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Development of android-based immune system learning media SMA Negeri 6 Sidrap

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ABSTRACT

This android application-based learning media is an interactive teaching material that can facilitate students in the learning process. the purpose of the research is to produce valid and practical android-based learning media in Biology subjects to facilitate the learning process. The research method used is Research and Development (R&D) by applying the 4D model with stages: 1) Define, 2) Design, 3) Develop, 4) Disseminate. Data were obtained through observation, interview, and questionnaire techniques. Data processing was carried out with quantitative descriptive techniques using formulas and validation criteria and practical criteria. The results showed that based on the validation test by material experts and media experts, it was declared very valid with a percentage value of 83.2%. While the results of the assessment of the teacher's response were declared very practical with a percentage value of 97.14% and the results of responses from students were declared very practical with a percentage value of 84.97%. Based on the data obtained, it can be concluded that the development of learning media based on android applications is declared feasible for use in the Biology learning process.

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1. INTRODUCTION

The experience of learning is now more meaningful and varied thanks to the current fast-paced development of technology, which is characterized by the emergence of various types of technology, including in the world of human resource development that can be used as media and learning resources (Zulkifli et al., 2021). Teachers must be able to innovate in the classroom in light of advances in science and technology (IPTEK). This is done through the application of various programs that can produce interactive learning media. One of them is Android based on applications learning, a different type of educational tool that can be utilized whenever and anywhere (Sari & Cahyono, 2020).

A smartphone is a mobile phone that features a PDA (Personal Digital Assistant) that can operate like a mini computer and can be used for communication (D. R. Putra & Nugroho, 2016). (Tutut, 2013) stated that the use of smartphones in Indonesia exceeded 15 million units in the second quarter of 2013, with the majority of users being teenagers

aged 15-18 years. The rapid development of smartphones is an opportunity, especially in education. For this reason, teachers must be more creative in solving educational problems (Syahmi et al., 2022). The creation of cutting-edge, imaginative, and interactive learning media is one opportunity.

Based on observation, SMA Negeri 6 Sidrap has allowed students to bring smartphones or androids for certain lessons. The use of smartphones often causes negative impacts (Sobon & M, Jelvi, 2019) stated that the use of smartphones can reduce the level of student learning activities. However, smartphones can also be utilized as learning media. based on (Adawiyah & Safrida, 2021)belief that using smartphones as learning resources might result in an enjoyable environment, provide an easier understanding of the material and add to the learning experience, and require a short time for the teacher to deliver a material (Baalwi, 2023). (Kuswanto, 2018) stated that the existence of learning media can allowing students to learn based on their skills regardless of time and place. By using learning media students will not feel bored, because students do not only listen to the theory with the lecture method from the teacher, but students will be more interested in the lessons taught and encouraged to learn in order to achieve good learning outcomes (Nurmayanti et al., 2021).

Learning media that utilizes smartphones is one development in alternate media for learning (Priangga, 2021). The availability of these learning resources is anticipated to supplement classroom instruction and give students the chance to learn less-mastered subjects like biology. Biology is a subject that is frequently memorized (Theresia Nona Elci et al., 2021). This can make it challenging for students to comprehend biology classes because learning biology essentially entails grasping concepts rather than memorization of the entire (Yusup, 2018) like the Immune System material, this material really requires a strong understanding, because in learning the immune system includes all structures and processes that provide the body's defense against pathogens (Oktavia & Nurani, Nani, 2021), therefore, educational media that can aid students is required. One of the learning tools that can leverage technology to make learning simpler is Android-based media for learning, which can make it simpler for students to obtain subject knowledge.

In order for pupils to better understand the information, learning materials should be made as interesting as feasible (Astuti et al., 2018). Designing learning media requires a relevant curriculum that is used as the main reference for making learning media in formal and informal education (Dwiqi et al., 2020). The learning media selection needs to be tailored to the participant's characteristics (I. Putra, 2021). In addition, usability, attractiveness, and utility must be considered (Royani et al., 2021). In developing a learning media, several supporting applications are needed such as Website 2 Apk Builder, which is software that converts learning media files from Power Point combined with Ispring Suite into android applications. It is anticipated that using this alternate learning method will make it simpler for pupils to engage in learning Biology.

