Faculty of Tarbiyah IAIN Kediri
ICOE The Ananual International Conference on Education Proceedings

DEVELOPMENT OF ABATAR INTERACTIVE MULTIMEDIA (BUILD FLAT APPLICATION) TO INCREASE STUDENTS' INTEREST IN 4TH GRADE MATHEMATICS

Difani Fulan Maulidiyah Rachmah
Institut Agama Islam Negeri (IAIN) Kediri
E-mail: difanifulan.mr@gmail.com

Choirul Annisa
Institut Agama Islam Negeri (IAIN) Kediri
E-mail: choirul.annisa@iainkediri.ac.id

Aulia Rohmawati*
Institut Agama Islam Negeri (IAIN) Kediri
E-mail: inoe.kilea@gmail.com

*Correspondence e-mail: inoe.kilea@gmail.com

Article Info
Article History:
Received 23 June 2023
Revised 09 September 2023
Accepted 07 November 2023
Available online 08 November 2023

Abstracts
The nation's standard of living is impacted by education. Therefore, it is essential to raise educational standards. In order to boost students' interest in studying, this study intends to create interactive learning media in the form of an application named Abatar Interactive Multimedia (Build Flat Application). R&D (research and development) is the methodology employed, along with the APPED development model. Interactive Learning Multimedia called Abatar, which has undergone a validity test, is the outcome of this study. The average score for the media validation test, which included input from professionals in media design, content, learning, and user testing, was 90.13% in the Valid category. However, studies on pupils revealed a 33% boost in their interest in learning. This demonstrates that Abatar Interactive Multimedia is useful for instruction and can boost students' attention in MI Hidayatus Shibyan's class 4A.

Keyword:
Abatar Interactive Multimedia, Student Interest

Introduction

Education influences the quality of a nation's life. The level of education affects a country's standard of living. This is in line with one of Indonesia's objectives, which is to educate the people of the country, as mentioned in the preamble of the 1945 Constitution. In order to strengthen Indonesia's human resources, it is necessary, per (Feriandi, Y., & Indrakusuma, 2019), to increase education quality. The educational process can be used to raise the quality of human resources. The quickening evolution of civilization and culture is a reflection of the expansion of knowledge. The advancement of society's attitude depends on education, and civilisation and cultural development are directly tied to it. So, in order to advance knowledge, education must be developed to the fullest extent possible. The quality of education is closely correlated with the usage of media in learning, claims (Susetyaningsih, 2019). The right usage of educational media can give pupils a more fulfilling learning experience. After employing learning media, communication that was previously one-sided between the teacher and students can now be two-way. As a result, the learning environment,

which previously rendered pupils inert, dull, and lacking in significance, may be made more participatory and engaging. Teachers can accomplish their learning objectives more quickly and save time by using media in areas like mathematics that have tangible concepts.

The development of media can benefit from the advancement of science and technology (IPTEK). Teachers today must be creative and imaginative thinkers due to the rapid growth of science and technology (IPTEK). Teachers need to be up-to-date on technology advancements in order to give lessons that are more interesting for students, especially when employing learning media. The learning process would be more fascinating and varied due of the advances in teaching, claims (R. I. Alam, G. F. Az-Zahra, H. M., 2019). The innovations produced by teachers can steadily raise the caliber of instruction while also inspiring students to want to study more. One way to make use of technology improvements is through the creation of educational media. Multimedia is the foundation of most interactive learning materials since it blends text, graphics, animations, audio, and video to engage all of the senses in the learning process. Students can learn whenever and wherever they wish with the help of interactive learning media. Additionally, it might pique pupils' interest in learning. According to research by (Novitasari, 2016), including interactive multimedia into better learning techniques or programs helps pique students' interest in the subject matter, particularly when cartoon characters are involved. The use of interactive learning media in mathematics is one technique to represent abstract mathematical concepts for simple understanding and to improve students' recollection of the materials presented, according to other research, which also corroborate this.

Android Studio is one of the applications that may be used to make interactive learning media. Android Studio is an Integrated Development Environment (IDE) for creating Android applications, according to (Dzil Ikram, Fachrurrazi, & Fhonna, 2021). Google released it on May 16, 2013, and the Apache 2.0 license makes it freely downloadable. Google's official IDE, Android Studio, took the role of the previous Android developer program, Eclipse. The reason Android Studio was chosen is because it contains numerous features that help programmers, especially those who are just starting out. For students to follow and pay attention to the learning process, designers must have the skills necessary to create visually appealing and compelling presentations. According to Sapitri and Bentri's research, using Android Studio to generate instructional media can improve student retention and comprehension of material. Using interactive learning media is practical and can inspire engaging and fun learning activities for students, according to a new study by Jesi Alexander.

