Jurnal Cakrawala Pendas
Vol. 10 No 4, October 2024
DOI: http://dx.doi.org/10.31949/jcp.v10i4.10027

p-ISSN: 2442-7470
e-ISSN: 2579-4442

DEVELOPMENT OF AUGMENTED REALITY MEDIA TECHNOLOGY ANDOID-BASED APPLICATIONS ON LEARNING "CULTURAL DIVERSITY IN INDONESIA" ELEMENTARY SCHOOL

Geby Angelina Nainggolan[1*], Nurdinah Hanifah[2], Rana Gustian Nugraha[3]
[1,2,3]Universitas Pendidikan Indonesia
[1]gebyangelina@upi.edu

Abstract
Media in social studies learning material on cultural diversity in Indonesia still only uses pictures in books as an intermediary tool for learning. This makes students quickly bored and understanding of the material received quickly forgotten by students due to the lack of visualization channeled on the concept of material. This study aims to find out the development of android-based application media with augmented reality technology on learning cultural diversity in Indonesia. This study uses the Design and Development (D&D) development research method with the ADDIE development model (Analzye, Design, Development, Implementation, and Evaluation) with the research subject, namely class IV students totaling 24 people at one of the State Elementary Schools located in Bandung Regency, West Java. The data collection techniques used in this study are using expert validation questionnaires and response questionnaires that aim to determine the feasibility of learning media android-based applications with augmented reality technology as a learning medium in social studies learning material on cultural diversity in Indonesia. The results of the material expert validation test get a percentage of 98% and media expert validation gets a percentage of 94%. Meanwhile, the results of user response (teacher) get a percentage of 94%. In addition, the results of student responses obtained from limited trials get a percentage of 92% and broad trials get a percentage of 87%. Therefore, it can be concluded that the learning media android-based applications with augmented reality technology is very feasible to use in the social studies learning process.
Keywords*: learning media; android application; augmented reality; IPAS; cultural diversity in Indonesia*

Abstrak
Media pada pembelajaran IPS materi keragaman budaya di Indonesia masih banyak hanya menggunakan gambar dalam buku sebagai alat perantara pembelajaran. Hal tersebut membuat siswa cepat bosan serta pemahaman materi yang diterima cepat lupa diingat oleh siswa karena kurangnya visualisasi yang disalurakan pada konsep Penelitian ini bertujuan untuk mengatahui pengembangan media aplikasi berbasis android dengan tekonologi augmented reality pada pembelajaran keragaman budaya di Indonesia. Penelitian ini menggunakan metode penelitian pengembagan *Design and Developent* (D&D) dengan model pengembangan ADDIE (*Analzye, Design, Developent, Implementation, and Evaluation)* dengan subjek penelitian yaitu siswa kelas IV berjumlah 24 orang pada salah satu SD Negeri yang berada di Kabupaten Bandung, Jawa Barat. Teknik pengumpulan data yang dilakukan pada penelitian ini yaitu menggunakan angket validasi ahli dan angket respon yang bertujuan untuk mengetahui kelayakan media pembelajaran aplikasi berbasis android dengan teknologi augmented reality sebagai media pembelajaran pada pembelajaran IPS materi keragaman budaya di Indonesia. Hasil uji validasi ahli materi mendapatkan persentase 98% dan validasi ahli media mendapat persentase 94%. Sementara itu hasil respon pengguna (guru) mendapatkan persentase 94%. Selain itu hasil respon siswa diperoleh dari uji coba terbatas mendapatkan persentase 92% dan uji coba luas mendapatkan persentase 87%. Maka dari itu, dapat disimpulkan bahwa media pembelajaran aplikasi berbasis android dengan teknologi augmented reality sangat layak digunakan pada proses pembelajaran IPS.
Kata kunci: media pembelajaran;aplikasi android;augmented reality;IPS;keragaman budaya di Indonesia

Received	: 2024-06-14	Approved	: 2024-10-29
Reviesed	: 2024-10-26	Published	: 2024-10-31

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 1048-1063

Introduction

The national education in question is contained in chapter 1 article 1 paragraph 2 which states that national education is education based on Pancasila and the 1945 Constitution of the Republic of Indonesia which is guided by religious values, Indonesian national culture and is ready to respond to changing times. With the changing times, namely the changes in the digital era experienced in life are very rapidly growing and very influential in various aspects, especially in the field of education (Haw, 2023). The development of science and technology has a positive impact such as the use of teaching materials in schools or other educational institutions where the learning process in schools begins to adapt to the development of information technology learning process in the classroom began to adapt to the development of information technology, which leads to changes and transitions in the education paradigm . This transformation, driven by recent advances in education system technology has contributed significantly to the change of modern learning process. The utilization of technology in education as a tool for the learning process is often known as learning media (Akhmadan, 2017). With the changes of the digital era in life, the utilization of technology in the learning process is one of the needs and demands of education in today's global era.

