Al-Ishlah: Jurnal Pendidikan
Vol.15, 2 (June, 2023), pp. 1181-1193
ISSN: 2087-9490 EISSN: 2597-940X, DOI: 10.35445/alishlah.v14i1.2816

Development of Android-based Learning Media for Economics Learning

Sri Wahyuni[1], Suarman[2], Sri Kartikowati[3]

[1] Universitas Riau, Pekanbaru, Indonesia; sri.wahyuni.5197@gmail.com
[2] Universitas Riau, Pekanbaru, Indonesia; suarman@lecturer.unri.ac.id
[3] Universitas Riau, Pekanbaru, Indonesia; tikowati@lecturer.unri.ac.id

ARTICLE INFO

Keywords:

Android-Based Learning Media;
Expert Judgement;
Interactive;
Statistical Economic;
Economic Learning

Article history:

Received 2022-10-04
Revised 2022-10-23
Accepted 2023-05-15

ABSTRACT

This study aimed to develop android-based learning media to help economics lessons, especially in national income materials for Class XI students of the Department of Social Sciences at the senior high school level. The research method used was research and development (R&D), with the ADDIE model. The media was then implemented in class XI students, with a total of 20 students. The research sample was selected purposively with consideration of the material in the media and the ease of research. Media demands, student profiles, and the learning environment were observed and interviewed for the study. The media was planned and developed using Articulate Storyline 3, validated by 3 media and 2 material specialists (Expert Judgement), and analysed qualitatively. Student and instructor responses to questions on media practicality and usefulness were quantified. The entire ADDIE circuit was evaluated at each stage. The results of the analize stage prove that students and teachers need support media for material related to economic statistics. The design and development of media were carried out by researchers by providing several advantages, including simple and interesting, interactive media that can be used in offline and online modes. Its excellence gained recognition of eligibility from validators. Student response at the limited trial and implementation stage showed the media had a practicality level which is high and very useful. In fact, economics teachers at both schools gave a perfect assessment (maximum score) for all indicators of the teacher response questionnaire statement. It can be concluded that the media was needed by students and teachers based on economic statistics. The media was designed and developed with advantages based on needs analysis. The media was valid and should be implemented.

This is an open-access article under the CC BY-NC-SA license.

Corresponding Author:
Sri Kartikowati
Universitas Riau, Pekanbaru, Indonesia; tikowati@lecturer.unri.ac.id

1. INTRODUCTION

Economics lessons included subjects that were difficult for students, especially materials related to formulas, calculations, curves, analysis, and critical thinking. It takes a good learning strategy so that students can easily understand the material. However, the pandemic has made it more difficult for teachers and students to learn economics. Many students state that economic material is increasingly difficult to understand when they are studying online (Yohana Paramita, 2021). Economic learning activities need to be modernized. One of them is by developing device-based media owned by students, namely Android (Kuswanto & Radiansah, 2018). The application allows students to learn independently and study anywhere and anytime. This is reinforced by the huge number of Android users, which 100 million people, and 65.4% of them were teenagers (Rahmandani, Tinus, & Ibrahim, 2018). Android became an option because of its ease of developing third devices at no cost and easily accessible (Dong & Liu, 2013). The use of media in learning makes learning activities more effective and efficient (Puspitarini & Hanif, 2019).

Media development is also strengthened by the results of previous research, which states that there are still many things that must be improved in the development of economic learning media. As found by Sari, et al. (2019) in their research on the development of an android-based learning media pie system for journal material for adjustment of class XI social studies students of senior high school. They suggested that the economic learning media developed should be uploaded to Google Play or the Play Store. Sibilana (2016), with her research on the development of android-based learning media for Islamic material for class XI senior high school, recommends different things where learning media should be The developed economy can be accessed both online and offline. Kuswanto (2020), with the development of android-based media for class XI Biology material, added that the economic learning media developed should have a variety of practice questions that are complex with interesting animations. The explanation above shows the need for learning media that can help economic learning activities, where learning media is developed on an Android basis whose device is widely used by students and modern and flexible. Media use has proven to be effective and efficient in learning, and media development needs to continue with the improvements suggested by previous researchers for maximum learning outcomes.

The modernization of learning media has positively impacted students, especially during the pandemic (Verde & Valero, 2021). Android was chosen as the basis for media development because it is a complete, open, free space, popular operating system, and easy access (Cahyani, 2019; Andriani and Suratman, 2021). In its development, android-based economic learning media should meet the criteria of good media, such as content quality, material accuracy, instructional quality, program integration, supporting student exploration, clear narratives, and using features that can improve student learning abilities (Arsyad, 2017; Darejeh et al., 2022). The development of economic learning media, it is expected to provide many benefits, such as more interesting learning, more teaching materials, varied learning methods, many learning activities, more interactive learning, clarifying learning, and increasing effectiveness and time efficiency (Aghni, 2018). Statements by Verde & Valero (2021); Cahyani (2019); Andriani and Suratman (2021); and Arsyad (2017) showed that the modernization of learning media could be done by developing media that were in accordance with good learning media standards. Well-developed media, as well as Android-based, which is proven to be superior, is expected to provide many benefits and improve the quality of learning.

