KnE Social Sciences
IJESAS
International Joint Seminar on Education, Social Science and Applied Science
Volume 2024

Research Article

Android-based Interactive Learning Media for Junior High School Science: Improving the Achievement of Independent Curriculum

Riska Imanda*, Sri Setiawaty, Rohantizani Rohantizani, Aulia Febrianti Sirait, and Jaza Anil Husna Pasaribu

Universitas Malikussaleh, Aceh, Indonesia

ORCID
Riska Imanda: https://orcid.org/0000-0003-4516-2321

Abstract.
This research aims to determine: (1) the quality of Android-based interactive learning media and (2) the response of teachers and students to Android-based interactive learning media in the form of an independent curriculum. A research and development (R&D) study was conducted by adapting the 4-D development model (define, design, develop, and disseminate). A sample of teachers and students from a junior high school in Bireuen Regency was selected using a stratified-cluster random sampling technique (i.e., selecting research locations based on an even distribution of teacher and student populations). The initial stage of product assessment was carried out by media experts, material experts, and four chemical experts, and responses from 33 students. The results show that: (1) Based on the validity test performed by media experts and material experts, the overall average percentage in the "Valid" category was 83% and 84.5%, respectively. (2) Based on the responses from teachers, the overall average percentage in the "Very Good" category was 95.8%. The results of this research indicate that Android-based interactive learning media in the form of an independent curriculum is valid and very suitable for use in junior high school science learning.

Keywords: Bilingual Mobile Learning Android Application, independent curriculum, 4-D

Corresponding Author: Riska Imanda; email: riskai.manda07@unimal.ac.id

Published: 3 July 2024

Publishing services provided by Knowledge E

Selection and Peer-review under the responsibility of the IJESAS Conference Committee.

1. INTRODUCTION

Education is a process that involves educators and students through an interaction process that can develop students' potential. Education can also be interpreted as a conscious effort made by a person to form a personality with character and develop skills through enrichment so that fundamental knowledge is created. The development of science and technology (IPTEK) in the era of Industrial Revolution 4.0 is increasingly rapid, everyone is required to have more knowledge and skills, while one of the factors that supports knowledge is literacy. The Covid-19 pandemic has caused significant literacy and numeracy learning loss. Learning loss is defined as not maximizing the learning process at school (Budiyastomo, 2020). The rapid development of science and

technology today requires education to participate in the use of technology as a form of innovation in learning (Imanda, 2022 and Azizah, 2023). Apart from that, there is a Ministry of Education and Culture, Research and Technology policy regarding “Freedom to Learn” and “Independent Campus”.

The development of information technology and communication science is currently progressing so rapidly that it is impossible to avoid it. Muhibullah (2022) stated that one of the results of the development of technology and information is the use of Android technology which is commonly used by various ages ranging from adults, students, and children. Android-based smartphones have become a primary need in human life today, Android is a mobile operating system that is growing relatively quickly and rapidly among other operating systems that are currently being developed. Dasmo, et al (2017) said that Android as an operating system for smartphones is described as a bridge between devices and their use to interact with their devices and run applications available on those devices.

Android is a mobile operating system that is experiencing relatively fast and rapid growth compared to other operating systems that are currently being developed. Efrain, et al (2021) stated that apart from functioning as a communication tool, smartphones have various other benefits. One of them is as a medium that helps the learning process, where smartphones can be used to search for the latest information and dig deeper into learning material. Thus, students prefer to spend time playing on smartphones rather than using time to study both at school and at home, even though smartphone media can also be used as a medium for learning (Muhibullah, 2022). This can be used as a basis for using Android in learning, especially chemistry learning with the hope of increasing students’ interest in learning chemistry. According to Laksono (2020), chemistry is often considered a difficult subject, and many students do not even have the interest to study it in depth. This is because there are still many students who have difficulty understanding chemistry concepts.

Chemistry is one of the core scientific disciplines that can connect various scientific fields. (Hidayah, dkk. 2021). Based on the results of interviews with chemistry subject teachers, it is known that there are several problems faced by students in learning exact subjects such as chemistry. The teacher stated that several problems that often arise include students’ lack of interest in learning and interest in chemistry material which is considered difficult and difficult to understand, as well as the existence of special terms in the material. The learning process greatly influences students’ interests and learning outcomes because not all students feel comfortable and interested in learning (Robianto et al. 2019). One step that can be taken to overcome this problem is to utilize

technological advances, such as creating innovative learning media. This aims to create a learning process that has meaning and relevance for students. Based on research by Robianto et al (2019), the use of mobile learning has the potential to support the learning process and provide flexibility in teaching and learning activities. This can create a higher interest in learning for students. Previously, Suhartati (2021) revealed that one application that can be used in creating Android-based learning media is Smart Apps Creator (SAC). SAC is the latest digital interactive media that creates multimedia content that can be installed on Android-based smartphones. The Smart Apps Creator application is very easy to use because Budyastomo (2020) states that one of its advantages is that it does not require programming skills so anyone can operate it efficiently and can insert animations according to the developer's needs and desires. Meanwhile, Android as an operating system for smartphones is described as a bridge between devices and their use to interact with their devices and run applications available on those devices (Dasmo, et al, 2017; Setiawaty, et al, 2022; Muhibullah, 2022; Unaida and Lukman, 2023). Android-based digital learning is a form of adaptation to the new normal in the education sector, which is expected to become a hosting partner for schools to digitize education. Thus, educational institutions will change to focus more on cognitive and psychomotor competencies.