Technology needs in the field of education are facilities and infrastructure in schools to support the learning process in accordance with the times. According to Mustaqim & Kurniawan, (2017) a good learning process must have interactive, fun, challenging, motivating aspects and provide more space for students to be able to develop their creativity and independence according to the talents and interests of students so that the learning atmosphere obtained by students is enjoyable. On the other hand, technologies are expanding learning opportunities beyond the classroom, blending formal and informal learning (Zhuang et al., 2017 in Tan et al. (2024)), and serving as learning tools to shape new pedagogical approaches in schools and infuence students' daily learning experience (Euler & Wilbers, 2019; Collins & Halverson, 2018 in Tan et al. (2024))

According to Zain, & Pratiwi, 2021 interactive media is concrete media and is suitable when used in elementary school students because it is at the concrete operation stage where the use of real objects is needed to help students' understanding last longer and be applied in everyday life. Therefore, developing interactive media can be used as an innovation in the learning process. With the development of technology, it has a very positive effect in the field of education, especially shooting learning media for tools in the interactive learning process. According to Nurfadhillah et al. (2021) there have been many technology-based learning media used as tools for the learning process because it is proven that the media can complement and support the interaction activities of educators in learning activities.

In social studies learning activities in elementary schools there is material on cultural diversity by recognizing traditional houses in Indonesia, in learning cultural diversity in Indonesia will discuss Indonesia which is an archipelago in which there are many ethnic groups, cultures, religions, and regions. With the existence of cultural diversity in Indonesia, it should be maintained by the younger generation of Indonesia so that it remains sustainable and becomes Indonesian culture according to (Hamidiyah, & Yermiandhoko, 2020) Thus one way that can be done is to help preserve Indonesia's cultural diversity by introducing and teaching cultural diversity material in Indonesia. Hidayanto (1999) (in Nugroho et al., 2020)) which suggests a picture in the implementation of the learning process of social studies is the difficulty of teachers in producing methods or learning models as well as social studies learning media

that are effective, interactive and on target. This is because social studies learning material has a fairly complex scope of material and is abstract if only understood through reading alone.

The resource person in this interview is only one person, namely the fourth grade teacher of elementary school. Based on interviews with fourth grade teachers at SDN Cangkuang 07, the learning process at the school is very lacking in media utilization. One of them is social studies learning on the material of Cultural Diversity in Indonesia. The learning process aids only use books and pictures shown to students. This is an obstacle to channeling the concepts and material of cultural diversity that cannot be shown directly due to the lack of visuals shown. It is also unfortunate that grade IV students at the school are allowed to bring smartphones which are only used to play games, play social media, watch videos, and chating.

Therefore, based on these problems, researchers want to develop a product in the form of learning media with aspects that are easy to use and interesting, innovative, and attract the attention of students, and keep up with technological developments by using learning media android applications based on Augmented Reality technology. According to Wiranda & Adri, 2019 android application is an operating system on smartphones and tablets. This operating system can be illustrated as an intermediary between the device and its users so that users interact with their devices by running applications available on the device. One form of support in the world of education is the utilization of smasrtphone with android applications that can present learning media. Then the existence of Augmented Reality technology in this android application is also a technology-based learning learning aid that combines three-dimensional (3D) objects into a real environment to form virtual objects which are then projected directly using a smartphone (Furth in Hamidiyah & Yermiandhoko, 2020). So the advantage of this AR-based android application is that students can see a visual display packaged in an android application by displaying 3D objects like real shapes through a smartphone screen so that it can realize learning that is memorable, innovative, and fun for students and teachers.

Thus, researchers want to develop learning media that utilizes technology to the fullest, is liked by dasae school students, and is used by students as a learning resource at school and at home in understanding and recognizing cultural diversity material in Indonesia. So to facilitate this learning, researchers developed an augmented reality-based android application learning media named "KEBUDIN". In this KEBUDIN application there are features containing special material about Cultural Diversity in Indonesia for grade IV students, quizzes and augmented reality-based features where this AR feature will bring up 3D objects on traditional houses in Indonesia. With the learning media of augmented reality-based android applications, researchers hope that students can have new experiences by getting to know cultural diversity in Indonesia by quickly understanding it and not quickly forgotten and researchers hope that students can use this media independently and can be used anywhere. Therefore, this study aims to determine the process of developing KEBUDIN application media on cultural diversity material in Indonesian elementary schools and determine the feasibility of KEBUDIN application media on cultural diversity material in Indonesian elementary schools.

