The Development of Science Learning Media Using Android Applications in Solar System Subject

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Abstract
This research uses R&D (Research and Development). The model used in this research is ADDIE (Analysis, Design, Development, Implementation, and Evaluation), but the researcher only limits it to the development stage. This study aims to produce and test the feasibility of Android-based science learning media in solar system subjects, especially in the sixth grade. Data collection techniques used are literature studies and questionnaires/questionnaires. The product feasibility test is carried out by media experts and material experts. The data analysis technique was carried out qualitatively and quantitatively. Based on the feasibility test conducted by the experts, it can be seen that the validation results by media experts obtained an average of 4.69 which indicated the "Very Worthy" category, then the validation results by material experts obtained an average of 4.32 so it entered in the "Very Worthy" category. Based on these data, it can be concluded that the Android application-based science learning media in the solar system subject is appropriate to be used as a medium for learning science, especially the solar system subject.

Keywords: Media, Applications, Android, Solar System
INTRODUCTION

Ilmu Pengetahuan Alam (IPA) also known as Natural Sciences is one of several lessons that must be mandatory in elementary schools and is also one of the fields of science that makes the natural environment around us the object of study (Sahibu & Disyan, 2018: 245). This is in line with the thoughts of Irfan et al. (2019: 19) who state that science is studies that occur in nature. Science learning in elementary schools uses general science concepts whose subjects have not been separated. In the science learning, students are expected to have many opportunities to develop skills by carrying out various activities, including researching various scientific facts, especially those related to daily life, observing various objects or natural events, practicing the application of scientific concepts in everyday life, and doing various activities or science experiments (Miftianul & Gunawan, 2020: 169).

The implementation of science learning in elementary schools has its challenges to be able to become subjects that can equip students with a conceptual understanding of the natural environment. Based on the research conducted by Dedynggego et al. (2015: 46) the delivery of science material in the Solar System subject is still through books or two-dimensional images so students have to imagine for themselves how rotation, revolution, and so on can occur in the solar system. The Solar System is real matter and exists all around us but is abstract. This means that the solar system has a form but it is impossible for the teacher to bring the original form of the solar system. Suprihatin in Suryandaru & Setyaningtyas (2021: 6041) states that teachers are expected to be able to apply interesting learning and which can lead to motivation to learn or motivate students. Since the material in the Solar System is abstract, teachers need to make appropriate efforts so the abstract material can be easily understood and understood by students. Learning media is one of the means to convey information about a learning concept that can be received very well (Sari & Setiawan, 2018:101). Wahyu et al., (2020: 108) revealed that many studies prove that the use of learning media can change the learning patterns, in the sense that students who were previously objects become the main subjects of learning to make learning more interactive, participatory, and collaborative. Nadjurodin (2015: 13) suggests that the function of learning media is to increase students' motivation to learn, clarify and complete the information provided verbally, as well as create enthusiasm and reduce student boredom while studying. According to Annisa (2019: 26), current learning media still use the conventional media of books and wall Images or still images, thus making the learning atmosphere monotonous and less interesting. This is in line with Suparman et al., (2020: 251) who revealed that in general learning in elementary schools still uses conventional learning where teachers still use the lecture method so that students in a class are less active and less enthusiastic.

It is not only influenced by effective communication to achieve optimal learning, but it is also necessary to pay attention to the media used by teachers in delivering learning materials (Muttaqin et al., 2021: 2). Learning media according to Prusetyo (2017: 15) is a tool that has a function in conveying learning messages. The implementation of media in learning or teaching activities does not intend to replace the role of the teacher, but to complement and assist teachers in delivering material or information (Hasan, 2021: 224). Learning media according to Arsyad in Abdullah, (2017: 43) has various types, including visual media, audio-visual, multimedia, and reality. The benefit of using audio-visual learning media in classroom learning will make learning more interesting, effective, and efficient to provide new experiences for students (Rosidah, 2016: 124).