According to an interview with a mathematics teacher at MI Hidayatus Shibyan on September 17, 2022, the teacher's primary teaching tools are PowerPoint slideshows with instructional videos on particular themes and folded paper. The teacher typically explains things directly or through lectures. The use of lecture methods is justified by the fact that the subject matter necessitates a teacher-direct explanation and that students have ingrained misconceptions about mathematics that make them despise anything abstract. However, the lecture approach is seen as less effective for subjects like three-dimensional shapes because pupils have not fully understood the notion using this way. The teacher typically uses PowerPoint presentations with instructional films on creating three-dimensional designs as well as media like folded paper to teach students about three-dimensional shapes. However, there are several obstacles that prevent students from making the best use of media, like the school's lack of projectors. Some of the media being used are not practical because they make learning difficult for kids. Other forms of media must therefore be used to support learning so that each student can use them on their own.

Because both play equally significant roles in education, the role of media in learning is equivalent to that of the teaching approach. Making abstract ideas concrete is the objective of learning medium. One subject involving abstract concepts is mathematics, which presents difficulties for learners. Students struggle with mathematics, as was indicated in the interview

with the mathematics instructor at MI Hidayatus Shibyan. Plane geometry is one of the more difficult subjects for pupils since it requires them to see and comprehend a lot of concepts. Students typically struggle to find solutions to this topic's challenges. Because there are some disparities between the material in the book and the PowerPoint or videos, the teacher has tried to use media like PowerPoint presentations with instructional videos on the subject, but the pupils find it perplexing. Numerous test questions are pulled straight out of the book. Therefore, there is a need for additional media that can tie together the teacher's materials and the information in the book, making the subject matter more applicable and simpler for students to understand.

In their initial study, "Development of Interactive Learning Media for Mathematics Lessons Recognizing Shapes and Spaces Using the Inquiry Method for Elementary Level Students" by (Pohan & Jaelani, 2018) sought to describe the impact of interactive inquiry-based learning models and numerical skills on the outcomes of mathematics learning. There were 35 third-graders in the research sample. Field observations, student math test results, and interviews with instructors and parents about the current learning process were used to obtain the data. According to the study's findings, pupils who used the interactive inquiry-based learning model had better math learning outcomes than those who used more traditional teaching strategies. The study also showed that the interaction between the learning model and students' numerical skills had an impact on learning outcomes. In contrast to Achmad Baroqah's research, which concentrated on solid geometry, the current research is concerned with interactive learning medium for teaching flat geometry.

The second study, "Optimization of Interactive Learning Media in Improving Children's Mathematical Abilities in Popo Village, Manggarai Regency" by (Jundu, Jehadus, Nendi, Kurniawan, & Men, 2019), sought to enhance students' understanding of mathematical concepts and inspire teachers to create learning media for students' successful learning. The study employed a qualitative research methodology and interactive learning tools to carry out context-based learning activities. The findings demonstrated that the interactive learning media package helped students better understand concepts and that they picked up mathematical ideas more quickly, which increased their willingness to learn the subject. The research methodology employed in Ricardus Jundu's study contrasts with that used in the current study; the latter uses a research and development (RnD) methodology.

The third study, "Interactive Learning Media to Increase Students' Interest in Learning Mathematics at SMP 1 Bukit Sundi," by (Wulandari, 2020), sought to ascertain how interactive multimedia-based learning materials might affect students' interest in learning mathematics at SMP 1 Bukit Sundi. The methods used to obtain the data were observation, interviews, and literature reviews. Based on three indicators-attention, interest, and engagement-data analysis concentrated on the students' interest in learning. The findings indicated that interactive multimedia-based learning materials had a beneficial impact on students' motivation to learn mathematics. The media also caught the interest of pupils while they were learning. The current study differs from previous studies in that it used fourth-grade pupils as its sample and was done at MI Hidayatus Shibyan.

In their fourth study, "Development of Android-Based Flat Mathematical Interactive Learning Media for SD/MI Students," (Adawiyah & Batubara, 2020) sought to create interactive learning materials on plane geometry for elementary school students using the Android platform. The study employed a development design that was modified from the Luther model. An interest survey given to students and a questionnaire sent to media design specialists served as the study tool. With a rating of 91.6% for good quality from media design professionals and a rating of 92% based on student answers, the results demonstrated that the interactive learning media for plane geometry based on Android was simple for primary school kids to utilize. The focus of the current research differs from Nur Alfia Adawiyah's research,

which focuses on interactive learning media for plane geometry. The current research examines interactive learning media to increase students' learning interest.

In their fifth study, titled "Development of Interactive Learning Multimedia for Mathematics Subjects for Grade 5 Elementary Schools," (Firmansyah, Aldriani, & Dewi, 2020) sought to develop augmented reality-based learning media in geometry for mathematics in the fifth grade of elementary school. Black Box and Design and Development (DnD) methodologies were employed in the investigation. Online learning was the method of instruction. The study's findings included a learning media program on geometrical subjects for fifth-graders that could be accessed via mobile devices or desktop PCs. The method of instruction employed in Feri Hidayatullah Firmansyah's study contrasts with that of the current research, which involves face-to-face instruction.