Research Methods

In this study using the Design and Development (D&D) method to produce a product. According to (Febrista & Efrizon, 2021) this design and development method was proposed by Richey and Klein who stated that the D&D method is a systematic development research method, where the method explores processes starting from the design process, the development process and the evaluation process which aims to form an empirical basis for creating products and tools. This research was conducted at SDN Cangkuang O7 which is located at Jalan

Cisirung Number 97, Cangkuang Wetan, Dayeuhkolot District, Bandung Regency, West Java. With research participants, namely 23 students, material experts and media experts totaling 2 people. The development research procedure used is the ADDIE model. This research uses the ADDIE development model developed by Dick and Carey (in Pitriani et al., 2021) which includes five stages including Analysis, Design, Development, Implementation, and Evaluation.

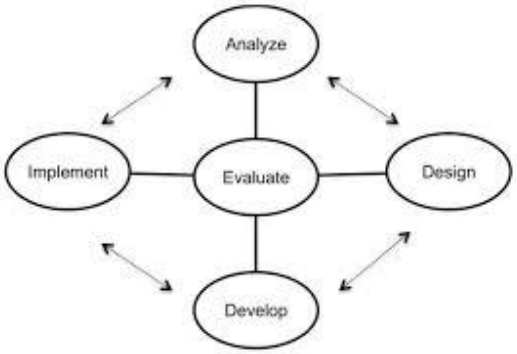

Figure 1. ADDIE Model

In this analysis stage, researchers analyzed the material, user needs (students), and media needs. At the user analysis stage, researchers conducted interviews with fourth grade teachers. Furthermore, the design stage, the researcher makes a design of the appearance of the product to be developed. The researcher's development stage carries out product development with the display design that has been designed. Furthermore, at the product development stage, product validation tests are carried out by material expert validators and media experts. At the implementation stage, after the media has been validated by material experts and media experts, a trial is carried out, namely seeing the user (student) response to the product. The trial to students was carried out in two stages, namely a limited trial of 6 students and a broad trial of 18 students. The trial was to determine the feasibility of the android-based application product developed. In the last stage, namely evaluation, the researcher revised the product from the trial suggestions made at the implementation stage.

The data collection technique used interviews and questionnaires. The instruments used are interview sheets, material and media expert assessment questionnaires, and user response questionnaires (students). The analysis technique used in this research is descriptive qualitative and quantitative analysis. Qualitative data comes from the results of interviews, the results of questionnaires from material experts, media experts, and user responses (students) with qualitative data analysis in the form of criticism and suggestions from material experts, media experts, and user responses.

The modified interview instruments include:

Table 1. Interview instruments

Indikator	Number of Questions
Learning process	1
Use Of learning Media	3
Characteristics of students	1
Facilities and infrastructure	2
School curriculum	1
Total	**8**

Rahmi (2023)

The material assessment instrument is used to see and determine the feasibility of material in this KEBUDIN application with material on Cultural Diversity in Indonesia in IPAS learning grade IV SD.

Table 2. Material Assesment Instruments

Aspects	Indicator	Assesment Item
Content	The arrangement of the material presented is in accordance with the learning outcomes	The arrangement of the material presented is in accordance with the learning outcomes
	Regularity in presentation of material	The presentation of the material is well organized
	The material presented is easy to understand	The material presented is easy to understand
	Penyajian gambar dalam aplikasi sesuai dengan materi	Presentation of images displayed on the application in accordance with the subject matter
	Suitability of 3D object illustration with reality	The 3D object illustration is appropriate
	The language in the material used is appropriate for elementary school students	The language used is appropriate for elementary school students
	The language used is easy to understand	The language used is easy to understand
	Language in the media is appropriate for students' intellectual development	The language used is in accordance with the intellectual development of elementary school students.
	The content of the material presented can motivate and	The language used is appropriate for the intellectual development of elementary school students
Evaluatin	The question items on the evaluation menu in the application do not deviate from the content of the material	The quizzes presented in the application are in accordance with the content of the material
	The concept of the questions made does not deviate from the accuracy of the material content	The concept of quiz questions is appropriate with the content of the material

According to Walker dan Hess (in Arsyad (2019))

This media expert assessment instrument is used to determine the feasibility of this android-based KEBUDIN application media on the material of Cultural Diversity in Indonesia in grade IV SD IPAS learning.

Table 3. Media Assesmnet Instrument

Aspects	Indicator	Assesment Item
Software	Effective and efficient in the use of learning media based on android applications	The developed media is easy to use
	The accuracy of selecting the type of *application/software/tools/in* the development of learning media based on android application	The *application/software/tool/used* for learning media development is appropriate
	Ease of management and maintenance	Can be easily managed and maintained
Visual Communication Design	Simple and engaging	Simple yet engaging media
	The initial appearance of the learning media has a good center of view	The initial appearance of the learning media is eye catching and proportional
	Colors in the display have the right combination with the background	The color chosen is relevant to the display background
	Does not use many letter combinations	Not using too many *fonts* in learning media
Ease of Use	*Usability* (easy to use and simple in operation)	The application is easy to use and simple in operation
	Learning media can be installed and run using android	Media can be downloaded on android cell phones
	The *button* functions and runs according to the command given	Each button functions and runs according to the command given
	Scene to scene runs without error	*Scene to scene* runs without error
Augemented Reality	Image presentation quality of 3D objects	Attractive 3D image quality
	Proportionality of 3D object size	Proportional size of 3D objects
	Resemblance of color and texture of 3D objects to reality	The color and texture of the media and reality are the same
	AR can be viewed close up with hand and camera coordination on an android mobile phone	AR can be viewed more closely with hand and camera coordination
	QR code sensitizations for displaying 3D objects	QR code sensitizations for displaying 3D objects