The development of learning media has contributed a lot to the world of education. Setiawati (2017), in the results of her development on android-based learning media for English material for students of SMK Sidoarjo, stated that learning media can increase student learning motivation. The same results were also obtained by Andriani and Suratman (2021) and Sari et al. (2019) related to the development of android-based learning media to increase student motivation and learning outcomes, obtaining results that learning media results from the development carried out provided many benefits to students. In addition, the development of interactive media also has an impact on student knowledge (Arthur et al., 2022); even other researchers in developing media in the form of additional books for

local culture have succeeded in imparting knowledge and skills (Kertih & Sriartha, 2022). The research above clearly proves that many benefits were obtained from the results of developing learning media. These benefits can be seen in increasing student motivation and learning outcomes, increasing student knowledge, developing student learning skills, and various other benefits.

The suggestions of previous researchers and the benefits of media development that have been presented were opportunities to develop economic learning media with their own advantages. Development was carried out with the help of the Articulate Storyline 3 application. However, the development with the help of such tools has been done a lot. As done by Octavia et al. (2021), the development of M-Learning media with the Articulate Storyline application to improve the learning outcomes of High School students. Kamilah (2022), development of interactive media with the help of Articulate Storyline on tax materials. Kusuma (2021) about the development of learning media based on the Articulate Storyline Application for class X social science students in the field of economics, Setiadi et al. (2020) regarding the development of android-based Mobile Learning with a contextual approach for Class X Social Science students, and Dewi (2021) development of arithmetic material learning media using the Articulate Storyline application with the Montessori method for high school students, the media to be developed has a variety of differences and advantages. Although many researchers have used the Articulate Storyline application to develop Android-based media, the media development that will be carried out has comics, learning videos, and interactive counting simulations, and can be accessed online and offline for free.

Previous research and the suggestions they gave led researchers to add new advantages found in the developed media, with interesting and different specifications and details. The media specifications developed include having a Login page as a student database. The main menu page contains basic competencies and indicators of learning achievement. There was a start-to-learn page; there were various features of student learning resources, namely materials, learning videos, comics, and numeracy simulations that directly involved students. There was a practice page about all the interesting materials and online quizzes. There was an information page containing a summary of the material, reference sources, and profiles of researchers and supervisors. The series of product specifications were expected to meet the needs of students both in terms of understanding, skills, and characteristics of students. This economic learning medium was intended for class XI students majoring in Social Sciences at the senior high school level. Apart from being a learning medium, this media was intended to help economics teachers have many teaching references and can implement media on various learning strategies, thus providing a new learning experience. Learning can be more fun and achieve the desired goal.

2. METHODS

The research was carried out with a research and development (R&D) approach, which is research whose series of stages aimed to produce and develop certain products, as well as testing the feasibility and effectiveness of products produced by Sugiyono (2017). The research and development model implemented was the ADDIE model. ADDIE itself consists of a series of stages of Analysis, Design, Development, Implementation, and Evaluation, as shown in Figure 1.