Considering the outcomes of interviews and observations at SMA Negeri 6 Sidrap, learning still looks monotonous which makes students quickly feel bored or bored with learning and lack of facilities makes it challenging for students to comprehend the lessons being taught. Thus, teachers need practical media so that they are not constrained in the learning process and can be accessed even though facilities at school are not available. In accordance with this, a learning tool for mobile devices was created that is suitable for the learning process, especially for Biology topics.

Microsoft Power Point is a Microsoft Office application program that is useful for creating presentation files. Various features and attractive templates that can be used for presentations, and assist in spreading the word by using interactive presentation slides. Ispring Suite is a tool used to create interactive questions with various forms (Nugraha et al., 2021). Ispring Suite can convert Power Point files into an attractive flash format that users can use directly (Hanisah et al., 2022). Ispring Suite is also a versatile e-learning

authoring tool that allows the creation of various types of e-learning content (Ariyanti et al., 2020). Website 2 Apk Builder is used to convert web-based applications to apk-based applications. The way this application works is very easy by changing the file format from web (html) to android application (apk) so that this web-based application can function properly on android-based smartphones (Safira et al., 2022). The three apps can be combined to build an android learning application that will make it easier for students as well as educators to teach and learn (Furi & Rozi, 2020).

2. RESEARCH METHOD

Research and development (R&D) is a sort of activity used in this study to create interactive learning materials. The 4-D model (Define, Design, Develop, and Disseminate) will be the basis for the R&D model that will be used which was created by (Thiagarajan, 1974). As a result of this research, it is anticipated that learning resources based on Android applications would be created that are reliable and useful, making them appropriate for use as teaching resources for students.

Participants in this study were the Biology teacher for class XI and a total of 30 students from IPA 1 in class XI. This study was conducted at SMA Negeri 6 Sidrap. which is located at Arawa, Kec. Watang Pulu, Sidrap Regency, South Sulawesi. Data were gathered through observation, unstructured interviews, and questionnaires that were sent to media, material, and respondents that included biology class XI teaching professionals and class XI students. The validity and practical of learning media based on applications Android were examined in this study using quantitative analysis of the data.

To calculate the ratio of validity and practicality in learning media, apply the formula below:

$$percentage = \frac{\sum x}{SMI} \text{ x } 100\%$$

(Tegeh et al., 2014)

Description:
∑ x = Overall Score
SMI = Ideal Maximum Score
100% = Constant

The validity of learning media based on android is evaluated using the following criteria:

Table 1. Validator Assessment Criteria

Validity Criteria	Category	Description
81,00% - 100,00%	Very Valid	Can be applied without modification
61,00% - 80,00%	Valid	Can be applied to small repairs
41,00%- 60,00%	Less Valid	It is suggested not to use it because it needs major fixes.
21,00% - 40,00%	Not valid	Unusable
0,00% - 20,00%	Not Very Valid	Unusable

Source: (Wandani & Nasution, 2017)

The results of e-module practicality were measured using the following criteria:

Table 2. Practicality Assessment Criteria

Validity Criteria	Category	Description
81,00% - 100,00%	Very Practical	Can be used without improvement
61,00% - 80,00%	Practical	Can be applied to small repairs
41,00%- 60,00%	Less Practical	It is suggested not to use it because it needs major fixes.
21,00% - 40,00%	Not Practical	Unusable
0,00% - 20,00%	Not Very Practical	Unusable

Source: (Wandani & Nasution, 2017)