Pertiwi, I. D. (2023)

While the quantitative data is obtained based on the validation scores of material experts, media experts, and user responses (students) with data analysis interpreting the data into numbers. The results of the data obtained through the assessment of the questionnaire form are compiled in an assessment scale using a Likert scale with intervals of 1 to 4 where the lowest value on the assessment is 1 and the highest value on the assessment is 4, the following are the criteria (rubric) scale assessment for the validity test of material experts and media experts as well as user response assessment (Hamzah & Baalwi, 2022).

Table 4. Likert Scale Criteria

Category	Interval Scale
Very Good	1
Good	2
Fair	3
Less	4

After summing up and grouping the scores from the answers given by the validators and user responses, then the researchers assessed using the data analysis technique formula from Suharsimi (2011) (in Hendrianti, et al., 2021) namely as follows.

$$\text{Value} = \frac{Score\ obtained}{Ideal\ score} \times 100\%$$

Furthermore, in the data analysis technique from material experts, media experts and user responses, a percentage interval is used Jannah and Julianto (2018).

Table 5. Percentage of Product Validity Criteria

Percentage	Category
81% - 100%	Very good
66% - 80%	Good
51% - 64%	Enough
35% - 50%	Not Enough

Results and Discussion

(Usmaedi et al., 2020) suggest learning objectives by utilizing Augmented Reality technology greatly supports the learning process in elementary schools so that the teaching process is more interactive and the material is easily understood by students. So the development of KEBUDIN application media was developed with augmented reality technology. KEBUDIN application was developed for the learning process to be more interactive especially on the material of cultural diversity in Indonesia. The process of developing the android-based KEBUDIN application media is carried out using the ADDIE model research method with five stages, namely 1) analysis, 2) design, 3) development, 4) implementation and 5) evaluation (Yuwono et al., 2021)

At the analysis stage, the initial stage is to identify to obtain data in developing learning media by analyzing material, user needs and media needs. (Suksma et al., 2023) which states that in the analysis stage, needs analysis, analysis of the characteristics of elementary school students, curriculum analysis, and media analysis are carried out. Thus this research was conducted by analyzing the material, user needs and media analysis.

The first analysis stage identifies grade IV SD material by determining the Learning Outcomes of IPAS material on Cultural Diversity in Indonesia. The user needs are obtained from the results of interviews with grade IV teachers. Based on the results of the interview, there is a lack of use of learning media during the learning process, especially in the field of technology, while the school allows students to bring cellphones and some students at the school

Jurnal Cakrawala Pendas Vol. 10, No. 4, October 2024, pp. 1048-1063

already have smartphones. Furthermore, media needs are software and hardware used during the KEBUDIN application media development process.

Table 6. Software Application Development Process

No.	Software Name	Software Usage Purpose
1.	Miscrosoft Word 2021	Developing material content that will be developed in the KEBUDIN application
2.	Canva Pro	● Create a KEBUDIN application display design ● Create a 3D scan image design ● Select and use animated images needed in the application display
3,	Unity 3D	Performing the process of making androis-based KEBUDIN applications with AR technology features until the final stage becomes an apk file
4.	Notepad	As a tool for C# programming in running buttons on applications that are being developed in unity 3D.
5.	CSM 3D	Platform as a process of converting files from PNG into 3D files called CBX
6.	Blender	Tools that are carried out as a process of converting files from BBX to FBX files to be imported into unity on augmented reality features.
7.	Adobe Photoshop	Tools that are carried out as converting images to grayscale 8 bits / channel so that they can be imported on the Vuforia engine.
8.	Vuforia Engine	Platform used to obtain custom code that will be imported in the development process in unity 3D.
9.	Wordwall	Platform used to create quizzes that are linked to app media.

The table above is the software used in the KEBUDIN application development process. Operating the software requires hardware in the form of an adequate computer or laptop and smartphone. If there is no proper hardware, the hardware cannot be operated properly and will hinder the process of developing learning media applications.

After the analysis stage is carried out, the next stage is the design stage. There are four stages in the program structure design, namely: (1) Make an outline of the content; (2) Make a flowchart; (3) Make a display; (4) Make a plot summary (storyboard) (Hamidiyah, & Yermiandhoko, 2020). Thus, in the design stage of this KEBUDIN application, the design stages are to outline the application content, create a flow using flowchart and finally implementation the design for the KEBUDIN application display with canva.