Based on the analysis of these conditions, it is deemed necessary to carry out research, "Android-Based Interactive Learning Media for Junior High School Science: Improving the Achievement of Independent Curriculum".

2. METHODOLOGY/ MATERIALS

The type of research used in this research is Research and Development (R&D) which produces a product in the form of Android-based interactive chemistry learning media. The opinion expressed by Sugiyono (2018) is in accordance with this context, where research and development (R&D) is a method used to produce certain products and test the suitability of these products. This research aims to develop Android-based interactive chemistry learning media with the help of Smart Apps Creator application for class X chemistry material in the independent curriculum. This research adapts the 4-D development model (define, design, develop and disseminate) as mentioned by Hakky (2018).

2.1. Development Procedure

The stages in this research include: (1) Define (analysis) stage, at this stage, the researcher collects information about problems in learning activities and carries out a needs analysis for the product to be developed in the form of interactive chemistry learning media by looking for problems that are often encountered by teachers and experienced by students in implementation of teaching and learning activities. (2) Design Stage: This step in designing the product is carried out by preparing the required software, namely by installing smart apps creator software on the laptop and creating a product design according to the student's needs. The next thing to do is write a storyboard and layout design for learning media. (3) Develop, the steps taken to start assembling Android application-based learning media by combining characters, and backgrounds, compiling materials, practice questions, games, animated images, sound effects, and background sounds. After the learning media is ready, the media design is validated by carrying out validation tests with media experts and material experts. (4) Desiminate (Implementation) not carried out in this research, this research is limited to development only.

The feasibility category table used to evaluate media refers to the table developed by Purwanto (2013). The following are the eligibility categories contained in the T able 1.

Table 1: Eligibility Category Table.

No	Percentage (%)	Category
1	86 – 100 %	Very Good
2	76 – 85 %	Good
3	60– 75 %	Not enough
4	55-59 %	Very less

Source: Purwanto (2013)

3. RESULTS AND DISCUSSIONS

Based on the research that has been carried out, an Android-based interactive learning media application has been obtained for student learning at school. The application has an attractive appearance and contains various multimedia elements that can attract students' interest in learning. The following is an example of what the application looks like.

3.1. Media Expert Validation

Next, the researchers carried out validation tests on media experts and material experts. The purpose of validating media experts and material experts is to obtain the validity of the media being developed so that it is suitable for testing. The validation results of media experts and material experts can be seen in Tables 2 and 3 below:

TABLE 2: Validation Results Of Media Experts.

Aspects	Number per aspect	Maximum number of aspects	Maximum number of aspects	Category
Display Design	17	20	85 %	Valid
Software Engineering	17	20	85%	Valid
Linguistics	3	4	75%	Quite valid

From the results of media expert validation, it shows that the learning media developed is included in the “valid” category with a percentage of all aspects of 83%.

TABLE 3: Validation Results Of Material Experts.

Aspects	Number per aspect	Maximum number of aspects	Percentage (%)	Category
Content standard	18	20	90 %	Valid
Learning	3	4	75 %	Quite valid

Validation data from material experts was obtained by providing the product in the form of an Android system application and using validation instruments for material experts. Based on the validation results, it can be concluded that the Android-based interactive learning media developed in this research can be categorized as “Valid” in terms of content and learning standards, with an overall aspect percentage of 84.5%. After carrying out validation tests and revising the validation results, the researchers carried out a further stage, namely the field test stage, namely testing teacher and student responses. The results of the teacher and student response test can be seen in

This research is a type of research and development (R&D) research by adapting the 4-D development model (define, design, develop and disseminate). The implementation of the entire research development procedure in detail can be seen in the following description:

Table 4: Validation Results Of Material Experts.

Aspects	Total score	Average score	Maximum average	Percentage (%)	Category
Display Design	58	19,3	20	97	Very good
Software Engineering	57	19	20	95	Very good
Linguistics	12	4	4	100	Very good
Content standard	58	19,3	20	97	Very good
Learning	12	4	4	100	Very good

3.2. Define

The define stage carried out by researchers collected information about learning in the field, such as analyzing student needs and problems, analyzing the curriculum, and analyzing student characteristics. The researcher carried out this analysis with the aim of determining existing problems in the field as a source for the researcher's initial study in developing the assessment sheet. The analysis stage carried out in this research was interviewing chemistry study teachers and conducting a literature study of assessment sheets available in several schools. The 4-D development model includes 3 things, namely; needs analysis, task analysis and instructional analysis. The results of the needs analysis viewed from these three aspects become a problem for students.

