ENGLISH LEARNING MEDIA USING AUGMENTED REALITY TECHNOLOGY

THESIS

Diajukan untuk Memenuhi Sebagian Syarat Guna Memperoleh
Gelar Sarjana Program Strata 1 (S.1)
dalam Ilmu Teknologi Informasi

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Alhamdulillah, praise be to Almighty Allah SWT for giving me the strength and time to complete and finish this thesis. Without Allah`s blessing, I could not have completed the thesis.

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MOTTO

بِسْمِ ٱللَّهِ ٱلرَّحْمَـٰنِ ٱلرَّحِيمِ

وَاللّٰهُ اَخْرَجَكُمْ مِّنْۢ بُطُوْنِ اُمَّهٰتِكُمْ لَا تَعْلَمُوْنَ شَيْـًٔاۙ
وَّجَعَلَ لَكُمُ السَّمْعَ وَالْاَبْصَارَ وَالْاَفْـِٕدَةَۙ لَعَلَّكُمْ تَشْكُرُوْنَ

Eng:

And Allah brought you out of the wombs of your mothers while you knew nothing, and gave you hearing, sight, and intellect so perhaps you would be thankful.

Indo:

Dan Allah mengeluarkan kamu dari perut ibumu dalam keadaan tidak mengetahui sesuatu pun, dan Dia memberimu pendengaran, penglihatan, dan hati nurani, agar kamu bersyukur.

(QS.AN-NAHL AYAT 78)

ABSTRACT

Lack of student interest in learning can be influenced by several factors, one of which is the lack of learning media. Augmented Reality is an interactive experience that combines the real world and computer-generated content. AR can be defined as a system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects. The waterfall model used in this research is the oldest and the most well-known SDLC model. The special feature of this model is its sequential steps. It goes down through the phases of requirement analysis, design, development, testing, and maintenance. This study aims to build an application for English learning media using Augmented Reality technology with Marker Based Tracking and measuring the effectiveness of the application for English learning media. In the main menu of the application there are several buttons such as: course, about, guide and exit button. The application testing technique used is User Acceptance Testing (UAT). From the results of testing the application device can run perfectly on Android smartphones from Android version 11 to Android 13. The results of testing the responses from students and teachers show that this application is so worth it, with a percentage value of 91%. The effectiveness of this application is classified as effective in increasing student understanding, this is evidenced by the average pretest and post-test scores increasing from 55,2 to 79.6 with an increase of 24.4%.

Keyword: augmented reality, marker-based tracking, English, learning media

ABSTRAK

Kurangnya minat belajar siswa dapat dipengaruhi oleh beberapa faktor, salah satunya adalah kurangnya media pembelajaran. Augmented Reality adalah pengalaman interaktif yang menggabungkan dunia nyata dan konten yang dihasilkan komputer. AR dapat didefinisikan sebagai sistem yang menggabungkan tiga fitur dasar: kombinasi dunia nyata dan virtual, interaksi waktu nyata, dan registrasi 3D yang akurat dari objek virtual dan nyata. Model air terjun yang digunakan dalam penelitian ini adalah model SDLC tertua dan paling terkenal. Keistimewaan model ini adalah langkah-langkahnya yang berurutan. Itu turun melalui fase analisis kebutuhan, desain, pengembangan, pengujian, dan pemeliharaan. Penelitian ini bertujuan untuk membangun aplikasi media pembelajaran bahasa Inggris menggunakan teknologi Augmented Reality dengan Marker Based Tracking dan mengukur keefektifan aplikasi media pembelajaran bahasa Inggris. Pada menu utama aplikasi terdapat beberapa tombol seperti: course, about, guide dan exit button. Teknik pengujian aplikasi yang digunakan adalah User Acceptance Testing (UAT). Dari hasil pengujian perangkat aplikasi dapat berjalan dengan sempurna pada smartphone Android mulai dari Android versi 11 hingga Android 13. Hasil pengujian tanggapan dari siswa dan guru menunjukkan bahwa aplikasi ini sangat worth it, dengan nilai persentase 91%. Keefektifan aplikasi ini tergolong efektif dalam meningkatkan pemahaman siswa, hal ini dibuktikan dengan rata-rata nilai pretest dan posttest meningkat dari 55,2 menjadi 79,6 dengan peningkatan sebesar 24,4%.