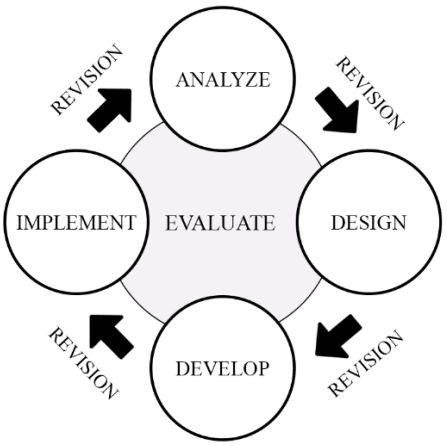

Figure 1. ADDIE Development Research Model Chart

The research and development of this media were preceded by the analysis stage (Mulyatiningsih, 2016). The analysis carried out is an empirical and theoretical analysis. Empirical analysis, namely student needs to be related to learning media, student and school characteristics, learning facilities and environments, as well as problems or conditions of media that have been used. The empirical analysis was then juxtaposed with media theory, which was good to develop and as needed. The second stage was design or planning. At this stage, an overview of the media was made, which was developed based on empirical and theoretical analysis. The third stage was the development, innovation and improvement of the previous media, so that the media developed can meet the needs analysis that has been carried out. The design and development carried out were validated for feasibility by expert validators. Once declared valid, the medium was tested limited to see the shortcomings. Next is the implementation stage. Students and teachers used the media to see the level of usefulness and practicality of the media. The results of the trial activities were limited and implemented and evaluated to be improvements to the media. The final stage was evaluation. Although it was at the last stage, the evaluation was carried out at each stage assembled in the development of the ADDIE model. The final evaluation was carried out to get a final product that is feasible and can be disseminated to users. The samples used for the trial stage were limited and the implementation was taken with purposive techniques, namely sampling taking into account the objectives and limitations research (Syahza, 2021). This technique was used to consider the learning materials used in the media, namely national income, specifically for class XI of Social Sciences at the Senior High School level. 16 students of Class XI of Social Sciences of SMAIT Al Fityah were selected to be asked for their responses to the use of media in the limited trial stage, and Class XI students of Social Sciences SMAIT Al Bayyinah with a total of 20 people asked for their response to the use of media at the implementation stage. These two schools were selected based on the analysis of needs, facilities and learning environments carried out.

The needs analysis was carried out by observation and interviews of students and teachers. The interview was conducted on May 23, 2022, by first asking students to fill out a Google Form related to media that has been implemented in schools, existing media problems, and media expectations learn in the future. After filling out the Google Form, several students were selected to be interviewed directly regarding the questions in the Google Form questionnaire. The students selected to participate in the interview were 5 people, and 1 economics teacher. Students were selected based on the Google Form questionnaire answers provided. After obtaining the data, a media design and development was made which is then validated by experts. Validation wasa carried out by experts, and their decisions were then used to determine whether the media was viable or not. This approach was also often referred to as expert judgement Sugiyono (2017). There were 3 media experts and 2 material experts who validated media development. The indicators that were the assessment of media experts can be seen in Table 1.

Table 1. Media expert validation instrument grid

No.	Aspects	Indicators	Question Item
1	Aspects of orientation in students	1. The suitability of the appearance, audio, narration, and language style on the media with the characteristics of the student	1
		2. The entire media is packaged attractively and supports student learning activities	7
2.	Aspects of relevance to the subject of teaching	1. Questions and quizzes according to the desired output	6
		2. Media allows students' learning motivation to increase on the learning of economic materials	8
3.	Presentation aspects	1. Clarity of presentation of text, images, numbers, theories, videos, and comics to read and understand	2
		2. Audio sounds, *background backsounds*, sound effects, do not interfere with learning activities	3
4.	Affordability aspects	1. Ease of access and affordability of use	4
5.	Aspects of ease	1. Practical and flexible use in *offline* and *online* mode	5

The media expert validation sheet consists of 8 questions that were filled out qualitatively. Furthermore, with the same number of questions, here is the indicator of the validation sheet by the material expert:

Table 2. Material Expert Validation Instrument Grid

No.	Aspects	Indicators	Question Item
1.	Aspects of content quality and purpose	1. The suitability of the presentation of material in the media with the competence of Dasar, indicators, and learning objectives	1
2.	Aspects of the novelty of the material	1. Presentation of material on *up-to-date* media	2
3.	Aspects of the presentation of the material	1. The material presented is structured, systematic, and easy to understand	3
4.	Aspects of material relevance	1. The components in the presented medium are relevant to the material	4, 6
		2. Compatibility of questions and quizzes with the material discussed	5
5.	Language aspects	1. The language used is effective, does not cause double meanings, and is in accordance with language rules	7
		2. Spelling on the material is in accordance with language rules	8

The validation sheet filled out by the experts is then analyzed with a qualitative approach. Data analysis, reducing data, triangulating and concluding expert decisions based on the final opinion of the validation series (Nugraheni, 2017). After validation was carried out, an assessment of the usefulness and practicality of media use was conducted to see the success of media implementation. The media was tested on a limited basis in two different schools, with each school consisting of 16 students and 21 students. Response questionnaires to the use of media were used to assess the practicality. Teachers were also asked to fill out a questionnaire so that there was an evaluation from students and teachers

in the media. The questionnaire of student and teacher responses related to the practicality and usefulness of media is prepared based on the theory of the benefits of learning media by Rivai (2019); Kemp and Dayton (in Aghni (2018), and Daryanto (2016). These indicators of usefulness were seen from the aspects of teaching and learning activities, ease of learning and teaching, and the usefulness of media in students and teachers. The questionnaire was created using a Likert assessment scale with an explanation in Table 3.