3.3. Design

In the design stage, researchers determine media that is appropriate to the learning objectives, choose the format and carry out initial designs for Android-based interactive media, the development methods used and sources for developing Android-based interactive media. The initial design of Android-based interactive media is prepared before carrying out the development stage with the aim of producing a complete module based on its components.

At this stage, the product produced is in the form of a learning module, namely Android-based interactive media. The first thing to do is create an initial design (media framework, initial module design and material scope map). The initial design for Android-based interactive media that has been prepared, then consulted with the team, according to the supervisor, there are still many improvements in the form of concepts outlined in the material scope map. The design process was carried out using the Smart Apps Creator application.

3.4. Develop

This stage is carried out product validation. Validation is carried out with the aim of knowing the validity of the media display and the validity of the material content. The validity of learning media is obtained from media expert assessments and material expert assessments. The assessment carried out by media experts includes aspects of media display, software engineering and language. Before being implemented, the media that had been designed was first tested for validity by a media expert lecturer from the Chemistry Education Study Program at Syiah Kuala University. Media expert validation aims to determine the validity of the appearance of the learning media being developed. The data on media validity results obtained in this research based on validation sheets filled in by media experts are presented in Table 2. Based on Table 2, it shows that the learning media developed is included in the valid and quite valid category. This category can be seen from the average score in the display design aspect and in the software engineering aspect of 17 out of a maximum score of 20 with a percentage of 85% in the valid category, and the average score in the linguistic aspect of 3 out of a maximum score of 4 with a percentage of 75% with a quite valid category. This category shows that the media being developed is suitable for testing in the next stage. In line with research results (Mahuda, 2021; Setiawaty, 2022), media that is valid is suitable for testing, by improving additional comments and suggestions from validators.

Next, a feasibility test was carried out on the teachers. An assessment of the quality of the media by the chemistry teacher included aspects of display design, software engineering, language, content and learning standards. At this stage, a trial of the quality of the learning media was carried out on 3 high school chemistry teachers. The results of the product quality trial assessment can be seen in Table 5 below:

Table 5: Test of media quality by teachers.

Aspect	Total number of teachers	Total score	Average score	Maximum average	Persentase (%)	Category
Display Design	3	58	19,3	20	97 %	Very good
Software engineering	3	57	19	20	95 %	Very good
Language	3	12	4	4	100 %	Very good
Content standards	3	58	19,3	20	97 %	Very good
Learning	3	12	4	4	100 %	Very good

Based on Table 5, shows that the assessment results on 5 aspects of learning media are included in the “Very Good” category from 17 statement items assessed by 3 chemistry teachers. In the display design aspect, the average score was 19.3 out of a maximum score of 20, the percentage was 97% in the very good category. The software engineering aspect received an average score of 19 out of a maximum score of 20 with a percentage of 95% in the very good category. The linguistic aspect received an average score of 4 out of a maximum score of 4 with a percentage of 100% in the very good category. The content standard aspect obtained an average score of 19.3 out of a maximum score of 20 with a percentage of 97% in the very good category. The last aspect, namely the learning aspect, received an average score of 4 out of a maximum score of 4 with a percentage of 100% in the very good category. Based on the research results, shows that the development of Android learning media is very suitable for use and usually helps in the learning process both in class and at home. States that the learning media developed with the help of the smart apps creator application is easy to run because it does not require a special programming language. This confirms that Android-based interactive learning media can increase students’ interest in learning in line with the opinion of (Hayden, dkk. 2011, Setiawaty, dkk. 2022) which states that students can also use the media independently anytime and anywhere because it does not require an internet connection. Other findings from research (Kartini, 2021) also state that the learning process requires Android-based interactive media to increase students’ understanding.

4. CONCLUSION

Based on the results of research and development of Android-based learning media on the subject of chemistry class However, the researcher only carried out the first stage to the third stage because the fourth stage in this development model will be carried out in the next research. Android-based learning media in junior high school science material obtained validity from media experts of 83% in the “Valid” category, and material experts of 84.5% in the “Valid” category. The quality of the learning media developed obtained assessment results with an average percentage of 95.8% in the “Very Good” category.

This paper and the research behind it would not have been possible with out the exceptional suppor to four teams, Chemistry Education, Malikussaleh University and supported by Lembaga Penelitian dan Pengabdian Kepada Masyarakat (LPPM).