The current study intends to create cutting-edge learning resources for plane geometry in fourth-grade mathematics at MI Hidayatus Shibyan in the form of interactive multimedia learning resources that users may control and operate. The objective is to increase kids' interest in math, and more specifically concepts related to plane geometry. According to the aforementioned debates, learning media might affect students' interest in their studies. As a result, it is necessary to develop instructional media that can handle current issues, such as the Interactive Multimedia Abatar (Flat Building Application), an Application for Plane Geometry. Users of this interactive multimedia learning tool can access it anytime and wherever they choose, giving students the freedom to learn how they want to. Students' learning results can be enhanced by the developed medium by encouraging greater interest in learning plane geometry. In order to increase students' interest in fourth grade mathematics, the researcher is therefore interested in performing a development study with the title "Development Of Abatar Interactive Multimedia (Build Flat Application) To Increase Students' Interest In 4th Grade Mathematics".

Methods

Research and development (Research and Development) is the method used in this investigation. The APPED model, which was put forth by (Dwi Surjono, 2017), was used as the research and development model in this study. These five sequential and logical steps: Analysis, Planning, Production, Evaluation, and Dissemination make up the APPED model. In this study, observation, interviews, and surveys were employed to collect data. Student interest questionnaires and validation questionnaires were the instruments employed. Sources of validation data included media design experts, material experts, learning experts, user tests, and a total of 8 people. Student interest data came from 32 students in class 4A MI Hidayatus Shibyan. Quantitative data is the kind that was gathered for this investigation. quantitative information in the form of scores derived from the examination of the pretest and posttest results from student learning interest surveys. The following formula is a study of media feasibility validation data that was taken from (Wardathi & Pradipta, 2019) research:

$$P=\frac{X}{Xi} \text{ x } 100\%$$

Information:

P : Percentage of each criterion
X : Score of each criterion
Xi : Minimum score for each criterion

Table 1. Percentage Scale Criteria

Interval	Criteria
81% - 100%	Very worth it
61% - 80%	Worthy
41% - 60%	Decent enough
21% - 40%	Not worth it

0% - 20%	Very unworthy

Furthermore, to calculate the percentage of all subjects, the following formula is used:

$$X = \frac{P}{N}\ x\ 100\%$$

Information:
X : Percentage
P : Total percentage of all subjects
N : The number of subjects
Based on these calculations, the following assessment criteria are obtained:

Table 2. Expert Validation Criteria

Interval	Criteria	Description
76% ≤ X ≤ 100%	Valid	No revision
51% ≤ X ≤ 75%	Valid enough	No revision
26% ≤ X ≤ 50%	Invalid	Revision
X ≤ 25%	Invalid	Revision

While the data analysis from the student interest questionnaire adapted from the research of (Anggraeni, Alpian, Prihamdani, & Winarsih, 2021) namely as follows:

$$N = \frac{K}{NK}\ x\ 100\%$$

Information:
N : Percentage score
K : Acquisition score
NK : Maximum score
Based on these calculations, the following qualitative criteria are obtained:

Table 3. Trial Qualitative Criteria

Interval	Criteria
81% ≤ N ≤ 100%	Very good
61% ≤ N ≤ 80%	Good
41% ≤ N ≤ 60%	Pretty good
N ≤ 40%	Not good

The data analysis in this study used the computation of the normalized average gain (N-Gain) score data produced by (Hake, 1999) to determine the increase in students' learning interest before and after utilizing Abatar Interactive Multimedia (Build Flat Application). The following is the N-Gain test formula:

$$\text{N-gain (g)} = \frac{\text{Skor posttest-Skor pretest}}{\text{Skor maksimal-Skor pretest}}$$

Information:
N-gain (g) : The amount of the gain factor
Posttest score : The value of the final test results
Pretest score : The value of the initial test results
Maximum score : The maximum score of the test

Table 4. Percentage of Gain Factor Criteria

Interval	Criteria
g > 0,7	Tall
0,3 ≤ g ≤ 0,7	Currently
g < 0,3	Low

Results and Discussion

Findings

1. Interview Results

At MI Hidayatus Shibyan, interviews were performed as part of a needs analysis and preliminary research project. System requirements analysis and functional

requirements analysis are the two types of needs analyses that are carried out. The results of a September 2022 interview with MI math instructor Hidayatus Shibyan are listed below.

Table 5. Needs Analysis Results

Analysis	Condition	Solution
System	According to conversations with math teachers at MI Hidayatus Shibyan in Kediri Regency, it is known that teachers have used a variety of digital-based learning tools, but pupils are still unsure of which tools to use when studying.	To prevent pupils from becoming confused when utilizing it, teachers require learning materials that can tie together the various media that have been used. The media may be digital so that students may readily access it and have a unique learning experience.
Functional	According to conversations with math instructors at MI Hidayatus Shibyan in Kediri Regency, the media that the teacher has utilized is still one-way, which means that when students use the media again for learning, there is no portion that enables students to interact with the teacher.	In addition to categorizing already-existing media, new media must provide students with different animations that enable individual study without regard to time or location. Due to this, pupils are more motivated to learn and pick up on the content more rapidly.