Table 3. Likert Scale User Response Questionnaire

No.	Symbol	Information	Score
1	Ss	Strongly Agree	4
2	S	Agree	3
3	Ts	Disagree	2
4	Sts	Strongly Disagree	1

Source: adoption and modification of Riduwan (2018)

The results of the user response questionnaire were then quantitatively analyzed by calculating the frequency distribution of students, as well as the number of minimum and maximum scores, and dividing them by the class interval for the answer category. The steps for analyzing the degree of practicality of the medium were as follows:

1. Determine the minimum score of all indicators= 1 x 12 = 12
2. Determining the maximum score of all indicators= 4 x 12 = 48
3. Class interval length = $\frac{48-12}{3}$ = 12

The criteria for the practicality and usefulness of the media are then categorized as in Table 4.

Table 4. Categories Practicality and Usefulness of Android Media

No.	Assessment Score	Category
1	37 – 48	High
2	25 – 36	Middle
3	12 – 24	Low

Source: adoption and modification dari Sudjana (2017)

3. FINDINGS AND DISCUSSION

The android-based learning media, which was later named Mekoid, was validated by 3 media experts and 2 material experts. All experts were selected according to their field and asked for their opinions and decisions related to the learning media. After being declared eligible, the media was tested limited to class XI social science students of SMAIT Al Fityah with 16 people. From the results of the limited trial, there were several suggestions for improvement given, including increasing the completeness of the material, improving the level of questions, and adjusting the speed of the online quiz time. The improvement was carried out by researchers under the direction of the supervisor, after which the media was implemented in 20 students of class XI social sciences SMAIT Al Bayyinah. After learning to use the media, students were given a response questionnaire to see the usefulness and practicality of the media. The results of the analysis stage found that students experienced difficulties in economics lessons, especially material related to formulas, calculations, and analysis. At school, students have facilitated tablets and a computer laboratory. As a result of observations and interviews, most students requested that the tablets given the maximum be used for learning. Students want interesting and interactive learning resources. Interesting exercises and quizzes can help students understand, students want there to be an application-based learning media that includes all learning resources, and teachers need media to maximize learning activities. The student learning environment has supporting facilities, such as the internet network, LCD projector, and supporting the existence of application-based media.

Needs analysis then becomes the basis of media design. The media was developed with the help of the Articulate Storyline 3 application. Some of the features contained in the planned media were login pages, media explanation pages, Basic Competency pages and indicators, and various learning resources such as materials accompanied by audio, comics, calculation simulations, and learning videos. The media accompanied by practice questions, includes all the material. There was a trigger that connected the answer with a positive or negative response from the results obtained by the student. Online quizzes with various models, namely crossword puzzles, planes, hitting mice, guessing cards, and matchmaking, were made using the Wordwall application. After the media design was completed, the media results were published in html 5 form and then converted into an Android-based application or Apk with the help of the Apk Builder Pro 2 application. Development in the media was carried out by adding advantages, namely a simple and attractive design, comics that match the material, there were links and barcodes to view videos and e-books, interactive calculation simulations, and can be accessed online and offline.

Furthermore, the media was validated by experts in their fields. Validation was carried out at most 3 times. The results of validation by media experts are in Table 5:

Table 5. Validation Summary by Media Experts

No.	Validators	Valuation	Decision
Stage 1 Validation			
1	Media Expert 1	Comic design lacks High Definition and is still vague	The media is not worth piloting
2	Media Expert 2	The comic writing is enlarged, set by the material on the comic blackboard, the backsound is more vigorous, the level of the material problem is improved,	The media is not worth piloting.
3	Media Expert 3	Ease of media access improved again	Media worth testing with revisions
Stage 2 Validation			
1	Media Expert 1	All media components fit the criteria of a good medium	Media worth a trial without revisions
2	Media Expert 2	The second part of the simulation has a miswriting, the duration of *the online* quiz is too fast	Media worth testing with revisions
Validation Stage 3			
1	Media Expert 2	All media components fit the criteria of a good medium	Media worth a trial without revisions

Table 5 show the validation process and the decisions given by the experts. In the first stage, all the majority of experts said the media was not yet worth testing, and one expert declared the media worthy of trial with revisions. In the second validation stage, the validator declared the media worthy of trial with revisions, until, in the end, after various improvements were implemented, the media was worthy of trial without revision. Based on the final decision of the media expert, the media was declared worthy of implementation. In addition to media experts, here is a validation summary from material experts:

Table 6. Validation Summary by Material Experts

No.	Validators	Valuation	Decision
Stage 1 Validation			
1	Material Expert 1	We recommend that the materials in the simulation section be separated	The media is not worth piloting
2	Material Expert 2	Comics are not yet relevant to the material	The media is not worth piloting

Stage 2 Validation			
1	Material Expert 1	We recommend that each *online* quiz be accompanied by instructions on how to play it	Media worth testing with revisions
2	Material Expert 2	All components are in accordance with the criteria of a good medium	Media worth a trial without revisions
Validation Stage 3			
1	Material Expert 1	All components are in accordance with the criteria of a good medium	Media worth a trial without revisions

It was not much different from the decisions of media experts. In the first stage of expert validation of the material, experts stated that the media was not yet feasible to be tested. The improvements were made until at the final stage of media validation, it was feasible to test without revision. Based on the decision of the material expert, the media was declared worthy of a trial. Here is the final design of the media after going through a series of validations which can be seen in Figures 2, 3, 4 and 5.