Kata kunci: augmented reality, pelacakan berbasis penanda, bahasa Inggris, media pembelajaran

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Alhamdulillah, praise be to Almighty Allah SWT for giving me the strength and time to complete and finish this thesis under the name “English learning media using augmented reality”. Without Allah`s blessing, I could not have completed this thesis.

May sholawat and salam be with our Prophet Muhammad Peace be upon him who has guided us from the darkness and lightness in the world as well as in the next world.

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Semarang, 22 June 2023

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CHAPTER I
INTRODUCTION

1.1 **BACKGROUND**

Gorman (1968) assessed the importance of proficiency in English for social mobility and the role of educational provision in attaining proficiency in English in a multilingual environment. Gorman introduced the word "bilingual" to describe a situation characterized by "linguistic heterogeneity" (p.214), where for a number of reasons English quickly replaced other languages as the major language of teaching in Kenyan elementary schools.

The colonial legacy of English dominance in many African nations continues to have an impact on the implementation of multilingual education policies (Mazrui & Mazrui, 1992; Rassool & Edwards, 2010) Language learning, language usage, and language choice are all affected in bilingual and multilingual communities, schools, and classrooms, such as those in Kenya.

English is an important aspect of the Kenyan curriculum since it is utilized as the primary language of

instruction in all subjects (excluding foreign languages) beginning in upper elementary school. English was mandated in African schools beginning in standard one and would become the major language of instruction in standard five. The shift from mother tongue to English as the major language of instruction was so significant that it had a long-term impact on language policy following independence.

This research considers the problems students face when learning English language such as: (English pronunciations, relating objects and vocabularies) and the challenges faced by students for whom English in an additional language. Cook (1996 as cited in Pourhosein Gilakjani, 2016) defined pronunciation as the production of English sounds. Pronunciation is learnt by repeating sounds and correcting them when produced inaccurately. When students begin learning pronunciations, they form new habits and get through challenges brought on by their native language.

According to Yates (2002 as cited in Pourhosein Gilakjani, 2016), pronunciation is the production of

sounds that is used for making meaning. The purpose of pronunciation is not to sound like a native English speaker, but to be clearly understood by others. According to the writer's research at mico integrated academy primary school, the students are not able to relate the words with the objects and have difficulty with the pronunciations.

The teacher thought that the objectives of learning English, especially vocabulary is just to make students understand about the meaning of words from the description above the writer chooses this study to let students relate the object and the vocabulary and to teach the students the pronunciation of English vocabulary. According to sanni merdekawati and himmawati puji lestari, the teacher must prepare students to face global competition by developing science and technology (2011). The importance of integrating technology into the learning process has been praised by many people around the world (Nyagorme, p, Enoch, SB, & Arkorful, V.2017: (425) 26-37).

Augmented reality is one of the (AR) technologies that is presently in development. Augmented Reality is being created for a variety of industries, one of which is education. Augmented Reality is being utilized to create material that is interactive, learning, and fascinating. Augmented Reality is a technology that integrates the virtual and real worlds in a real-time and dynamic manner.

The goal of this project is to develop a learning tool that will aid grade 3 elementary school students in developing their English language proficiency, particularly in the area of vocabulary and pronunciation development. Therefore, one of the alternatives is to integrate AR technology so that learning may be done anytime and in a fun way outside of the classroom, even when there is very little class time. Based on the "New Progressive Primary English" curriculum for the third grade, this project is to create an augmented reality application tool for learning English vocabulary and pronunciation.