References

[1] Budyastomo AW. Gim Edukasional untuk Pengenalan Tata Surya Educational Game for Basic Knowledge of Solar System. Teknologi: Jurnal Ilmiah Sistem Informasi. 2020;10(2):55–66.

[2] Imanda, R., Rahmi, A., Setiawaty, S., Dandina, D. A dan Humaira, N. 2022. Development of Chemistry Textbooks Based Scientific Approach in Efforts to Implement Prototype Curriculum at Schools. Jurnal Penelitian Pendidikan IPA, 8(6): 3153-3158

[3] Azizah RN, Rahmi E, Herman M. Pengembangan Media Pembelajaran Teka Teki Kimia (TATIK) Berbasis Android Pada Materi Reaksi Reduksi Dan Oksidasi Kelas X Di SMA N 1 Kota Baru. Jurnal Education And Development. 2023;11(1):53–9.

[4] Muhibullah M, Zamhari M. Pengembangan Cacing Kimia Sebagai Media Pemebelajaran Kimia Berbasis Android Pada Materi Larutan. Jurnal Inovasi Pendidikan Kimia. 2022;16(1):38–40.

[5] Dasmo, Astuti, I. A. D., & Nurullaeli. 2017. Pengembangan Pocket Mobile Learning Berbasis Android. JRKPF UAD, 4(2), 71–77.

[6] Efrain, R., Manggopa, H, K & Liando, O, E, S. (2021). Pengembangan Media Pembelajaran Berbasis Android Mata Pelajaran IPA Sekolah Mengengah Pertama. Jurnal Pendidikan Teknologi Informasi dan Komunikasi, 1(4), 335-341

[7] Laksono PJ. Pengembangan Three Tier Multiple Choice Test Pada Materi Kesetimbangan Kimia Mata Kuliah Kimia Dasar Lanjut. Orbital: Jurnal Pendidikan Kimia. 2020;4(1):44–63.

[8] Hidayah R, Fajaroh FR, Narestifuri E. Pengembangan Model Pembelajaran Collaborative Problem Based Learning Pada Pembelajaran Kimia Di Perguruan Tinggi. Jurnal Pendidikan, Sosial. Dan Agama. 2021;13(2):503–20.

[9] Robianto A. Pengembangan modul berbasis aplikasi android untuk mata kuliah Ilmu bahan teknik pada prodi D3 teknik mesin universitas negeri malang. Jurnal Teknik Mesin Dan Pembelajaran. 2019;2(2):124–33.

[10] Suhartati O. Flipped Classroom Learning Based on Android Smart Apps Creator (SAC) in Elementary Schools. J Phys Conf Ser. 2021;1823(1):1–7.

[11] Setiawaty, S., Imanda, R., Lukman, R.I dan Pasaribu, I. A. 2022. Development of STEM Learning based Android to Improving Students' Logical Thinking Skills. Jurnal Penelitian Pendidikan IPA, 8 (6): 2933-2936

[12] Unaida R. dan Lukman, R.I. 2023. Perception of Prospective Teachers to the Needs of ICT in Chemical Learning in the Age of Digital Transformation. Mathematics and Science Education International Seminar 2021 (MASEIS 2021), 299-306.

[13] Sugiyono. (2018). Metode Penelitian Kuantitatif, Kualitatif, dan R&D. Bandung: Alfabeta.

[14] Purwonto dalam Amirullah, G., & Adinata, R. (2013). Pengembangan Mobile Learning Bagi Pembelajaran . Jurnal Kesejahtraan Dan Pendidikan, 4(2), 97-101

[15] Mahuda I, Meilisa R, Nasrullah A. Pengembangan Media Pembelajaran Matematika Berbasis Android Berbantuan Smart Apps Creator Dalam Meningkatkan Kemampuan Pemecahan Masalah. Jurnal Program Studi Pendidikan Matematika. 2021;10(3):1745–56.

[16] Setiawaty S, Lukman IR, Imanda R. dan Putra, R. 2022. Development of Android-based Chemistry Learning Media Integrated AIR Model. 2022. Proceedings of Malikussaleh International Conference on Multidisciplinary Studies (MICoMS), 3: 00013-00013

[17] Hayden K, Ouyang Y, Scinski L, Olszewski B, Bielefeldt T. Increasing Student Interest and Attitudes in STEM: Professional Development and Activities to Engage and Inspire Learners. Contemp Issues Technol Teach Educ. 2011;11(1):47–69.

[18] Setiawaty S, Lukman IR, Imanda R, Sari PR, Mursyida L. Development Of Chemistry Puzzles Book For High School Students. AIP Conf Proc. 2022;2468(1):040014.

[19] Kartini KS, Putra IN. Respon Siswa terhadap Pengembangan Media Pembelajaran Interaktif Berbasis Android. Jurnal Pendidikan Kimia Indonesia. 2021;4(1):12–9.