Advances in science and technology influenced the use of teaching aids in various schools and other educational institutions (Muhson, 2010: 1). Tahel & Ginting, (2019: 114) revealed that recently many learning media have been integrated with information technology to make it easier for students and teachers to access the media. Aquami in Vivi (2021: 1343) states that the excess use of technology in learning makes student performance better. Technology-based learning media is considered capable of being a good learning media because it is easy to use, can be used continuously, does not require a lot of space to store media, and will not be damaged due to weather factors. Based on this, the researcher wants to develop an android application-based
science learning media on the subject of the Solar System learning application will be made attractively by combining entertainment elements, namely a combination of text, images, audio narration, and animation to provide support for visualization of the solar system. This is in line with the thoughts of Maesaroh et al. (2016: 6) who revealed that learning media with Images and sound will make it easier for students to remember the material that has been conveyed by the teacher. Android is a Linux-based operating system designed for touch screen mobile devices such as smartphones and tablets. The current Android operating system has developed rapidly (Widiastika et al., 2020: 48). The existence of Android can simplify our activities and can be used as an innovation in various ways. According to Zuliana in Ibrahim & Ishartiwi (2017: 81), android has advantages including being able to take a comprehensive approach, an open-source, free platform, and also has a populist operating system. Android is very close to students’ daily life. In addition to functioning as a communication tool, Android also has the chance to be developed into interactive learning media which is useful for students (Isma Ramadhani Lubis & Jaslin Ikhsan, 2015: 192).

METHOD

This study uses the Research and Development method called R&D. The model of development used in this research is ADDIE (Analysis, Design, Development, Implementation, and Evaluation), but researchers only limit it to the development stage. This study aims to produce and test the feasibility of Android-based science learning media in solar system subjects, especially in sixth-grade elementary students. The researcher uses literature studies and questionnaires to collect the data. The product feasibility test is tested by 2 lecturers of the University of Muhammadiyah Surakarta as media experts and material experts. The data analysis technique was carried out qualitatively and quantitatively. Qualitative data were obtained from criticism and suggestions/input from media and material experts. Meanwhile, quantitative data were obtained from the results of the instrumented assessment on science learning media based on android applications in the Solar System subjects from media and material experts using a Likert scale. The data that has been obtained based on the feasibility test is then analyzed by finding the ideal mean (Mi) and Standard Deviation (SBi) Then the score obtained is converted into a 5-scale.

\[
M_i = \frac{1}{2} \left( \frac{x_{\text{maximum score}} + x_{\text{minimum score}}}{} \right)
\]

\[
SB_i = \frac{1}{6} \left( x_{\text{maximum score}} - x_{\text{minimum score}} \right)
\]

RESULT AND DISCUSSION

The study aims to produce media products and test the feasibility of Android-based science learning media in solar system subjects, especially in class VI SD. The first stage carried out by the researcher was the analysis stage. Needs analysis is carried out by conducting literature studies and questionnaires. Based on the results of the analysis of the literature study, it was found that students still had difficulties in learning science, especially the Solar System. Solar System material is abstract material. The teacher still conveys the material monotonously by using the lecture method and still images so that the students in the class are less enthusiastic and less active in asking the teacher. Since the material contained in the Solar System is still abstract, it requires appropriate teacher efforts so the material can be understood by students. Learning media is a means of delivering information about learning concepts that are very well received. In the second stage or the design stage, the researcher makes a product design. At this step, the researchers began to compile materials and quizzes that were adapted to basic competencies, indicators of competency achievement, and learning objectives. In addition, the researchers also prepared several fonts, images in png format, backgrounds, and icons that will later be used as navigation buttons. In the third stage or the development stage, there are several applications and software needed to develop research products. Some of them are Microsoft PowerPoint 2016, CorelDraw,
Canva, iSpring Suite version 10, and Website to APK Builder Pro. The most frequently used software is Microsoft PowerPoint 2016, which acts as the main software in product design. The following is the design on the product start page that was developed.

![Picture 1. Product Preview Design](image1)

After all the designs have been created in PowerPoint 2016, the next step is to create a quiz using the iSpring Suite application as shown in Picture 2. Then after the quiz is completed, the navigation buttons on each slide are enabled so they can be pressed according to the button directions as in Picture 3.

![Picture 2. Create Quizzes](image2)
![Picture 3. Activate Navigation Key Function](image3)

After the above steps are completed, the next thing to do is to publish the file that has been created as shown in Picture 4. Then the published file is uploaded to the Website to APK Builder Pro software to produce a file with the apk format, which is the final format that will be available later and could be installed on the smartphone as Picture 5.