1.2 PROBLEM STATEMENT

The problem statement in this research:

1. How to build an application for English learning media using augmented reality?
2. How the effectiveness of this learning media in supporting student's learning?

1.3 PROBLEM LIMITATION

The problem limitation in this research Are:

1. This application was built for class III of Mico Integrated Academy.
2. This application contains English vocabulary off the school's book (New progressive primary English.
3. This application is only a tool or utility, not a tool to substitute teachers in providing English learning media.
4. This research was conducted at Mico Integrated Academy Their address is off Eastern bypass, Rd to Utawala Academy, Kenya.

1.4 RESEARCH OBJECTIVES

These Research Objectives in this research Are:

1. To build an application for English learning media using augmented reality.
2. To see the effectiveness of this learning media in supporting students learning

1.5 BENEFIT OF RESEARCH

The benefit of this research are as follows:

1. Can be used by teachers to create more teaching interactive and interesting.
2. Can be used to improve the student's vocabulary skills
3. Can be used to create more interesting learning atmosphere to increase student's interest in learning.

CHAPTER II
LITERATURE REVIEW

2.1 BASIC LITERATURE

2.1.1 Learning Media

In general, media education serves as a teaching and learning instrument. Everything may be utilized to excite learners' ideas, feelings, worries, abilities, or skills in order to illiterate the learning process. This restriction is fairly broad, and it encompasses a thorough grasp of the source, the environment, humans, and the method utilized for learning or training. Meanwhile, according to Briggs (1977) is physical means of learning media to deliver content/learning materials such as books, movies, videos and so on. Then, according to the National Education Association (1969) revealed that learning means of communication media in print and point of view heard, including technology hardware. The learning process is a communication process and takes place in a system, the learning media occupies an important position as one of the components of the learning system.

2.1.3 English vocabulary

A vocabulary is described as the words of a language, comprising single items and phrases or chunks of many words that convey a certain meaning in the same manner as individual words do. Is a group of words in a person's native language. According to Hornby (2006: 1645) vocabulary is all the words that person knows or uses and it is all the words in a particular language. According to Hatch and Brown (1995: 1) vocabulary is a list or a set of words that individual speakers of language may use.

A vocabulary, usually developed. with age, serves as a useful and fundamental tool for communication and acquiring knowledge. Acquiring an extensive vocabulary is one of the largest challenges in learning a second language. Learning English vocabulary is a basic and very important part of learning the language. Learning a new vocabulary word means more than just understanding what the word means. To learn new English words, you must understand them and be able to use the words correctly when you speak or write. You will probably

learn English words faster when they are important to your daily life or come from a subject that interests you. A good way to learn English vocabulary is to see and hear many repetitions of the words within a topic or an interesting context like a story or a reading. When you study a foreign language, you have to learn a lot of new words. The most common words and words you need for your everyday communication.

2.1.3 Augmented Reality

Augmented Reality is a multi-sensory experience that mixes the actual environment with computer-generated material. AR is described as a system that combines real and virtual worlds, allows for real-time interaction, and accurately registers virtual and real things in 3D.

Augmented Reality technology uses cameras, computers, Android phones, and special glasses to enter information into the virtual world and show it in the actual world. Tourism, social engagement, such as entertainment and gaming, communication, buying and sale places, and education all make use of augmented reality technology.

Because of the advancement of mobile devices and personal computers, augmented reality ideas may now be employed in traditional educational settings such as schools and universities. AR is mainly consistent with constructivist and situated learning theory because it places the students within a real-world social and physical context while scaffolding, guiding, and facilitating metacognitive and participatory learning processes, namely, peer coaching, authentic inquiry, active observation, and reciprocal teaching.

There are two types of augmented reality marker based and marker less augmented reality:

A. Marker based

Augmented Reality markers are usually square black and white illustration with thick black borders and white backgrounds. The computer will recognize the position and orientation of the marker and create a 3D virtual world, namely the poi nt (0,0,0) and three axes, namely X,Y,Z. Marker based tracking has been developed

since the 1980s and in the early 1990s it began to develop for the use of augmented reality.