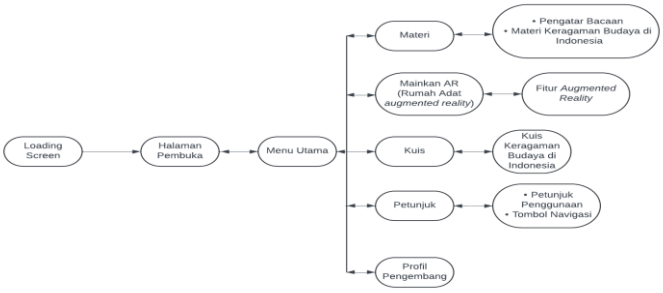

Figure 2.Flowchart

The media development stage of the android-based KEBUDIN application is carried out after the design stage has been compiled (Wibowo et al., 2022) said that the development stage is to develop the media in accordance with the initial design design that has been made and compiled at the design stage. At the media development stage based on the previous design, changing the flowchart and storyboard into real media and ready to use is carried out at the development stage (Afriani et al. (2022) in Putri et al., 2024)) The design that has been compiled and prepared is entered into the development process using Unity 3D. Features provided in the KEBUDIN application are Cultural Diversity Material in Indonesia, Play AR (Customary House Augmented Reality), Quiz, Instructions for Use and Developer Profile. In Unity 3D, the process of developing augmented reality features is also carried out there with other tools, namely Vuforia Engine. Scan images that will be imported into Vuforia Engine are edited in Adobe Photoshop. The creation of 3D objects uses CSM 3D tools, and Blender which will make 3D objects into FBX files. The FBX file will be imported to Unity 3D "Play AR" feature. After that, to operate each button on the application is done using simple coding, namely C# on notepad. Here is the appearance of the KEBUDIN application. According to Rohmah (2021) as for educational games for learning media, namely Kahoot, Quizizz, Educandy, Wordwall, Academy Khan Kids, and Boombazle for educational games. Therefore, researchers also poured wordwaal educational games in the KEBUDIN application. Here's a look at the KEBUDIN application

Figure 3. Opening page application

Figure 4. Main menu display

Figure 5. Material display

Figure 6. Material display

Figure 7. Play AR display

Figure 8. Quiz display

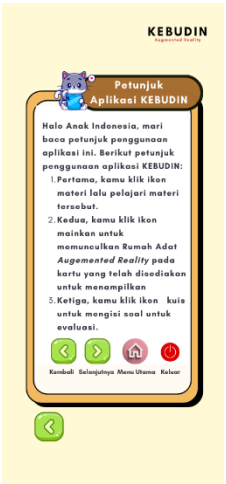

Figure 9. Instruction for uses display

Figure 10. Developer profile display

The results of application development on the initial display can be seen in Figure 3 which displays a welcome sentence and there is a button to open the next page in the application. Furthermore, Figure 4 displays five menus on the main menu page that can be selected. Figure 5 displays the initial appearance of the material which contains an introduction to the material,

Figure 6 displays the contents of the cultural diversity material in Indonesia which is scrolled down to see all the material. Figure 7 displays the camera on the augmented reality custom house feature to scan images that display 3D objects of custom houses. Figure 8 displays a quiz that is directly connected to the website (wordwall). Figure 9 displays instructions for using the application. While Figure 10 displays the developer profile on the application.

After carrying out the development process, the researchers then validated the product to material experts and media experts (Hamzah, & Baalwi, 2022). At the material validation stage, the researcher asked the opinion of the UPI Sumedang Campus Lecturer to find out the feasibility of the material in the KEBUDIN application. The following are the results of the material validation assessment on the KEBUDIN application.

Table 7. Results of Validation by Material Experts

No	Aspects	Indicators	Score	Criteria
1	Content	- The arrangement of the material presented is in accordance with the learning outcomes	4	Very Good
		- Regularity in presentation of material	4	Very Good
		- The material presented is easy to understand	4	Very Good
		- Presentation of images in the application in accordance with the material	4	Very Good
		- Conformity of 3D object illustrations to reality	4	Very Good
		- Easy to understand language	4	Very Good
		- The language in the materials used is appropriate for elementary school students	4	Very Good
		- The language used is appropriate for the intellectual development of elementary school students	3	Very Good
		- The material presented in the application motivates and attracts attention	4	Very Good
2.	Evaluation	- The question items on the evaluation menu in the application do not deviate from the content of the material	4	Very Good
		- The concept of the questions made does not deviate from the accuracy of the material content	4	Very Good
		Total	43	Very Good
		Percentage	98%	Very Good

Based on the results of the material expert assessment in the table above, it can be concluded that the material in the KEBUDIN application shows the "Very Good" category with a score of 98%, which means that the material in the KEBUDIN application is suitable for use in the learning process.