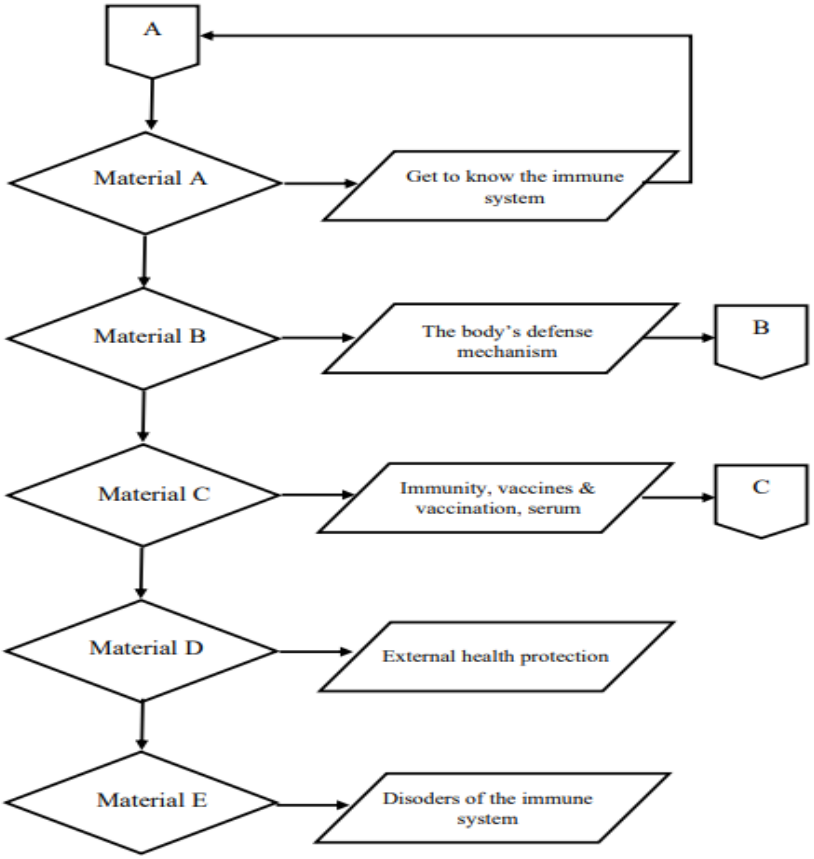
3. RESULTS AND DISCUSSIONS

3.1. Define Stage

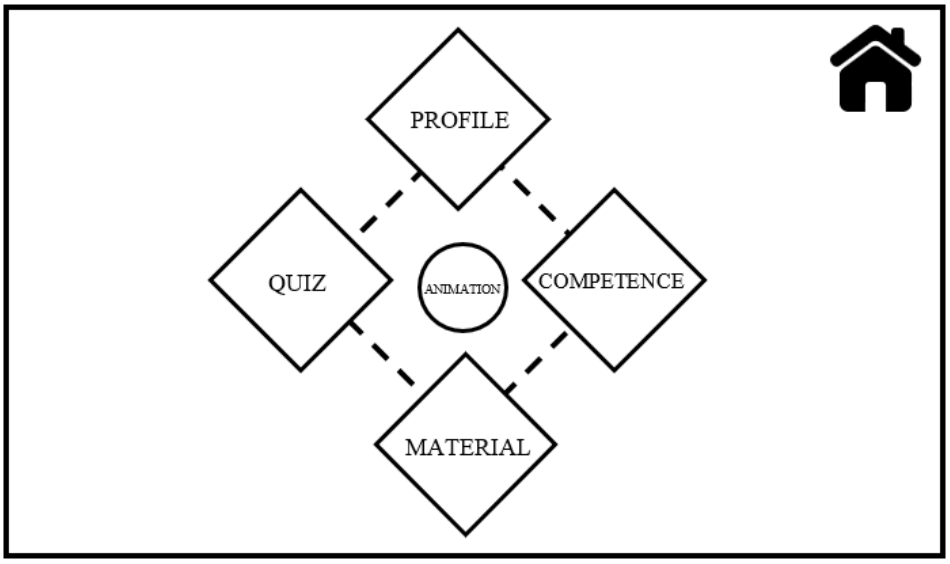
The definition stage involves completing five steps: starting and concluding analyses, the student analysis, the concept analysis, the task analysis and goal analysis. According to the preliminary analysis, researchers discovered that a lack of resources at the school made it challenging for students to access learning. With relation to immune system material in particular, it is envisaged that the availability of learning media using apps for Android will be able to meet student learning issues. Following With relation to immune system material in particular, it is envisaged that the availability of learning media using apps for Android will be able to meet student learning issues.

3.2. Design Stage

Several steps are taken at this level, namely, the preparation of tests in the form of task instruments or practice questions, then continue with the mapping of the content to the media selection, which was done in accordance with the results of defining the media chosen and used are tests, images, audio, and animation that will be presented in learning materials based on Android applications. The next step is format selection, where the format used is in accordance with the circulation of learning strategies or lesson plans. The final step is to create flowcharts and storyboards to represent the first design of learning materials based on Android applications. The flowchart and storyboard for creating learning material based on Android are shown below.