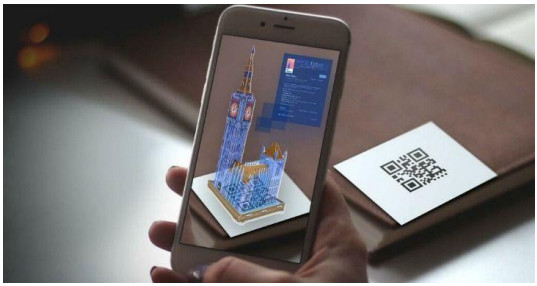

Figure 2.1 marker-based

B. Marker less

One of the augmented reality methods currently being developed is the marker-less Augmented reality method, with this method users, no longer need to use a marker to display digital elements, with the tools provided by Qualcomm for the development of mobile device-based augmented reality, it makes it easier for developers to create marker-less application. As currently developed by the world's largest Augmented Reality company total immersion and Qualcomm, they have made various Marker-less tracking techniques their flagship

technology, such as Face tracking, 3D Object tracking, Motion tracking and GPS based tracking.

Figure 2.2 marker-less

2.1.4 Unity Hub

Unity is a cross-platform game development platform. Unity can be used to build high-quality 3D and 2D games, develop them across mobile, desktop, VR/AR, consoles, or the web, and connect with loyal and enthusiastic players and customers.

2.1.2 Vuforia

Vuforia Engine is a software development kit (SDK) for creating Augmented Reality apps with the SDK, you add advanced computer vision functionality to your application, allowing it to recognize images, objects,

and spaces with intuitive options to configure your app to interact with the real world.

2.1.3 System Development Life Cycle (SDLC) Waterfall

Software development is a process that involves the creation and maintenance of frameworks, applications, and other software elements.

1) Initiation

This stage is typically identified by a made-proposed software project.

2) System Concept Development

This step is the definition of the construction, which includes system documents, management plan analysis, and facility analysis.

3) Planning

Construct management strategies and other plans.

4) Requirement analysis

Examining and creating user demands after analyzing software system user needs.

5) Design

Create a system design document based on the acquired requirements.

6) Development

Create protocols for system testing, coding, repair, and review.

7) Testing

Proving the software system complies with the requirements.

8) Implementation

Installation of software on the system and execution of fixes for found issues.

9) Maintenance

After the program has been made available, it might need to be adjusted, enhanced, corrected for errors, and refined consequently, this stage involves handling these issues.

2.2 RELEVANT RESEARCH OF STUDIES

Understanding how discovering or researching on item impacts another is what makes research relevant. Another way to define “relevance” is the significance of a certain research or theory.

Table 2.1. relevant research studies

No	Author	Title	Publish	Description
1	Mikhael Kristian, Iskandar Fitri, Aris Gunaryati	Implementation of Augmented Reality for introduction to android-based mammalian animals using the marker-based tracking method	2020	The marker tracking used in the application and several displays of mammal animal objects for animal recognition for children.
2	Hasan ismail, ulfa wulan Agustina, luluk choirun nisak nur.	Developing learning media using augmented reality technology for English learners	2019	The results of the research based on the development steps are as follows: analysis and design.

3	Dias Agata*, Heny Yuniarti, Ahmelia Ayu Pratiwi Adison	Android Based English Learning Media and Quiz Using Augmented Reality	2020	The process of identifying target images was done by comparing images that have been printed and captured by the camera.
4	L. N. Khunaeni, W.D. Yuniarti, dan M.A.khalif	Pengembangan modul fisika berbantuan teknologi augmented reality pada materi gelom bang bunyi	2020	Media pembelajaran diperlukan untuk mendukung keberhasilan pembelajaran

		untuk SMA/MA Kelas XI		. Media pembelajaran yang baik juga harus mampu menjawab tantangan perkembangan teknologi dan user friendly terhadap pengguna

The development of this study:

- Will provide an audio so that the users can listen to the audio to learn the pronunciations.