![Picture 4. Publishing File](image4)
![Picture 5. Uploading Files to Apk](image5)

The final media product developed by the researcher is a media that collaborates with various types of interesting images, writings, audio, and video in apk format with the name Ayo Belajar Tata Surya and has a file size of 36.2 MB with 36 pages and can be run at least on Android version 5.0 otherwise known as the Lollipop version. The final result of the media product is described in the following figure.
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After the media has been developed is installed or set in such a way, then it is tested on media and material expert validators to determine the feasibility level of the application. Validation was carried out by 2 lecturers at the University of Muhammadiyah Surakarta. The media was validated by Mr. Almuntaqo Zainuddin, M.Pd. as a lecturer in Media and Learning Resources courses; ICT media; Computer. The material was validated by Anatri Desstya, S.T., M.Pd. as a lecturer in the subject of Basic Science Concepts; Elementary science learning; Elementary science education; Elementary Mathematics, and Natural Sciences Curriculum Study. After getting validation from the 2 experts, then the data obtained was processed. Analysis of research data was carried out quantitatively. Quantitative analysis was carried out on the data obtained from sheets that were validated by media experts and material experts. The analysis of the expert validation data is based on the conversion of the questionnaire that has been used. The data is in the form of a rating scale consisting of five scales, namely very worthy, worthy, enough, less worthy, and very less worthy as described in Table 1.

### Table 1
**Conversion of Scale into Score Scale**

| Scale | Criteria      | Value Interval                                | Score |
|-------|---------------|-----------------------------------------------|-------|
| 5     | Very Worthy   | $M_i + 1,5 \, SB_i > \leq$                    | 4,0   |
| 4     | Worthy        | $M_i + 0,5 \, SB_i \leq t < M_i + 1,5 \, SB_i$ | 3,3   |
| 3     | Enough        | $M_i - 0,5 \, SB_i \leq t < M_i + 0,5 \, SB_i$ | 2,7   |
| 2     | Less Worthy   | $M_i - 1,5 \, SB_i \leq t < M_i - 0,5 \, SB_i$ | 2,0   |
| 1     | Very Less Worthy | $< M_i - 1,5 \, SB_i$                     |       |

On the media expert validation sheet, there are 16 indicators with 4 aspects assessed by the validator including media appearance, quality, effectiveness, and efficiency. The media display aspect consists of 7 indicators, the media quality aspect consists of 4 indicators, the media effectiveness aspect has 2, and the media efficiency aspect has 3 indicators. This is as written in table 2 below:

### Table 2
**Media Expert Validation Indicators**

| Aspect          | Indicator                        | Score |
|-----------------|----------------------------------|-------|
| Media Display   | 1. Image usage                   | 4     |
|                 | 2. Background selection           | 5     |
|                 | 3. Selection of font              | 5     |
|                 | 4. Color composition              | 5     |
|                 | 5. Images relate and support clarity | 5     |
|                 | 6. Attractive program design      | 5     |
|                 | 7. Regular page design            | 5     |
| Media Quality   | 8. Ease of operation              | 5     |
|                 | 9. Media very flexible            | 4     |
|                 | 10. Can be used repeatedly        | 5     |
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| Aspect                         | Indicator                                                                 | Score |
|-------------------------------|---------------------------------------------------------------------------|-------|
| Media Effectiveness           | 11. On target and well-received                                           | 5     |
|                               | 12. Effective and efficient in the development and use of learning media   | 4     |
|                               | 13. Creative in ideas and pouring ideas                                   | 5     |
| Media Efficiency              | 14. Media Efficiency about time                                           | 5     |
|                               | 15. Media efficiency to space                                            | 5     |
|                               | 16. Media efficiency in terms of cost                                    | 4     |

Then the data obtained from the media expert validator is converted into a 5-scale score. Based on the validation from the media expert, the data calculation is obtained as follows:

| No. | Aspect             | Aspect Indicator Items | Total Score | Average Per Aspect Criteria | Criteria    |
|-----|--------------------|------------------------|-------------|----------------------------|-------------|
| 1.  | Media Display      | 1, 2, 3, 4, 5, 6, 7    | 34          | 4.86                       | Very Worthy |
| 2.  | Media Quality      | 8, 9, 10, 11           | 19          | 4.75                       | Very Worthy |
| 3.  | Media Effectiveness| 12, 13                 | 9           | 4.5                        | Very Worthy |
| 4.  | Media Efficiency   | 14, 15, 16             | 14          | 4.67                       | Very Worthy |
|     | **Average**        |                        | **4.69**    |                            | **Very Worthy** |