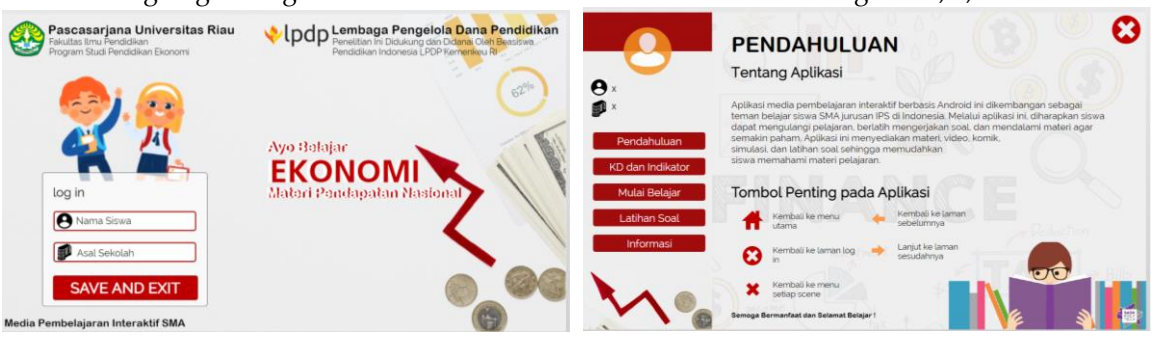

Figure 2. Log In Page Views and Media Usage Instructions

Figure 3. Learning Menu Display and Simulation of National Income Calculation

Figure 4. Display of Material Questions and Online Quizzes

Figure 5. Summary View, Referrals, Developer Profiles and Advisors

Furthermore, the media was tested limited and implemented in two different schools in Pekanbaru. The results of the questionnaire of responses of SMAIT Al Fityah students to the use of Mecoid media can be seen in the frequency distribution of Table 7 below:

Table 7. Frequency Distribution of Questionnaire Response of SMAIT Al Fityah Students to Media UseAndroid-based

Category	Assessment Score	Frequency	Percentage (%)
High	37 – 48	12	75
Medium	25 – 36	4	25
Low	12 – 24	0	0
Total		16	100

Table 7 presents data on the distribution of the number of students based on the total questionnaire scores obtained and categorized according to the range of grades owned. There were 12 people out of 16 students, or 75% of students, said that the android-based media used had a high practical level and were useful in learning. Another of 16 students stated the practicality level of the media was at a moderate level. These results prove that Android-based media is practical to use and provides benefits for the student learning process. Based on written responses to the questionnaire, SMAIT al fityah students stated that economic learning with Mecoid became more fun, and easy to understand. Even students asked for Mekoid to be made for the whole material of the economy. The questions presented were fun and interesting, and the material was explained concisely and easily understood.

A response questionnaire for the use of media was also given to SMAIT Al Bayyinah students after the media implementation stage was carried out. The results of the questionnaire can be seen in Table 4.16:

Table 8. Frequency Distribution of Questionnaire Response of SMAIT Al Bayyinah Students to Use Android-Based Media

Category	Assessment Score	Frequency	Percentage (%)
High	37 – 48	20	100
Medium	25 – 36	0	0
Low	12 – 24	0	0
Total		16	100

All SMAIT Al Bayyinah students responded to the use of android-based learning media in the high category. It can be seen from Table 8, 100% of students responded that the level of practicality of the media was high. Students also gave written responses to the student response questionnaire, that android-based economic learning media (Mekoid) makes economics lessons more fun, interesting, exciting, easy to understand, and have complete features. Students said they wanted to use Mecoid on other learning. The majority of students gave a positive and constructive response.

The results of the questionnaire of teacher responses in two schools, namely SMAIT Al Fityah and SMAIT Al Bayyinah, to the use of android-based media, got a perfect percentage, which was 100% with a total score of 40 with 10 statements, and the highest score per statement was 4. This figure means

that all items of the media response questionnaire statement in teaching got the highest score of 4. The percentage of 100% shows that teachers feel that android-based media has high practicality and usefulness for economic teaching activities in students. Even teachers want Mekoid to be presented with other economic materials.