2. Media Feasibility Validation

To ascertain the validity of the media through the evaluation of several validators, media feasibility validation was carried out. In this development research, product validation data was collected from media design experts, material experts, learning experts, and user testing on media creation. The following table shows the validation outcomes from media validation:

Table 6. Validation Results of Abatar Interactive Multimedia (Build Flat Applications)

No	Name	Mark	Information	Criteria
1	Muchammad Desta Pradana, M.Pd	V1 86,11%	Media design expert	Very worth it
		V2 92,59%		Very worth it
2	Nur Rohman, M.Kom	95,37%		Very worth it
	Average	91,35%		Valid, no revision
3	Tutik Dinur Rofiah, M.Pd	75%	Material expert	Worthy
4	Sari Dewi Puspa Rahayu, S.Pd	96,73%		Very worth it
	Average	85,86%		Valid, no revision
5	Ulvi Hidayat, S.Pd	100%	Learning expert	Very worth it
6	Sari Dewi Puspa Rahayu, S.Pd	91,66%		Very worth it
	Average	95,83%		Valid, no revision
7	Galuh Aulia Rahma	84,81%	User test	Worthy
8	Mughni Aisy Lavina	90,38%		Very worth it

Average	87,49%	Valid, no revision

3. Trial Results

The results of a questionnaire administered to 32 students in class 4A MI Hidayatus Shibyan provided information on test outcomes for students. By completing this survey, you can find out whether or not students' interest in learning has increased both before and after utilizing the Abatar Interactive Multimedia (Building Flat Application). The table below contains information from the trial's findings about the student interest questionnaire.

Table 7. Data on Class 4A MI Hidayatus Shibyan Student Names

No. Absence	Name	No. Absence	Nama
1	Afif Muqilatul Lathifah	17	Galuh Aulia Rahma
2	Azzahra Rachma Fauziah	18	M. Awaludin Azmi
3	Akia Kynanta Hatika Naura	19	Maulida Azkiya Farihah
4	Allya Safitri	20	Moch. Farhan Al-Habibi
5	Alvina Qurrota Ayuni	21	Moch. Faris 'Izzulkhaq
6	Amanda Putri Hermawati	22	Muhammad Raihan Dwiputra
7	Andira Puji Lestari	23	Muhammad Aqil Nazhor Muwafaq
8	Arju Syafi' Muhammad	24	Muhammad Fattan Assidqi
9	Aura Ilani Jasmine	25	Muhammad Nuril Amin
10	Avarra Hasna Aqilla Hidayat	26	Nur Lailatul Baroroh
11	Azka Nurul Auliya	27	Putri Mauliddina
12	Carissa Bunga Kusuma Arum	28	Ratu Ayu Sekar Wangi
13	Erina Faqihatun Nisa'	29	Sabrina Adela Putri
14	Farhan Panji Setiawan	30	Yasmin Nur Aini
15	Fiza Aida Khairina Fahmi	31	Zacky Muhammad Akmal Ibadirrahman
16	Galang Adelio Rizali	32	Mughni Aisy Lavina

Table 8. Data on Student Interest Questionnaire Results Before Using Abatar Interactive Multimedia (Build Flat Application)

No. Absense	No. Statement																Gain score	Presentase (%)	Criteria
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	3	3	3	2	2	2	3	3	3	2	1	3	3	2	3	3	41	64%	Good
2	3	3	4	3	1	2	3	3	2	3	3	2	2	2	3	3	42	66%	Good
3	1	2	2	1	2	2	1	2	1	2	1	1	2	2	1	2	25	39%	Not good
4	3	3	3	3	2	2	3	3	2	4	3	2	3	2	3	2	43	67%	Good
5	2	2	3	2	1	2	3	2	4	3	3	2	4	2	2	2	39	61%	Good
6	3	2	2	4	1	2	3	2	1	4	3	1	3	4	3	2	40	63%	Good
7	2	2	2	2	2	2	3	2	3	3	2	2	3	2	3	2	37	58%	Pretty good
8	1	1	1	2	1	1	2	2	3	2	1	2	1	2	1	2	25	39%	Not good