Picture 1. *Flowchart* Learning Media section Material

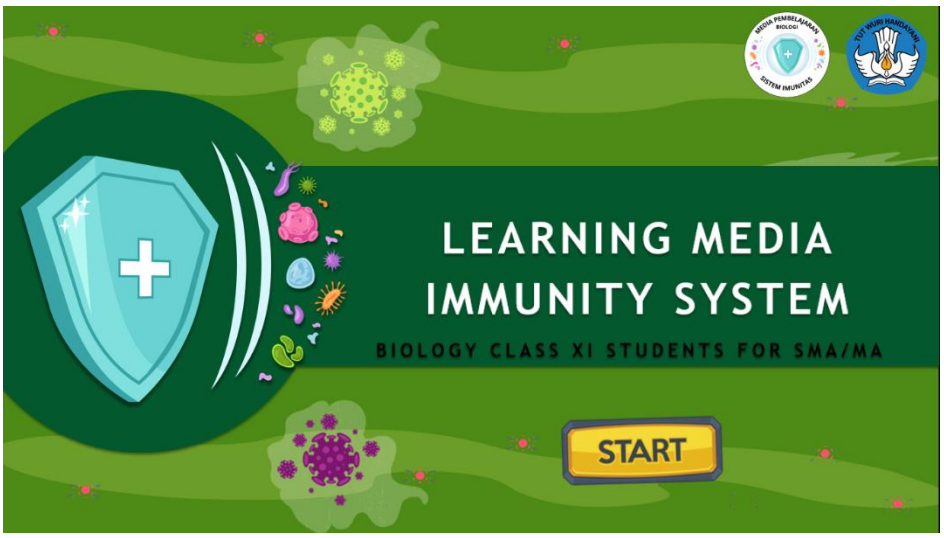


Picture 2. *Storyboard* Learning Media Main Menu section

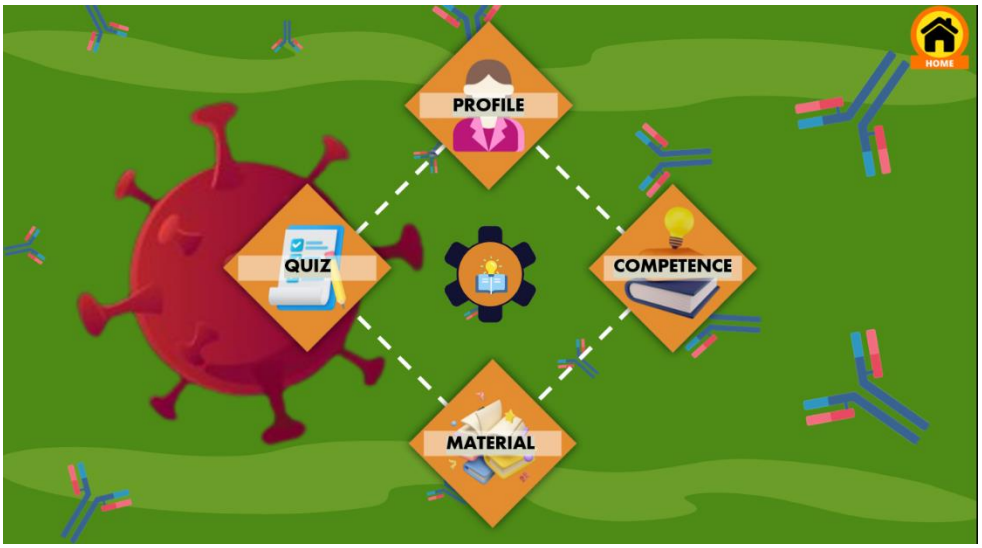
3.3. Development Stage

a. Expert Validation

After the learning media have been properly prepared, then validity is carried out to assess the degree of viability of the designed media, specialists in the media and the materials are used. and make revisions to the learning media if improvements are still needed. Listed below is a collection of educational materials created using Android applications:



Picture 3. Start Display of Learning Media Based on Android



Picture 4. Main Menu Display of Learning Media Based on Android

b. Development Trial

The study's findings suggest that the media may be used with minor adjustments. In this stage, researchers conducted trials with various steps, namely small group trials. Students of class XI IPA 1 in SMA Negeri 6 Sidrap served as the study's test subjects. Thirty students from SMA Negeri 6 Sidrap's Biology teachers and students in class XI IPA

1 served as the study's test subjects during the field testing. The field trial's goal is to determine whether the medium is appropriate for use and dissemination.

c. Final Product revision

At this stage, Based on the findings of teacher and student feedback surveys, researchers make final adjustments with regard to media for learning based on Android applications.