Android-based media was developed to help students and teachers in economic learning, especially national income materials. Development was carried out with the ADDIE model, where there were 5 stages that must be carried out: analysis, design, development, implementation, and evaluation. Development begins with empirical and theoretical analysis. Field facts say that the majority of students need interesting media, provide a complete explanation, and provide a new learning experience. Especially for economics subject matter containing formulas, curves, and analysis. Various applications were used to help with media development, including Articulate Storyline 3, Canva, and Apk Builder Pro. Android-based media was chosen because of its various ease of use and development (Riyadi, 2022).

In development research, validation was needed to evaluate whether the product was in accordance with the objectives (Harmono, 2020; Glod-Lendvai, 2018). The more expert an expert, the more able to decide and assess the validity of a medium. Validation with an expert judgement approach was used to obtain detailed and specific assessments from experts and obtain media feasibility decisions. The results of media and material validation get a decision worthy of trial to users. The media was tested limited and implemented in two different schools. The trials were limited, and the implementation aims to see the effectiveness of the media. The media was said to be effective if it achieved the expected results (Commission, 2013). The implementation process bore fruit, where 75% of SMAIT Al Fityah students and 100% of SMAIT AL Bayyinah students stated that the media was very useful and practical to use. The teacher gave a 100% assessment that the media was very useful and practical. In fact, some students stated that the media used was very interesting and helped students understand the material. Not only was there an explanation, but there was an interactive simulation that really helped students understand the calculations. Positive feedback was also conveyed by teachers who use the media. Teachers want media to be created for entire chapters on economics lessons and uploaded on the Play Store so that their use can be wider.

Positive feedback was one of the proofs that there were many benefits obtained in the use of Android-based media. However, the results of the implementation of the media found that there were still shortcomings in the media being developed. The media used sometimes experiences bugs or freezes when used, so users have to restart the application. This was because the Android base is free, causing a tendency for the entry of malware that can interfere with the running of the system (Riyadi, 2022). Another drawback to Android applications is that they can cause disruption of the security of the device used (Lazareska, 2017). However, the disruption of Android security because the application was still under discussion, because many studies say that the Android system was safer when using the application (Nowfeek, 2022). In addition to these findings, there were also limitations in this study, namely that the media was still discussing one basic competence of the material in class XI of Social Sciences in high school, and the number of students who were asked for a response is still a small number. It was hoped that further researchers could pay attention to aspects of the limitations and findings contained in this study. The development of android-based media at any time will continue to be influenced by technology, so it needs regular updates, including on learning materials.

The findings obtained in this study were that difficult lessons, especially economics lessons, need to be started by attracting the attention and enthusiasm of students (Tarika, 2018). When students feel interested, an interesting learning process can slowly form students' habits to solve difficult problems in the lesson. Media was only a tool, but the problem of students having difficulty dealing with the material of formulas, calculations, curves, and analysis was a habit that can be built in various ways. The media development proves that the resulting media was valid, feasible to use, effective, practical, and provides broad benefits for both students and teachers. The results of this study were in line with the findings of Setiawati (2017) in the development of Android-based learning media for English

lessons. Students give a high and positive response to the media used. In line with the development of learning media carried out by Prasetyo et al. (2015), where the media used succeeded in improving students' critical thinking skills and students responded well to the media they used, as well as development of learning media Andriani and Suratman (2021) its effect on student learning outcomes and motivation, that android-based media has succeeded in increasing student motivation and learning outcomes, media Android-based learning was recommended because it was proven to have ease of use, advantages, more interesting and accessible through devices that were widely used by students, students in their research also gave a positive response to the use of media.

4. CONCLUSION

The research was carried out with the ADDIE model Research and Development approach. The results of the stage of analyzing needs, student characteristics and learning facilities through observation and interviews found that the majority of students needed complete learning media, maximizing the use of learning facilities that were tablets that they have. Students want an interesting, fun, and interactive learning medium that makes it easier for them to understand economic statistics material. Students have characteristics that are happy with new things, learning facilities owned by students and schools also support media with contemporary technology. The results of this need analysis become the basis for media design and development, where there were several advantages of media developed by researchers, namely simple and interesting, having simulations, interactive counting, varied questions, there were online quizzes, and can be accessed for free online and offline. The developed media was also declared valid by 5 expert validators. The valid media was tested to see the response to its use from both students and teachers. Suggestions and input from the trial stage then became the material for media improvement by researchers. Then, the media was implemented in different students and schools. At the end of the limited trial and implementation, students were asked to fill out a response questionnaire to the use of media to assess the level of practicality and usefulness of the media.