Based on table 3 above, the Media Display aspect obtained an average of 4.67 per aspect with the "Very Worthy" category. The average in the aspect of Media Quality is 4.75 with the "Very Worthy" category. In the aspect of Media Effectiveness obtained an average of 4.5 with the category "Very Worthy". The Media Efficiency Aspect obtained an average of 4.67 with the "Very Worthy" category. The overall assessment results on the developed media obtained an average of 4.69 which was in the "Very Worthy" category.

On the material expert validation sheets, there are 18 indicators with 5 aspects of assessment, including the relevance of the material, the presentation of the material, the language, the accuracy of the material, and the evaluation of learning. The material relevance aspect has 5 indicators, the material presentation aspect has 5 indicators, the linguistic aspect has 2 indicators, the material accuracy aspect has 2 indicators, and the learning evaluation aspect has 4 indicators. This is as written in the following table:

| Aspect                  | Indicator                                                                 | Score |
|-------------------------|---------------------------------------------------------------------------|-------|
| Material Relevance      | 1. Material according to basic competencies                               | 4     |
|                         | 2. Material according to the indicator of competency achievement         | 5     |
|                         | 3. The material is in accordance with the learning objectives             | 4     |
|                         | 4. The truth and accuracy of the concept                                 | 4     |
|                         | 5. The truth and accuracy of the theory                                  | 4     |
| Material Presentation   | 6. The material presented is clear and systematic                         | 4     |
|                         | 7. Material is presented in an interesting way                            | 5     |
|                         | 8. Completeness of supporting materials                                  | 4     |
|                         | 9. Encouraging students to know the contents of learning media           | 5     |
|                         | 10. Stimulate student engagement for independent learning                | 4     |
| Language                | 11. The language used is easy to understand                              | 5     |
|                         | 12. The description of the material is very good                          | 4     |
| Material Accuracy       | 13. Accuracy of drawings and illustrations of the material               | 4     |
|                         | 14. The accuracy of the terms used                                       | 4     |
Table 5

| No. | Aspect                   | Indicator Item | Total Score | Average Per Aspect | Criteria      |
|-----|--------------------------|----------------|-------------|-------------------|--------------|
| 1.  | Material Relevance       | 1, 2, 3, 4, 5  | 21          | 4.2               | Very Worthy  |
| 2.  | Material Presentation    | 6, 7, 8, 9, 10 | 22          | 4.4               | Very Worthy  |
| 3.  | Language                 | 11, 12         | 9           | 4.5               | Very Worthy  |
| 4.  | Material Accuracy        | 13, 14         | 8           | 4.0               | Worthy       |
| 5.  | Learning Evaluation      | 15, 16, 17, 18 | 18          | 4.5               | Very Worthy  |
|     | Average                  |                |             | 4.32              | Very Worthy  |

Information obtained based on Table 5 states that the Material Relevance aspect obtained an average score of 4.2 and was included in the "Very Worthy" category. The Linguistic Aspect obtained an average of 4.5 with the category "Very Worthy". Aspects of Material Accuracy got an average of 4.0 with the category "Worthy". While the Learning Evaluation aspect obtained an average of 4.5 and was included in the category "Very Worthy". The results of the overall assessment by material experts obtained an average of 4.32 so it was included in the "Very Worthy" category.

Table 6

| Test                              | Average | Category       |
|-----------------------------------|---------|----------------|
| Media Expert Validation           | 4.69    | Very Worthy    |
| Material Expert Validation        | 4.32    | Very Worthy    |

Based on Table 6, it can be seen that the validation results by media experts got an average of 4.69 and indicated the "Very Worthy" category. Then the validation results by material experts got an average of 4.32 so it was included in the "Very Worthy" category. Based on these data, it can be concluded that the Android application-based science learning media on solar system subjects is appropriate to be used as a medium for science learning, especially the solar system material.