Table 3. Final Revision Result

No	Things to Revise	Revision Result
1.	Writing is too small	Researchers made improvements to all texts in the learning media.

3.4. Disseminate Stage

Students at XI IPA 1 SMA Negeri 6 Sidrap received an enhanced version of the android-based media for learning application from the researchers.

3.5. The level of validity of learning media based on android applications

The validation process of learning media based on android applications is assessed from the material and media aspects. With validation, the media developed can be measured for feasibility. The validity assessment uses an assessment sheet in the form of a questionnaire containing instruments. The outcomes of media validators and material validators are as follows and evaluation of media for learning based on android:

Table 4. Percentage of Total Score of Each Validator

Respondents	Percentage Score	Description
Media Validator	81,53%	Very Valid
Material Validator	85,00%	Very Valid
Overall Analysis	83,2%	Very Valid

Based on Table 4, The percentage of the total value gathered in the media validator of 81.53% and the material validator of 85.00% is included in the "very valid" category, indicating that learning media based on android applications can be used in Biology classes to cover material on the immune system. Android apps can be used in biology classes to address immune system-related information. The results of the acquisition of the practicality value of learning media based on Android applications have an average percentage value of 83.2% when the findings of the evaluation of media validators and material validators are combined. This qualifies as "very practical" and can be used just as is.

3.6. Practicality level of Android Based Learning Media

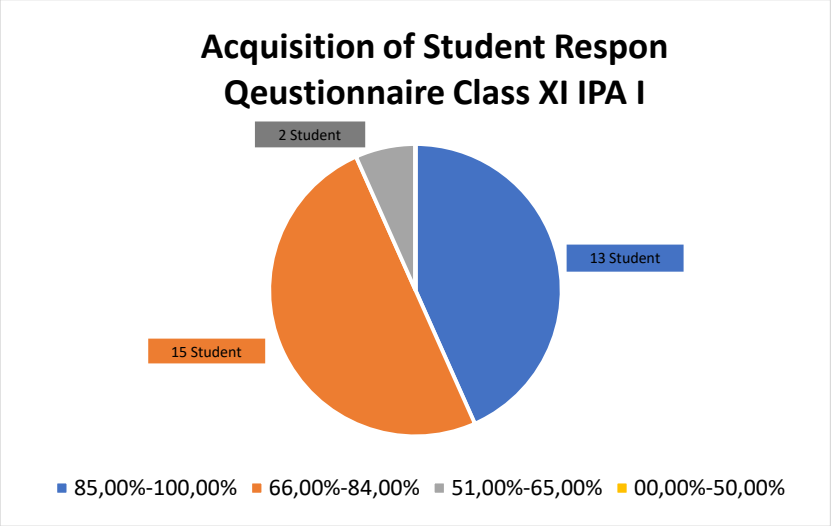
Use of dependable learning media in education is measured by practicality. If student and teacher evaluations meet the requirements from the media user response questionnaire, then the use of media in learning can be deemed to be practical.

a. Teacher response questionnaire data analysis

This stage is carried out by distributing questionnaires containing instruments to teachers of Biology class XI. The questionnaire criteria consist of material / content, media, language, and evaluation, each of which consists of several items, with the assessment score obtained from the teacher's response questionnaire is 68, with the percentage result obtained is 97.14% (very practical) and can be used without improvement.

b. Analysis of student response questionnaire data

The 30 students in the XI IPA 1 class will receive questionnaires at this stage to gauge their reactions to the developed android-based learning materials. The results of the analysis of the student response questionnaire are as follows:



Picture 5. Acquisition of student response questionnaires

The graph shows the percentage score of questionnaire answers from each student in class XI IPA 1 who used Android-based learning resources. The average percentage of students who filled out the questionnaire was 84.97%, including in the "very practical" category.

4. CONCLUSION

The process of developing educational materials based on Android involves the following four steps: (1) Define, which entails preliminary and final analysis, student analysis, task analysis, concept analysis, and creation of learning objectives. (2) Design, which entails test preparation, media selection, format selection, and initial design. (3) Develop, which entails product development, validation, development trials, and product revision. (4) Disseminate. The learning media based on android have a very high level of validity, according to evaluation findings from media validators and material validators, with 83.2% outcomes. A score of 97.14% was given for the category "Very Practical" on the teacher response assessment. A score of 84.97% in the category "Very Practical" and approbation of learning resources based on Android were also obtained from the results of the student response assessment.