Media was stated to have high practicality and usefulness by students and teachers. Based on the results of the student response questionnaire, as many as 75% of students in the trial were limited, and 100% of students were staged in implementation, stating that the media had a high level of practicality and usefulness. Even the two teachers in the trial stage were limited and the implementation gave the highest score for the media use response questionnaire. Students and teachers gave positive responses, even asking for media to be developed for all the materials in economics lessons. The processes and results show that android-based media developed with the ADDIE model was feasible to use, effective in increasing student learning motivation, practical to use and beneficial for students and teachers. There were limitations that were then recommended to subsequent researchers to be of concern, including the media that was made sometimes still experiences problems in its use, namely bugs and freezes, media also has not been uploaded to the Play Store, and the media was still created for one basic competency material and implemented on a small scale. It was hoped that further researchers could pay attention to bugs and freezes in the media, create media with a variety of materials, upload media to the Play Store for a wider range of use, and implement media on a larger number of students and schools.

REFERENCES

Aghni, R. I. (2018). Functions and Types of Learning Media in Accounting Learning. *Indonesian Journal of Accounting Education*, *16*(1), 98–107. https://doi.org/10.21831/jpai.v16i1.20173

Andriani, R., & Suratman, A. (2021). Andrioid-Based Learning Media to Improve Student Motivation and Learning Outcomes. *Journal of Analys*

, *7*(1), 56–65. https://doi.org/10.15575/ja.v7i1.10654

Arsyad, A. (2017). *Learning Media*. Jakarta: PT Raja Grafindo.

Arthur, R., Septiandini, E., & Renna, N. (2022). *Interactive Multimedia in Shallow Foundation Support Capacity Material*. *55*, 64–76. Retrieved from http://dx.doi.org/10.23887/jpp.v55i1.34501

Cahyani, E. D. (2019). *Analysis of Acceptance of Teacher's Room Application as a Medium for Fulfilling Academic Information for High School Students in the City of Surabaya Reviewed from the Utaut2 Model* (Universitas Airlangga). Universitas Airlangga. Retrieved from https://repository.unair.ac.id/88470/

Commission, P. (2013). *On Efficiency and Effectiveness: Some Definitions*. Canberra: Commonwealth of Australia.

Darejeh, A., Mashayekh, S., & Marcus, N. (2022). Cognitive-based methods to facilitate learning of software applications via E-learning systems. *Cogent Education*, *9*(1), 1–21. https://doi.org/10.1080/2331186X.2022.2082085

Daryanto. (2016). *Learning Media*. Yogyakarta: Gava Media.

Goddess, R. L. (2021). *Multimedia Development of Learning Social Arithmetic Materials Using Articulate Storyline to Facilitate Learning That Applies The Montessori Method at Kalyca Montessori Junior High School Yogyakarta*. Sanata Dharma University.

Dong, C., & Liu, X. (2013). Development of Android Application for Language Studies. *IERI Procedia*, *4*, 8–16. https://doi.org/10.1016/j.ieri.2013.11.003

Glod-Lendvai, A.-M. (2018). Validation – a brief introduction. *GeoPatterns*, *3*(1), 10–15. https://doi.org/10.5719/geop.3.1/2

Harmono, H. D. (2020). Validation of Dissolved Mercury (Hg) Metal Analysis Method in Surface Water with Automatic Mercury Analyzer. *Indonesian Journal of Laboratory*, *2*(3), 11–16. https://doi.org/10.22146/ijl.v2i3.57047

We are, N. (2022). Development of Interactive Learning Media Based on Articulate Storyline on Tax Administration Materials with Basic Competencies of Income Tax 21 Accounting Class. *JOURNAL OF EDUCATIONAL* SCIENCES, *4*(3), 3201–3213.

Kertih, I. W., & Sriartha, I. P. (2022). *Supplement Book of Social Studies Teaching Materials Through the Empowerment of Bali Local Wisdom as A Learning Source*. *55*, 182–193. Retrieved from http://dx.doi.org/10.23887/jpp.v55i1.45847

Kusuma, R. S. (2021). *Development of Articulate Storyline Application-Based Economic Learning Media for Class X Social Studies A Students at SMAN 1 Purwosari, Pasuruan Regency* (State University of Malang). State University of Malang. Retrieved from http://repository.um.ac.id/186328/

Kuswanto, J. (2020). Development of Android-Based Learning Media in Class XI Biology Subjects. *Indonesian Journal of Business Intelligence*, *3*(2), 54–60.

Kuswanto, J., & Radiansah, F. (2018). Android-Based Learning Media In Class XI Network Operating System Subjects. *Infotama Media Journal*, *14*(1), 15–20.

Lazareska, L. (2017). Analysis of the Advantages and Disadvantages of Android and iOS Systems and Converting Applications from Android to iOS Platform and Vice Versa. *American Journal of Software Engineering and Applications*, *6*(5), 116–120. https://doi.org/10.11648/j.ajsea.20170605.11

Mulyatiningsih, E. (2016). *Applied research methods in the field of education*. Yogyakarta: Yogyakarta State University.