Furthermore, product assessment by media experts assessed by two UPI Sumedang Campus Lecturers, he results of validation by the two media experts can be seen in the picture below.

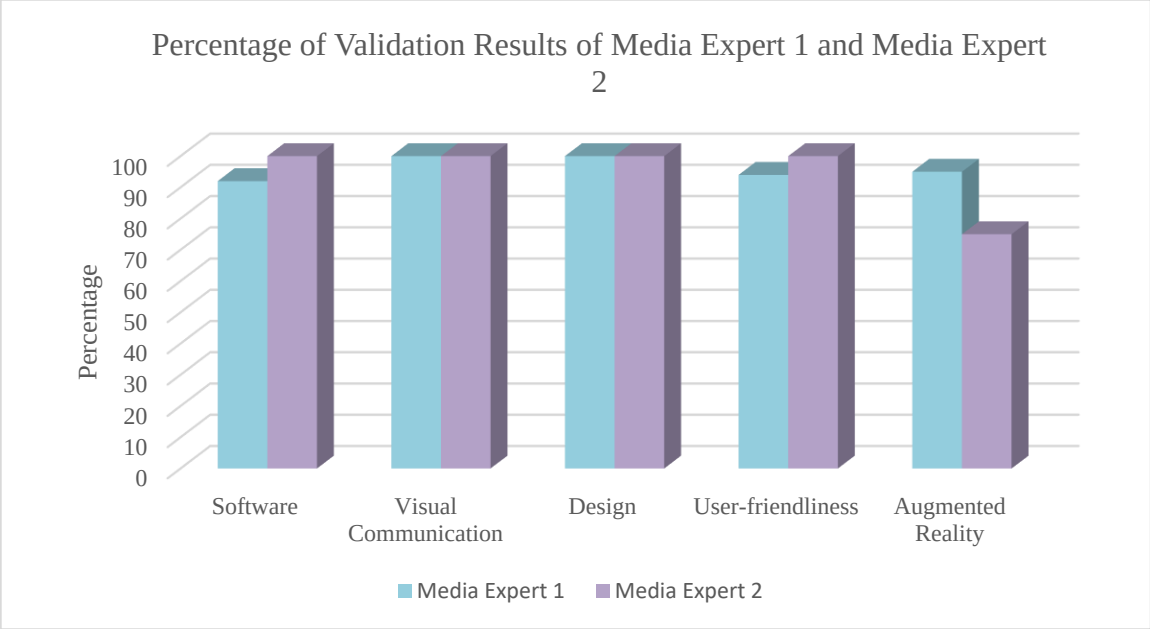

Figure 11. Results of Validation by Media Expert

Based on the picture above, the validation assessment of material expert 1 and material expert 2 as a whole gets a percentage of 96% and 93% which means it shows a very good category. So the average recapitulation of the results of media expert validation is 94% which means it shows a very good category. So it can be concluded that the KEBUDIN application media is very feasible to use in the learning process.

KEBUDIN applications that have been tested for validation by material experts and media experts are said to be feasible and can be tested as learning media in elementary schools. Learning media in the form of KEBUDIN applications can be said to be valid because from the test results, the scores obtained from the three validation experts were 98% from material experts, 96% from media experts 1, and 93% from media experts 2. It can be said that the KEBUDIN application product that has been developed is in accordance with the indicators of the feasibility of a media in terms of material and media.

Table 8. Validation result by validator

Expert Validation	Percentage	Category
Material Expert	98%	Very feasible
Media Expert 1	96%	Very feasible
Media Expert 2	93%	Very feasible
Total	287%	
Average (%)	**96%**	**Very feasible**

Based on this, it can be concluded that the learning media KEBUDIN application based on android can be declared to have met the feasibility with an average score of 96% with a validity level of "Very feasible" so that it can be used to be tested to elementary school students.

Furthermore, the implementation stage, according to (Rustandi, 2021) at this stage the application has been improved according to suggestions from media experts and material experts before being tested on students. There are two stages of testing, namely the first trial is a limited field trial and the second trial is a broad field trial to see the practicality and effectiveness of the KEBUDIN application media (Yuwono et al, 2021). Thus this study also conducted a limited trial with 6 students and a broad trial with 18 students. The following is the percentage of user responses (Students) of limited trials and broad trials of KEBUDIN application learning media.

Table 9. Trial results (student response)

Expert Validation	Percentage	Category
Limited trial	92%	Very Good
Extensive trial	87%	Very Good
Average(%)	**89%**	**Very Good**

The table above shows that the results of the limited trial to six students received a percentage of 92% in the very good category. In the broad trial with 18 student respondents, the percentage was 87% with a very good category. Thus the feasibility of KEBUDIN application media when used by students in the learning process gets an assessment in the "very good" category. The evaluation stage is the last stage of the ADDIE development model.