The results of research on the development of learning media for the immune system can be expected to be a reference material for the development of creative and innovative learning media in the world of education, as well as providing an interesting learning experience that is not limited by space and time so that learning can be maximized and learning objectives can be achieved.

REFERENCES

Adawiyah, R., & Safrida, L. N. (2021). Pengembangan dan Sosialisasi Game Edukasi Matematika Berbasis Android "GESIT" sebagai Alternatif Media Pembelajaran pada Masa Pandemi COVID-19. *JPKMI (Jurnal Pengabdian Kepada Masyarakat Indonesia)*, *2*(2), 83–92.

https://doi.org/10.36596/jpkmi.v2i2.134
Ariyanti, D., Mustaji, & Harwanto. (2020). Multimedia Interaktif Berbasis Ispring Suite 8. *Education and development*, *8*(2), 381–389.
Astuti, I. A. D., Dasmo, D., & Sumarni, R. A. (2018). Pengembangan Media Pembelajaran Berbasis Android Dengan Menggunakan Aplikasi Appypie Di Smk Bina Mandiri Depok. *Jurnal Pengabdian Kepada Masyarakat*, *24*(2), 695. https://doi.org/10.24114/jpkm.v24i2.10525
Baalwi, M. A. (2023). Pengembangan Media Pembelajaran Teknologi Augmented Reality Berbasis Smartphone Android pada Materi Bangun Ruang. *Journal on Teacher Education*, *4*(3), 756–761.
Dwiqi, G. C. S., Sudatha, I. G. W., & Sukmana, A. I. W. I. Y. (2020). Pengembangan Multimedia Pembelajaran Interaktif Mata Pelajaran IPA Untuk Siswa SD Kelas V. *Jurnal Edutech Undiksha*, *8*(2), 33. https://doi.org/10.23887/jeu.v8i2.28934
Furi, A. R., & Rozi, F. (2020). Pengembangan E-Modul Sebagai Sumber Belajar Mata Pelajaran Matematika Kelas Vi Di Sdn 3 Srengat. *JIPI (Jurnal Ilmiah Penelitian dan …*, *05*, 161–171. http://jurnal.stkippgritulungagung.ac.id/index.php/jipi/article/view/3639%0Ahttps://jurnal.stkippgritulungagung.ac.id/index.php/jipi/article/download/3639/1422
Hanisah, Irhasyuarna, Y., & Yulinda, R. (2022). Pengembangan Media Pembelajaran Interaktif menggunakan Ispring suite 10 pada Materi Reproduksi Tumbuhan untuk Mengukur Hasil Belajar. *JUPEIS : Jurnal Pendidikan dan Ilmu Sosial*, *1*(3), 6–16. https://doi.org/10.55784/jupeis.vol1.iss3.68
Kuswanto, J. (2018). Perancang Media Pembelajaran Model Game Mata Pelajaran Penjaskes Kelas V. *SITECH*, *Vol. 2*, *No*.
Nugraha, F. A., Nur'aeni, E., Suryana, Y., & Muharram, M. R. W. (2021). Efektivitas Media Powerpoint dalam Pembelajaran Materi Luas Daerah Segitiga untuk Meningkatkan Minat Belajar Peserta Didik di Sekolah Dasar. *Edukatif : Jurnal Ilmu Pendidikan*, *3*(5), 2760–2768. https://edukatif.org/index.php/edukatif/article/view/931
Nurmayanti, Sam, N. E., & Idrus, R. (2021). *Efektivitas Media Pembelajaran AIJ Berbasis Aplikasi Simulasi Cisco Packet Tracer Terhadap Hasil Belajar Peserta*. *1*(1), 48–54. https://doi.org/10.31605/jcis.v1i1.845
Oktavia, D., & Nurani, Nani, M. (2021). Edukasi Tentang Upaya Meningkatkan Imunitas Tubuh Di Masa Pandemi Covid-19 Di Ruang Lingkup Karang Taruna Dan Forkomdarisma Rw.09 Cirendeu, Ciputat Timur. *Jurnal Pengabdian Masyarakat LPPM UMJ*, *1*(1), 1–5.
Priangga, Y. S. (2021). Pengembangan Media Pembelajaran Berbasis Aplikasi Smartphone Untuk Memfasilitasi Kemampuan Berpikir Kreatif Matematis Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(2), 1116–1126. https://doi.org/10.31004/cendekia.v5i2.599
Putra, D. R., & Nugroho, M. A. (2016). *Pengembangan Game Edukatif Berbasis Android Sebagai Media Pembelajaran Akuntansi Pada Materi jurnal Penyesuaian Perusahan Jasa*. *XIV*(1).
Putra, I. (2021). Media Pembelajaran Biologi Berbentuk Infografis Tentang Materi Sistem Imun Pada Manusia. *Jurnal Penelitian dan Pengembangan Pendidikan*, *5*(3), 438. https://doi.org/10.23887/jppp.v5i3.38361
Royani, E., Haris, M., Hadisaputra, S., Studi, P., Kimia, P., & Mataram, U. (2021). *PENGEMBANGAN MEDIA PEMBELAJARAN KIMIA BERBASIS WEBSITE Development of Chemistry Learning Media Base on Website 2 APK Builder on Acid-Base Solution Material*. https://doi.org/10.29303/cep.v4i2.2670
Safira, D. V. T., Marliani, D. S., Nasihah, D. D., Nurmaulidiyah, N., Mubarok, J. F., & Ratnaningsih, N. (2022). Pengembangan Media Interaktif Berbasis Android Berbantuan Ispring dan Website 2 APK Builder pada Materi Aritmatika Sosial. *GAUSS: Jurnal Pendidikan Matematika*, *5*(2), 15–28. https://doi.org/10.30656/gauss.v5i2.5817
Sari, T. T., & Cahyono, A. H. (2020). Pengembangan E-Learning Berbasis Android "Fun Math" Sebagai Alternatif Belajar Matematika di Tengah Pandemi. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *4*(2), 1283–1298. https://doi.org/10.31004/cendekia.v4i2.355
Sobon, K., & M, Jelvi, M. (2019). Pengaruh Penggunaan Smarthphone Terhadap Motivasi Belajar Siswa Sekolah Dasar di Kecamatan Mapanget, Kota Manado. *Jurnal Inovasi Pendidikan dan Pembelajaran sekolah Dasar*, *Volume 3,*.
Syahmi, F. A., Ulfa, S., & Susilaningsih. (2022). Pengembangan Media Pembelajaran Komik Digital Berbasis Smartphone Untuk Siswa Sekolah Dasar. *JKTP: Jurnal Kajian Teknologi Pendidikan*, *5*(1), 81–90. https://doi.org/10.17977/um038v5i12022p081
Tegeh, I. M., Jampel, I. N., & Surata, I. K. (2014). *Model Penelitian Pengembangan* (1st ed). Graha Ilmu.