Nugraheni, T. D. (2017). *Development of Interactive Learning Media Using Articulate Storyline in Indonesian History Class X Subjects at SMK Negeri 1*. Semarang State University.

Octavia, A. D., Surjanti, J., & Suratman, B. (2021). Development of M-Learning Media Based on Articulate Storyline Application to Improve Learning Outcomes of High School Students. *Educational : Journal of Educational* Sciences, *3*(5), 2380–2391. Retrieved from https://edukatif.org/index.php/edukatif/article/view/797

Prasetyo, Y. D., Yektyastuti, R., Solihah, A., Ikhsan, J., Sugiyarto, K. H., & COMPANION research and conceptual studies on science learning based on national independence, M. (2015). *Development of Learning Models and Tools to Improve Higher Order Thinking Skills*. (November), 252–258.

Puspitarini, Y. D., & Hanif, M. (2019). Using Learning Media to Increase Learning Motivation in Elementary School. *Anatolian Journal of Education*, *4*(2), 53–60. https://doi.org/10.29333/aje.2019.426a

Rahmandani, F., Tinus, A., & Ibrahim, M. M. (2018). Analysis of the Impact of Using Gadgets (Smartphones) on the Personality and Character (Burly) of Students at Sma Negeri 9 Malang. *Civic Journal of Law*, *3*(1), 18–44. https://doi.org/10.22219/jch.v3i1.7726

Razeed, M., & Nowfeek, M. (2022). A Review of Android operating system security issues. *International Journal of Research and Scientific Innovation (IJRSI)*, *9*(1), 26–30. Retrieved from https://www.researchgate.net/publication/358425896_A_Review_of_Android_operating_system_security_issues

Riduwan. (2018). *Measurement Scale of Research Variables*. London: Alfabeta.

Rivai, N. S. and A. (2019). *Teaching Media*. Bandung: Sinar Baru Algesindo.

Riyadi, T. A. (2022). Effect Of Apk File On Android Operating System Security Based On Static and Dynamic Analysis. *InfoTekJar : National Journal of Informatics And Network Technology*, *6*(2), 6–11. Retrieved from https://jurnal.uisu.ac.id/index.php/infotekjar/article/download/4677/pdf

Sari, P. R., Djaja, S., & Kantun, S. (2019). Development of Android-Based Learning Media With Appy Pie System On Service Company Adjustment Journal Material For Class Xi Social Studies At Sma Negeri 2 Jember. *Journal of Economic Education: Scientific Journal of Educational Sciences, Economic Sciences And Social Sciences*, *13*(2), 91. https://doi.org/10.19184/jpe.v13i2.11005

Setiadi, M. E., Ghofur, M. A., & Surabaya, U. N. (2020). Development of Android-Based Mobile Learning Media with a Contextual Approach in Economics Class X Social Studies Subjects. *Journal of Education and Science*, *20*(3), 291–307.

Setiawati, F. C. (2017). *Increased motivation to learn English through the use of the student's android application at smk jawahirul ulum jabon sidoarjo thesis*.

Sibilana, A. R. (2016). *Development of Android-Based Learning Media for PAI Subjects for Class XI at SMA Negeri 2 Malang* (Maulana Malik Ibrahim State Islamic University Malang). Maulana Malik Ibrahim State Islamic University Malang. Retrieved from http://etheses.uin-malang.ac.id/4095/1/14770051.pdf

Sudjana, N. (2017). *Assessment of Teaching and Learning Process Results*. Bandung: Juvenile Rosdakarya.

Sugiyono. (2017). *Research & Development Research and Development Methods*. London: Alfabeta.

Syahza, A. (2021). *Research Methodology*. Pekanbaru: Unri Press.

Tarika, T. (2018). The Use of Image Media to Increase Motivation to Learn Social Studies for Grade I Students of SDN 019 Aursati, Mining District, Kampar Regency. *Journal of Pajar (Education And Teaching)*, *2*(2), 179. https://doi.org/10.33578/pjr.v2i2.5065

Verde, A., & Valero, J. M. (2021). Teaching and Learning Modalities in Higher Education During the Pandemic: Responses to Coronavirus Disease 2019 From Spain. *Frontiers in Psychology*, *12*, 1–12. https://doi.org/10.3389/fpsyg.2021.648592

Yohana Paramita, W. T. S. (2021). Critical Factors of E-Learning Readiness Drivers of Economic Learning Performance of High School Students During the Covid-19 Pandemic. *Journal of Education: A Journal of Research Results and Literature Studies in the Fields of Education, Teaching and Learning*, *7*(2), 314–327.