9	1	2	1	2	1	2	1	2	2	1	1	2	1	1	2	1	23	36%	Not good
10	2	3	2	3	4	4	3	2	4	3	4	2	1	4	1	1	43	67%	good
11	1	2	2	1	1	1	1	2	1	1	2	1	2	1	1	2	22	34%	Not good
12	1	2	2	1	1	2	1	1	1	2	3	1	2	1	1	1	23	36%	Not good
13	2	3	1	2	1	2	3	2	4	2	2	2	3	1	3	1	34	53%	Pretty good
14	1	2	1	2	2	3	3	1	2	4	3	1	3	3	2	1	34	53%	Pretty good
15	2	2	1	2	1	2	1	2	1	1	1	1	2	1	2	1	23	36%	Not good
16	1	2	1	2	2	2	4	2	4	4	2	1	2	4	3	1	37	58%	Pretty good
17	1	2	2	1	2	2	1	2	1	2	2	1	2	1	1	1	24	38%	Not good
18	1	1	1	2	2	2	2	2	2	4	4	1	3	4	3	4	38	59%	Pretty good
19	2	1	1	1	2	2	2	1	4	4	3	1	2	4	3	1	34	53%	Pretty good
20	1	2	1	2	2	3	4	1	4	4	2	1	3	1	2	1	34	53%	Pretty good
21	2	1	2	2	4	1	2	1	3	2	1	1	1	2	3	2	30	47%	Pretty good
22	3	2	1	1	1	2	3	2	3	2	1	3	2	2	4	1	33	52%	Pretty good
23	1	1	1	2	1	1	2	2	3	2	1	1	1	2	4	1	26	41%	Pretty good
24	1	1	1	3	2	1	3	1	3	2	2	1	1	2	3	1	28	44%	Pretty good
25	2	3	2	2	4	2	3	3	2	3	3	1	1	2	3	2	38	59%	Pretty good
26	2	2	2	2	1	2	3	2	2	2	3	2	1	1	2	2	31	48%	Pretty good
27	2	3	2	2	3	2	3	2	3	2	3	2	3	3	3	2	40	63%	Good
28	2	3	2	2	1	1	2	2	4	2	2	1	2	3	2	2	33	52%	Pretty good
29	2	3	2	2	3	2	3	2	3	2	3	2	3	3	3	2	40	63%	Good
30	1	2	1	2	2	1	2	1	2	2	2	2	2	1	1	2	26	41%	Pretty good
31	1	1	1	2	1	1	1	2	2	2	1	1	1	2	2	2	23	36%	Not good
32	2	2	2	1	1	1	1	1	2	1	2	2	2	1	2	1	24	38%	Not good
											Average						32.281	50%	Pretty good

Table 9. Data on Student Interest Questionnaire Results After Using Abatar Interactive Multimedia (Build Flat Application)

No. Absense	No. Statement																Gain Score	Presentase (%)	Criteria
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
1	3	4	3	4	3	3	3	3	4	3	4	3	4	3	3	3	53	83%	Very good
2	4	4	4	4	4	3	4	3	3	4	3	3	3	4	4	4	58	91%	Very good
3	4	4	4	4	4	3	3	4	4	4	3	3	3	3	3	4	57	89%	Very good
4	4	3	4	3	4	4	4	4	4	3	4	3	4	4	3	4	59	92%	Very good
5	4	4	4	4	4	4	4	4	3	3	4	3	3	4	3	4	59	92%	Very good

6	4	4	3	4	4	4	4	3	4	3	4	3	4	4	4	4	60	94%	Very good
7	4	4	4	3	4	3	3	3	4	4	4	4	3	4	4	3	58	91%	Very good
8	4	4	4	4	4	4	3	3	4	4	3	3	4	4	4	4	60	94%	Very good
9	4	4	4	4	3	3	4	3	3	4	3	3	4	3	3	4	56	88%	Very good
10	4	3	4	3	2	3	3	3	4	2	4	4	3	4	4	2	52	81%	Very good
11	4	4	4	3	3	3	4	3	3	3	4	4	4	3	3	4	56	88%	Very good
12	3	3	3	3	3	2	2	2	4	3	3	2	3	3	2	3	44	69%	Good
13	4	4	4	4	3	3	4	3	4	4	4	3	3	3	4	4	58	91%	Very good
14	4	3	4	4	4	3	4	3	2	4	4	3	2	3	3	3	53	83%	Very good
15	4	3	3	4	3	3	3	4	4	4	2	2	2	3	4	4	52	81%	Very good
16	4	3	4	4	3	3	2	3	3	3	4	4	2	3	4	3	52	81%	Very good
17	3	4	3	3	4	4	4	3	3	3	4	3	4	4	3	4	56	88%	Very good
18	4	4	4	4	4	3	4	4	3	4	3	3	4	4	4	3	59	92%	Very good
19	4	4	3	3	4	4	4	4	4	3	3	4	4	3	4	4	59	92%	Very good
20	4	4	4	4	4	3	3	4	3	4	3	3	3	4	4	3	57	89%	Very good
21	4	4	3	4	3	4	4	3	3	4	3	4	3	4	4	4	58	91%	Very good
22	4	4	4	4	4	3	4	3	4	3	4	4	4	3	3	4	59	92%	Very good
23	4	3	4	3	4	4	4	4	4	4	4	3	4	3	4	3	59	92%	Very good
24	4	4	4	4	3	4	4	4	4	4	4	4	3	3	3	3	59	92%	Very good
25	4	3	3	4	4	4	4	4	4	3	4	4	3	4	4	3	59	92%	Very good
26	4	4	4	4	4	3	4	4	3	4	4	3	4	4	4	3	60	94%	Very good
27	4	4	4	4	4	3	4	3	3	4	3	4	4	4	4	3	59	92%	Very good
28	4	3	3	3	3	3	3	3	3	3	3	2	2	2	3	3	46	72%	Good
29	3	4	3	4	4	4	4	3	4	4	3	3	4	3	4	4	58	91%	Very good
30	4	4	4	3	4	4	4	4	3	4	4	3	3	3	4	3	58	91%	Very good
31	4	4	3	4	3	3	4	4	4	2	3	1	1	4	3	4	51	80%	Good
32	4	3	3	4	4	3	3	4	4	3	3	2	3	4	3	3	53	83%	Very good
											Average						56.156	88%	Very good