CONCLUSION

The result of this research is to produce a product Android application-based science learning media for solar system subjects, especially for sixth-grade elementary school. The final media product developed by the researcher is a media that collaborates with various types of interesting images, writings, audio, and video in apk format with the name Let's Learn the Solar System which has a file size of 36.2 MB with 36 pages and can be run at least on Android version 5.0 otherwise known as the Lollipop version. The application is then tested on validators of media experts and material experts to determine the level of feasibility. Based on the results of the validation carried out by media experts, an average of 4.69 was obtained, indicating the "Very Worthy" category, then the validation results by material experts obtained an average of 4.32 so it was included in the "Very Worthy" category. Based on these data, it can be concluded that the Android application-based science learning media on solar system subject is appropriate to be used as a media for science learning, especially in the sixth-grade solar system subject.
Android-based application media for the science subjects of the solar system subject is a learning media that can be used as a game tool as well as to increase student understanding. The development of this educational application is expected to create a pleasant learning atmosphere and help the student learning process. This corresponds to the opinion of experts that the use of learning media with visual media in the learning process in the class according to Rosidah (2016: 124) will make learning more interesting, effective, and efficient to provide new experiences for students, especially elementary school students. Learning media in general are all tools that can be used in the teaching and learning process that can stimulate thoughts, feelings, skills, and attention so that they can improve the learning process in students (Mutia & Naeklan, 2021: 37).

Several studies are also relevant to the making of this media, namely the research conducted by Muttaqin et al., (2021: 7) entitled the making of android-based interactive learning media in science subjects with the subject of animal breeding for sixth-grade elementary school students aiming to obtain interactive learning media valid and practical android-based on science subjects, the subject of animal breeding for sixth-grade elementary school. Second, the research conducted by Miftianul & Gunawan (2020: 169) entitled the development of android-based learning media on solar system material for elementary school students aims to develop android-based learning media on solar system material for elementary school students, especially for sixth-grade. The results of previous research are strong evidence that this media can improve the understanding of solar system material in elementary school students. That way, the media that researchers develop is expected to help support learning and can increase students’ knowledge and curiosity about the material of the solar system can also increase.

REFERENCES

Abdullah, R. (2017). Pembelajaran Dalam Perspektif Kreativitas Guru Dalam Pemanfaatan Media Pembelajaran. Lantanida Journal, 4(1), 35. https://doi.org/10.22373/lj.v4i1.1866

Annisa, R. (2019). Aplikasi Belajar Tata Surya Berbasis Android Sebagai Media Pembelajaran Pendukung Kurikulum 2013 Untuk Siswa Sekolah Dasar. Jurnal Teknologi Informasi Dan Komputer Politeknik Sekayu, 9(1), 26–33.

Dedynggego, Mohammad, & Affan, M. (2015). Perancangan Media Pembelajaran Interaktif 3D Tata Surya Menggunakan Teknologi Augmented Reality Untuk Siswa Kelas 6 Sekolah Dasar Sangira. Jurnal Elektronik Sistem Informasi Dan Komputer, 1(2), 45–60.

Hasan, M. M. D. H. K. T. (2021). Media Pembelajaran. In Tahta Media Group (Issue Mei).

Ibrahim, N., & Ishartwi, I. (2017). Pengembangan Media Pembelajaran Mobile Learning Berbasis Android Mata Pelajaran Ipa Untuk Siswa Smp. Refleksi Edukatika : Jurnal Ilmiah Kependidikan, 8(1). https://doi.org/10.24176/re.v8i1.1792

IrfaN, I., MuhiDdiN, M., & RiStianA, E. (2019). Pengembangan Media Pembelajaran IPA Berbasis Powerpoint di Sekolah Dasar [Powerpoint-Based Science Learning Media Development in Elementary Schools]. Indonesian Journal of Primary Education, 3(2), 16–27.

Lubis Isma Ramadhani, & Ikhsan Jaslin. (2015). Pengembangan Media Pembelajaran Kimia Berbasis Android untuk Meningkatkan Motivasi Belajar dan Prestasi Kognitif Peserta Didik SMA. Jurnal Inovasi Pendidikan IPA, 1(2), 191–201.

