and Cognitive Achievement of High School Students. *Jurnal Inovasi Pendidikan IPA*, *1*(2), 191. https://doi.org/10.21831/jipi.v1i2.7504

Marlina, S., & Lautt, B. S. (2020). Development of android-based chemistry learning media for experimenting Development of android-based chemistry learning media for experimenting. https://doi.org/10.1088/1742-6596/1422/1/012037

Mayer, Richard & Moreno, Roxana. (2005). A Cognitive Theory of Multimedia Learning: Implication for Design Principle. 91.

Putra, I. N. T. A., & Kartini, K. S. (2020). Implementation of Mobile-Based Interactive Learning Media Case Study : Class Xi Hydrocarbons Material. *Jurnal Pendidikan Kimia Indonesia*, *4*(2), 43–52. https://doi.org/10.23887/jpk.v4i2.28536

Riduwan. (2015). *Scale of Measurement for Research Variables.* Bandung: Alfabeta.

Rivaldo Paul Telussa, N. T. (2024). Implementation of Direct Instruction Model Assisted by Interactive Media to Improve Elementary School Students' Understanding of Science Concepts. Jurnal Semnasdik, 48-54.

Sari, P. R., Djaja, S., & Kantun, S. (2019). Development of Android-Based Learning Media with the Appy Pie System on the Topic of Adjustment Journal for Service Companies in 11th Grade Social Sciences at Public Senior High School 2 Jember. *JURNAL PENDIDIKAN EKONOMI: Jurnal Ilmiah Ilmu Pendidikan, Ilmu Ekonomi Dan Ilmu Sosial*, *13*(2), 91. https://doi.org/10.19184/jpe.v13i2.11005

Sugiyono. (2015). *Research and Development Methodology (Research and Development/R&D).* Bandung: Alfabeta.

Wulandari, N. (2020). Development of Physics Learning Media Based on Android at Public Senior High School 3 Ngabang. *Jurnal Pendidikan Informatika Dan Sains*, *9*(1), 21. https://doi.org/10.31571/saintek.v9i1.1296