4. Calculation of N-Gain (g)

The N-Gain (g) test increases student learning motivation in using Abatar Interactive Multimedia (Build Flat Application). The table below shows the computation of the n-gain test's results and conclusions, which are as follows:

Table 10. N-Gain (g) Test Calculation Results

No. Absense	Pretest	Posttest	Ideal score	*N-gain (g)*	Information
1	41	53	64	0,5217	Currently
2	42	58	64	0,7273	Tall
3	25	57	64	0,8205	Tall
4	43	59	64	0,7619	Tall

5	39	59	64	0,8000	Tall
6	40	60	64	0,8333	Tall
7	37	58	64	0,7778	Tall
8	25	60	64	0,8974	Tall
9	23	56	64	0,8049	Tall
10	43	52	64	0,4286	Currently
11	22	56	64	0,8095	Tall
12	23	44	64	0,5122	Currently
13	34	58	64	0,8000	Tall
14	34	53	64	0,6333	Currently
15	23	52	64	0,7073	Tall
16	37	52	64	0,5556	Currently
17	24	56	64	0,8000	Tall
18	38	59	64	0,8077	Tall
19	34	59	64	0,8333	Tall
20	34	57	64	0,7667	Tall
21	30	58	64	0,8235	Tall
22	33	59	64	0,8387	Tall
23	26	59	64	0,8684	Tall
24	28	59	64	0,8611	Tall
25	38	59	64	0,8077	Tall
26	31	60	64	0,8788	Tall
27	40	59	64	0,7917	Tall
28	33	46	64	0,4194	Currently
29	40	58	64	0,7500	Tall
30	26	58	64	0,8421	Tall
31	23	51	64	0,6829	Currently
32	24	53	64	0,7250	Tall
Average	32.706	56.353	64	0.7506	Tall

Tabel 11. Conclusion of the calculation results of the n-gain *(g)* test

No	Categori	Amount	Presentase
1	Low	0 student	0%
2	Currently	7 students	21,87%
3	Tall	25 students	78,12%

Analysis

This development research has produced an interactive learning multimedia product named Abatar which stands for flat shape application. For grade 4 SD/MI, flat shapes are the topic of the applied mathematics. This development research also aims to identify the viability of Abatar interactive multimedia (flat-build application) and identify the learning preferences of students both before and after utilizing Abatar interactive multimedia (flat-build application). The APPED model is used as the development model in this development research. The analysis stage, the planning stage, the production stage, the evaluation stage, and the distribution stage are the five stages that make up this model.

The analysis and preliminary study are the first stage. At this point, the researcher conducted interviews with the math teacher at MI Hidayatus Shibyan, Kediri Regency, as part of a needs analysis and preliminary study. In September 2022, the interviewing process was carried out. Since it is one of the schools in Kediri Regency using the 2013 curriculum, the MI Hidayatus Shibyan school was selected. The purpose of the needs analysis is to determine what information and procedures are required for the created learning resources. System requirements analysis and functional requirements analysis are the two needs analyses that are

carried out. It is determined through system analysis what kind of media the teacher need. System analysis uses functional analysis to determine the kind of processes that are required. Table 5 displays the findings of the needs analysis. Preliminary study was done to identify which materials needed interactive multimedia after conducting a needs analysis. The usage of media is necessary for content that has numerous features and formulas, such as flat shape material in grade 4 SD/MI, according to the results of interviews with math teachers. The kind of media that the teacher needs is decided through system analysis. Functional analysis is a tool used in system analysis to identify the kinds of operations needed. The results of the needs analysis are shown in Table 5. After doing a requirements analysis, preliminary research was done to determine which materials required interactive multimedia. According to the findings of interviews with math teachers, the use of media is required for content that involves a lot of features and formulas, like flat shape material in grade 4 SD/MI.

They (Agustiningrum & Firda Khairunnisa, 2021) have also developed interactive multimedia on flat shape material. The distinction is in how this media was created, which makes use of the articulate narrative 3 application to help students see shapes and apply mathematics to comprehend flat shape material. Additionally, as a guide for the production stage, the researcher created an overview, flowchart, and storyboard during the planning phase. The media is then installed from Android Studio after it has been created and reviewed for appearance, content, and functionality. For students to master the subject in the Abatar application without being constrained by time and location, this media can be used online or offline. The developer has conducted evaluation throughout the media production process. This study, known as continual evaluation, seeks to reduce mistakes made when using the media. The media will subsequently enter the alpha testing and beta testing evaluation stages after the completion of production and continuous evaluation. Media design specialists, material experts, learning experts, and user tests carried out the alpha testing evaluation stage. Giving users or students surveys throughout the beta testing phase is how it is done.