Theresia Nona Elci, Yohanes Bare, & Oktavius Yoseph Tuta Mago. (2021). Pengembangan Media Pembelajaran Biologi Berbasis Android Menggunakan Model Pembelajaran Problem Based Learning Pada Materi Sistem Ekskresi Di Kelas VIII SMP. *Jurnal Pendidikan Mipa, 11*(2), 54–62. https://doi.org/10.37630/jpm.v11i2.484

Tutut. (2013). *Smartphone Android: Samsung Kuasai 80% Pasar Indonesia*. http://www.solopos.com/2013/08/01/penjualan-smartphone-samsungkuasai-80-pasar-indonesia-433539.

Wandani, M. N., & Nasution, H. . (2017). Pengembangan Multimedia Interaktif Dengan Autoplay Media Studio Pada Materi Kedudukan Relatif Dus Lingkaran. *Jurnal Kajian Pembelajaran Matematika*, *2*(1), 10.

Yusup. (2018). Kesulitan Guru Pada Pembelajaran Biologi Tingkat Madrasah/Sekolah Di Provinsi Jawa Barat (Studi Kasus Wilayah Priangan Timur). *Jurnal BIOEDUIN : Program Studi Pendidikan Biologi*.

Zulkifli, N., Ferdiansyah, H., & Nurmayanti. (2021). *Pengembangan Video Tutorial dalam Pelatihan Magang Kerja Siswa SMK di PT . Sinar Energi Sulawesi*. *5*(1), 116–123.