Evaluation is the process of providing an assessment of learning media (Trisiana & Wartoyo, 2016 in Adesfiana et al. (2022)). The trial phase was obtained from user responses, namely students. The questionnaire results were analyzed to determine the feasibility of the product. The results of the analysis become a reference for the need for revisions to the final product (Permana & Nourmavita, 2017) In this study, there were assessments from students in the broad trial activities. The suggestion given to the KEBUDIN application is that students want the quiz feature to be given additional quizzes. Thus the researcher added a quiz from the initial only one quiz to there are six quizzes available on the KEBUDIN application.

Figure 12. Before Revison

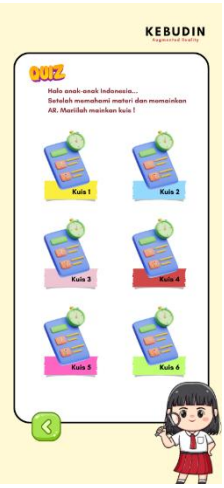

Figure 13. After Revison

The following is the display before revision in Figure 12 which shows the quiz feature which only has one exercise question in the form of a quiz provided in the application. In Figure

13 shows after the revision that the quiz feature in the application is added to there are six quizzes that can be accessed by students.

Conclusion

Based on the results of the process of developing android-based application media with AR technology in learning "Cultural Diversity in Indonesia" Elementary School, it can be concluded that android-based application media with AR technology in learning cultural diversity in Indonesia is proven to be suitable for use. The results of the assessment of material experts, media experts and user responses from students who conducted limited trials and broad trials showed the results of the feasibility of android-based application products with AR technology. In addition, at the time of implementation, students were very enthusiastic in learning and impressed by using adnroud-based application media. This shows that android-based applications are included in the category very feasible to use for learning media in the learning process, especially the material of cultural diversity in Indonesia. It is expected that learning media android-based applications with augmented reality technology can be a new innovation for the interactive learning process.

References

Adesfiana, Z. N., Astuti, I., & Enawaty, E. (2022). Pengembangan Chatbot Berbasis Web Menggunakan Model Addie. *Jurnal Khatulistiwa Informatika*, *10*(2), 147–152.

Akhmadan, W. (2017). Pengembangan bahan ajar materi garis dan sudut menggunakan macromedia flash dan moodle kelas vii sekolah menengah pertama. *Jurnal Gantang*, *2*(1), 27–40.

Arsyad, Azhar. (2019). *Media Pembalajaran*. Jakarta : Pt. Raja Grafindo Persada

Atmaja, N. J. D. (2018). Pengembangan aplikasi media pembelajaran interaktif 3D tata Surya menggunakan teknologi Augmented Reality dengan android. *Prosiding Semnastek*.

Febrista, D., & Efrizon, E. (2021). Pengembangan e-Modul Interaktif Berbasis Android pada Mata Pelajaran Penerapan Rangkaian Elektronika Kelas XI Teknik Audio Vidio. *Voteteknika (Vocational Teknik Elektronika Dan Informatika)*, *9*(3), 102–110.

Hamidiyah, Y. K., & Yermiandhoko, Y. (2020). Pengembangan Media Pembelajaran Augmented Reality Berbasis Android Materi Keragaman Rumah Adat Kelas IV Sekolah Dasar. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, *8*(4).

Hamzah, L., & Baalwi, M. A. (2022). Pengembangan Media Pembelajaran Pop-Up Book Materi Keragaman Budaya Dengan Model Addie Pada Kelas Iv Mi Asasul Muttaqin. *Lintang Songo: Jurnal Pendidikan*, *5*(1), 26–31.

Haw, C. (2023). PERKEMBANGAN TERKINI DALAM TEKNOLOGI SISTEM PENDIDIKAN TRANSFORMASI PEMBELAJARAN DAN PENGAJARAN DI ERA DIGITAL. *Jurnal Teknologi Terkini*, *3*(4).

Hendrianti, S. D., Hidayat, S., & Suherman, S. (2021). Pengembangan Media E-Booklet Pembelajaran Berbasis Flipbook Maker pada Materi Identifikasi Karir Siswa. *Jurnal Teknologi Pendidikan: Jurnal Penelitian Dan Pengembangan Pembelajaran*, *6*(2), 178–184.

Ikhwan, W. K. (2015). Implementasi Standar Isi, Standar Proses, Standar Lulusan Sebagai Standar Mutu pendidikan MTs Negeri Di kabupaten Tulungagung. *Pedagogia : Jurnal Pendidikan*, *4*(1), 16–22. https://doi.org/10.21070/pedagogia.v4i1.68

Jannah, M., & Julianto, J. U. L. I. A. N. T. O. (2018). Pengembangan media video animasi digestive system untuk meningkatkan hasil belajar siswa mata pelajaran IPA kelas V. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, *6*(2), 254798.

Muhson, A. (2010). Pengembangan media pembelajaran berbasis teknologi informasi. *Jurnal Pendidikan Akuntansi Indonesia*, *8*(2).