The alpha testing and beta testing phases are used during the evaluation stage. While the beta testing stage is used to gauge student interest in learning, the alpha testing step is used to assess the media's veracity. Van Den Akker noted in the research journal (Rochmad, 2012) that there are three criteria to establish the quality of development results, one of which is validity through expert evaluation. Through the evaluation of numerous validators, the alpha testing step is used to ascertain the media's legitimacy. The product validation data used in this development research comes from user testing on media development, material experts, learning experts, and lecturers who are professionals in media design.

Two lecturers who were experts and competent in the field of interactive learning media design, Mr. Muchammad Desta Pradana, M.Pd, and Mr. Nur Rohman, M.Kom, carried out the activities for media design expert validation. One lecturer and one math teacher, namely Mrs. Tutik Dinur Rofiah, M.Pd and Mrs. Sari Dewi Puspa Rahayu, S.Pd, validated the material specialists in the meantime. One class teacher and one math teacher is Mr. Ulvi Hidayat, S.Pd, and Mrs. Sari Dewi Puspa Rahayu, S.Pd is performed the validation of learning experts. Validation Two class 4A MI Hidayatus Shibyan students, Galuh Aulia Rahma and Mughni Aisy Lavina, conducted the user test. In table 6, the findings of the validator's evaluation are displayed. Based on table 6 above, it was determined that the media design experts' average score in the validator's evaluation was 91.35%, with the interactive learning multimedia's validity requirements being in the valid category and not being altered. With the validity requirements of interactive learning multimedia in the valid category and no revisions, the average rating score of the material expert validator is 85.86%. With the validity criteria in the valid category, not amended, the validation score of the learning expert validator averaged 95.83%. The average score for the user test validator in the valid category, not revised, is 87.49%. Therefore, it is generally recommended to test out Abatar Interactive Multimedia (Flat

Build Application), which is interactive learning multimedia. Because the media can offer concrete experiences and spur students' interest in learning, it can be inferred from the validation results that effective media can spark interest and enthusiasm for learning. It can also accommodate students who are weak or slow to understand or accept the lessons presented.

Beta testing is done by trial and error. The questionnaire responses from 32 students in class 4A MI Hidayatus Shibyan were used to determine the test results for the students. By completing this survey, you can find out whether or not students' interest in learning has increased both before and after utilizing the Abatar Interactive Multimedia (Building Flat Application). Table 7 above contains information from the trial findings on the student interest survey. It can be seen that there has been a large rise in student interest in learning based on tables 8 and 9 above, which show the percentage of pretest scores of 50% with reasonably good criteria and posttest scores of 88% with very good criteria. The Abatar Interactive Multimedia (Building Flat Application) increased students' interest in learning by 38% between the pretest and posttest, indicating that the learning process was successful. Additionally, the n-gain (g) test is used to determine whether there has been an increase in student learning interest in the use of Abatar Interactive Multimedia (Building Flat Applications). Table 10 displays the n-gain (g) test calculation results, and Table 11 summarizes the findings from the n-gain (g) calculation data. According to table 11 above, which uses the n-gain (g) test to define a rise in student learning interest, there are 7 students in the medium group, representing 21.87% of all students, and 25 students in the high category, representing 78.12% of all students. The analysis's findings show that, for the most majority of pupils, using the Abatar Interactive Multimedia (Building Flat Application) significantly increases their interest in learning. Although a significant portion of students fall into the moderate group, this nevertheless demonstrates a rise in student enthusiasm in learning.

Dissemination is the last step in this research process. The application is distributed by manually installing it on each Android device owned by the user and math teacher at MI, Hidayatus Shibyan, using a USB cord and a laptop. to make installation easier, specifically by publishing developed applications to the Google Play Store website. Once intellectual property rights (IPR) have been obtained, widespread dissemination takes place.

Conclusion

This development research resulted in an application named Abatar Interactive Multimedia (Build Flat Application) for flat material, which is interactive learning multimedia. Abatar Interactive Multimedia has successfully completed the validation phase, met the required standards, and is appropriate for use in class 4 flat shape learning activities. You can use an Android device to access the Flat Shape Application by Abatar Interactive Multimedia. Because the subsection of flat form material is already included in the Abatar Interactive Multimedia (Flat form Application), it has the advantage of making it easier for students to learn flat shape material in its entirety. Students can use this media to study individually in addition to using it in class because it comes with instructions that make it simple to understand how to utilize it. Additionally, since students can use their own devices, such as cellphones, to access this learning material anywhere, it can also be referred to as mobile learning. Before employing interactive learning resources, student interest The results of the analysis on the student learning interest questionnaires completed before utilizing Abatar Interactive Multimedia (Build Flat Application) obtained ratings with an average percentage of 50%, demonstrating the extremely low quality of Abatar Interactive Multimedia (Build Flat Application). Students' enthusiasm in learning is extremely high and has improved as shown by a 33% increase since using the Abatar Interactive Multimedia (Build Flat Application). In light of the foregoing, it can be said that the Abatar Interactive Multimedia (Build Flat Application) is appropriate for use by students for independent learning at school or elsewhere

without being constrained by place or time, especially for flat shape material, and can raise their interest in class 4A MI Hidayatus Shibyan.