Maesaroh, S., Sirumapea, A., & Setiaji, C. (2016). Pembelajaran Interaktif Pengenalan Hewan Menggunakan Bahasa Ingris Pada Siswa SD Kelas 3 Berbasis Android. Jurnal Sisfotek Global, 6(1), 69–75. http://journal.stmikglobal.ac.id/index.php/sisfotek/article/view/99/101

Miftianul, K., & Gunawan. (2020). Elementa: jurnal pgsd stkip pgri banjarmasin. Jurnal PGSD STKIP PGRI Banjarmasin, 2(1), 320–334. https://doi.org/10.33654/pgsd
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DOI: https://doi.org/10.31004/basicedu.v6i4.3109

Muhson, A. (2010). Pengembangan Media Pemelajaran Berbasis Teknologi Informasi. Jurnal Pendidikan Akuntansi Indonesia, 8(2). https://doi.org/10.21831/jpai.v8i2.949

Mutia, P., & Naeklan, S. (2021). Pengembangan Media Pemelajaran Berbasis Android Activities di Kelas II SD Swasta Tunas Harapan Islam Kecamatan Medan Amblas T . A 2020 / 2021 Email: mutia8623@gmail.com Email: naeklansimbolon@gmail.com Pendahuluan Media pembelajaran secara umum adalah.

Muttaqin, H. P. S., Sariyasa, & Suarni, N. K. (2021). Pengembangan media pembelajaran interaktif berbasis android pada mata pelajaran ipa untuk siswa kelas VI SD program studi pendidikan dasar universitas pendidikan ganesha. Jurnal Teknologi Pemelajaran Indonesia, 11(1), 1–15.

Nadjurodin, A. (2015). Modul Diklat Berjenjang Jenjang Sekolah: Umum Materi Diklat: Kependidikan. Journal Academia Accelerating the World’s Research, 1, 1–29.

Prasetyo, S. (2017). Pengembangan Media Pemelajaran Ipa Berbasis Android Untuk Siswa Sd/Mi. JMIE (Journal of Madrasah Ibtidaiyah Education), 4(1), 122–141. https://doi.org/10.32934/jmie.v4i1.29

Rosidah, A. (2016). Penerapan Media Pembelajaran Visual Untuk Meningkatkan Pemahaman Konsep Siswa Pada Mata Pelajaran Ips. Jurnal Cakrawala Pendas, 2(2). https://doi.org/10.31949/jcp.v2i2.499

Sahibu, S., & Disyan, Y. P. (2018). Aplikasi Pembelajaran Proses Daur Air Dan Peristiwa Alam Untuk Mata Pelajaran Ipa Kelas V Sd Berbasis Android. Jurnal It, 9(3), 245–256. https://jurnal.lppm-stmikhandayani.ac.id/index.php/jti/article/view/66

Sari, A. P., & Setiawan, A. (2018). The Development of Internet-Based Economic Learning Media using Moodle Approach. International Journal of Active Learning, 3(2), 100–109.

Suparman, T., Prawiyogi, A. G., & Susanti, R. E. (2020). Pengaruh Media Image Terhadap Hasil Belajar Ipa Pada Siswa Sekolah Dasar. Jurnal Basicedu, 4(2), 250–256. https://doi.org/10.31004/basicedu.v4i2.332

Suryandaru, N. A., & Setyaningtyas, E. W. (2021). Pengembangan Media Pembelajaran Berbasis Website Pada Muatan Pembelajaran Matematika Kelas IV. Jurnal Basicedu, 5(6), 6040–6048. https://doi.org/10.31004/basicedu.v5i6.1803

Tahel, F., & Ginting, E. (2019). Perancangan aplikasi media pembelajaran pengenalan pahlawan nasional untuk meningkatkan rasa nasionalis berbasis android. Teknomatika, 09(02), 113–120. http://ojs.palcomtech.com/index.php/teknomatika/article/view/467

Vivi, H. (2021). Jurnal basicedu. Jurnal Basicedu, 5(3), 1683–1688.

Wahyu, Y., Edu, A. L., & Nardi, M. (2020). Problematika Pemanfaatan Media Pembelajaran IPA di Sekolah Dasar. Jurnal Penelitian Pendidikan IPA, 6(1), 107. https://doi.org/10.29303/jppipa.v6i1.344

Widiastika, M. A., Hendracipta, N., & Syahruroji, A. (2020). Pengembangan Media Pembelajaran Mobile Learning Berbasis Android Pada Konsep Sistem Peredaran Darah di Sekolah dasar. Jurnal Basicedu, 5(1), 47–64. https://doi.org/10.31004/basicedu.v5i1.602