Mustaqim, I., & Kurniawan, N. (2017). Pengembangan augmented reality sebagai media pembelajaran pengenalan komponen pneumatik di SMK. *Jurnal Pendidikan Teknologi Dan Kejuruan*, *14*(2).

Nugroho, A. Y., Hartono, H., & Sudiyanto, S. (2020). Analisis Kebutuhan Pembelajaran Ilmu Pengetahuan Sosial Di Sekolah Dasar. *Jurnal Kependidikan Penelitian Inovasi Pembelajaran*, *4*(1), 15-25.

Nurfadhillah, S., Azhar, C. R., Aini, D. N., Apriansyah, F., & Setiani, R. (2021). *Pengembangan Media Pembelajaran Berbasis Teknologi Untuk Meningkatkan Hasil Belajar Siswa Sd Negeri Pinang 1*.

Permana, E. P., & Nourmavita, D. (2017). Pengembangan Multimedia Interaktif Pada Mata Pelajaran Ipa Materi Mendeskripsikan Daur Hidup Hewan Di Lingkungan Sekitar Siswa Kelas Iv Sekolah Dasar. *Jurnal PGSD: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar*, *10*(2), 79–85.

Pertiwi, I. D. (2023). *PENGEMBANGAN MEDIA INTERAKTIF AUGMENTED REALITY PADA PEMBELAJARAN IPAS MATERI FOTOSINTESIS UNTUK SISWA FASE B SEKOLAH DASAR* (Doctoral dissertation, Universitas Pendidikan Indonesia).

Putri, S. A., Aeni, A. N., & Ismail, A. (2024). DEVELOPMENT OF AN ANDROID-BASED RAIMA APPLICATION MEDIA TO IMPROVE STUDENTS'MASTERY OF CONCEPTS. *Jurnal Cakrawala Pendas*, *10*(1), 148–160.

Rohmah, N. (2021). Media pembelajaran masa kini: aplikasi pembuatan dan kegunaannya. *Awwaliyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *4*(2), 176–181.

Rustandi, A. (2021). Penerapan model ADDIE dalam pengembangan media pembelajaran di SMPN 22 Kota Samarinda. *Jurnal Fasilkom*, *11*(2), 57–60.

Sari, A. R., Sujana, A., & Isrok'atun, I. (2023). DEVELOPMENT OF ANIMATED VIDEOS TO ENHANCE STUDENTS MASTERY OF CONCEPTS IN THE SOLAR SYSTEM. *Jurnal Cakrawala Pendas*, *9*(4), 664–675.

Suarno, D. T., & Sukirno, S. (2015). *Pengembangan Media Pembelajaran Ips Dengan Tema Pemanfaatan Dan Pelestarian Sungai Untuk Siswa Kelas Vii Smp. Harmoni Sosial: Jurnal Pendidikan IPS, 2 (2), 115–125.*

Suksma, C. W., Margunayasa, I. G., & Werang, B. R. (2023). Pengembangan Media Pembelajaran Digital Augmented Reality Berbasis Android Pada Materi Sistem Tata Surya Untuk Siswa Kelas VI Sekolah Dasar. *Innovative: Journal Of Social Science Research*, *3*(3), 4261–4275.

Tan, X., Lin, X., & Zhuang, R. (2024). Development and validation of a secondary vocational school students' digital learning competence scale. *Smart Learning Environments*, *11*(1), 37.

Usmaedi, U., Fatmawati, P. Y., & Karisman, A. (2020). Pengembangan media pembelajaran berbasis teknologi aplikasi augmented reality dalam meningkatkan proses pengajaran siswa sekolah dasar. *Jurnal Educatio FKIP UNMA*, *6*(2), 489–499.

Wibowo, V. R., Putri, K. E., & Mukmin, B. A. (2022). Pengembangan Media Pembelajaran Berbasis Augmented Reality pada Materi Penggolongan Hewan Kelas V Sekolah Dasar. *PTK: Jurnal Tindakan Kelas*, *3*(1), 58–69.

Wiranda, T., & Adri, M. (2019). *Rancang Bangun Aplikasi Modul Pembelajaran Teknologi WAN Berbasis Android. VoteTEKNIKA (Vocational Teknik Elektronika Dan Informatika), 7 (4), 2302–3295*.

Yuwono, T., Ningrum, A. D. I., & Susilo, D. A. (2021). Pengembangan media pembelajaran pop up book berbasis discovery learning membuktikan luas dan keliling lingkaran. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *10*(2), 479–490.

Zain, A. A., & Pratiwi, W. (2021). Analisis Kebutuhan Pengembangan Media Powerpoint Interaktif Sebagai Media Pembelajaran Tematik Kelas V SD. *Elementary School: Jurnal Pendidikan Dan Pembelajaran Ke-SD-An*, *8*(1), 75-â.