References

Adawiyah, N. A., & Batubara, H. H. (2020). Pengembangan Media Pembelajaran Interaktif Matematika Bangun Datar Berbasis Android untuk Siswa SD/MI. *Repository Uin Walisongo*, *2*(1), 1–9.

Agustiningrum, F., & Firda Khairunnisa, G. (2021). *Pengembangan Multimedia Interaktif Berbasis Padlet Dengan Pendekatan Kontekstual Pada Materi Bangun Datar Untuk Siswa SD/MI Kelas XI*. *16*(12), 212–215.

Anggraeni, S. W., Alpian, Y., Prihamdani, D., & Winarsih, E. (2021). Pengembangan Multimedia Pembelajaran Interaktif Berbasis Video untuk Meningkatkan Minat Belajar Siswa Sekolah Dasar. *Jurnal Basicedu*, *5*(6), 5313–5327. https://doi.org/10.31004/basicedu.v5i6.1636

Dwi Surjono, H. (2017). *Multimedia Pembelajaran Interaktif*. Yogyakarta: UNY Press.

Dzil Ikram, M. F., Fachrurrazi, S., & Fhonna, R. P. (2021). Media Pembelajaran Interaktif Membangun Android Application for Beginners Berbasis Multimedia. *Sisfo: Jurnal Ilmiah Sistem Informasi*, *5*(2), 1–10. https://doi.org/10.29103/sisfo.v5i2.6222

Feriandi, Y., & Indrakusuma, A. H. (2019). Pengembangan Media Interaktif Dengan Aplikasi Macromedia Flash Pada Materi Pelajaran Komputer dan Jaringan Dasar Siswa Kelas X. *Journal of Computer and Information Technology*, *3*, 14.

Firmansyah, F. H., Aldriani, S. N. F., & Dewi, E. R. (2020). Pengembangan Multimedia Pembelajaran Interaktif untuk Mata Pelajaran Pengembangan Multimedia Pembelajaran Interaktif untuk Mata Pelajaran Matematika untuk Kelas 5 Sekolah Dasar. *Pendidikan Matematika*, *2*(2), 101–110. https://doi.org/10.17509/edsence.v2i2.29783

Hake, R. (1999). *Analyzing Change / Gain Score*. Indiana: Indiana University.

Jundu, R., Jehadus, E., Nendi, F., Kurniawan, Y., & Men, F. E. (2019). Optimalisasi Media Pembelajaran Interaktif dalam Meningkatkan Kemampuan Matematis Anak di Desa Popo Kabupaten Manggarai. *E-DImas*, *10*(2), 221–225.

Novitasari, D. (2016). Pengaruh Penggunaan Multimedia Interaktif Terhadap Kemampuan Pemahaman Konsep Matematis Siswa. *FIBONACCI: Jurnal Pendidikan Matematika Dan Matematika*, *2*(2), 10.

Pohan, A. B., & Jaelani, N. R. (2018). Pengembangan Media Pembelajaran Interaktif Pelajaran Matematika Mengenal Bangun Ruang Dengan Metode Inkuiri Untuk Siswa Tingkat Dasar. *KHATULISTIWA INFORMATIKA*, *VI*(1), 1–10.

R. I. Alam, G. F. Az-Zahra, H. M., & R. (2019). Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif Pada Mata Pelajaran Sains Materi Tata Surya Menggunakan Model APPED (Studi kasus: SD Brawijaya Smart 36 School),. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *3*(4), 383.

Rochmad. (2012). Desain Model Pengembangan Perangkat Pembelajaran Matematika. *Kreano: Jurnal Matematika Kreatif-Inovatif*, *3*(1), 67.

Susetyaningsih, S. (2019). Pengembangan Media Pembelajaran Berbantu Macromedia Flash

pada Materi Fungsi Kuadrat SMA kelas X. *JKPM : Jurnal Kajian Pendidikan Matematika, 4(2),* 148.

Wardathi, A. N., & Pradipta, A. W. (2019). Kelayakan Aspek Materi, Bahasa dan Media Pada Pengembangan Buku Ajar Statistika Untuk Pendidikan Olahraga Di IKIP Budi Utomo Malang. *Efektor*, *6*(1), 61. https://doi.org/10.29407/e.v6i1.12552

Wulandari, S. (2020). Media Pembelajaran Interaktif Untuk Meningkatkan Minat Siswa Belajar Matematika Di Smp 1 Bukit Sundi Interactive Learning Media To Increase Students ' Interest In Learning Mathematics At Smp 1 Bukit Sundi. *Indonesian Journal of Technology, Informatics and Science (IJTIS)*, *1*(2), 43–48. https://doi.org/10.24176/ijtis.v1i2.4891