CHAPTER III
RESEARCH METHOD

2.1 Development Procedure

The waterfall model is the most traditional and well-known SDLC model. This model is commonly employed in government initiatives as well as by many large corporations. This model's distinct characteristic is its successive steps. It goes down through the phases of requirement analysis, design, development, testing, and maintenance. Moreover, it ensures the design flaws before the development o f a product. This model works well for projects in which quality controls are a major concern because of its intensive documentation and planning (Nabil Mohammed Ali Munassar and A. Govardhan).

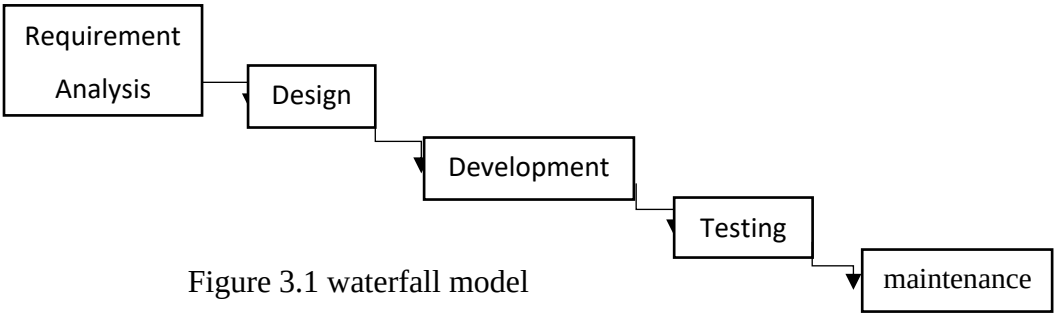

Figure 3.1 waterfall model

3.1.1. Requirement analysis

Requirement analysis will identify and consider the risks related to how the technology will be integrated into the standard operating procedures.

1. Analysis of Need

Needs analysis involves doing some kind of contributed to successful course planning.

a. Analysis of Teacher Needs

Analysis of teacher needs in the form of a questionnaire that includes suggestions for learning media that researchers will create, information about the classroom media used throughout the learning process, and learning process barriers. Teachers will receive this questionnaire to analyze their needs. The following table lists the inquiries on the needs analysis questionnaire.

No	Questions
1	What methods are used in this learning process, especially the English subject?
2	Are there any obstacles in this learning process, especially on the subject of English?
3	What are the attitudes and interests of students during this learning process?

4	What media do you use in learning, especially the English subject?
5	What are the shortcomings of the learning media used on this subject of English?
6	What do you think using Augmented Reality can improve students learning skills?
7	Have you ever created or developed learning media for the learning process?
8	Have you ever used Augmented Reality in learning?
9	Did you know about Augmented reality?
10	Does Augmented Reality need to be developed on this subject?

b. Students need analysis

A questionnaire that asks about the learning material utilized and the reactions of the students during the learning process is used to analyze the needs of the students, the questions in the student questionnaire can be seen in the following table:

Table 3.2 Students need analysis questions

No	Questions
1	Do teachers use learning media when teaching in class?
2	What media are often used in the learning process for English vocabulary?
3	Is the learning process of English vocabulary interesting?
4	Is English vocabulary challenging?
5	What do you think about the learning process, especially English vocabulary?
6	Are you satisfied with the learning media used in the subject of English?
7	Did this learning process help you to improve your English skills?
8	Do you know learning media Augmented Reality?
9	Has your school ever used the media Augmented reality in the learning process of English vocabulary?
10	Does Augmented Reality learning media need to be developed in the learning process of English vocabulary?

3.1.2. System Design

The design phase in which the researcher designs a learning media model that will be developed. This learning framework is designed using HIPO for designing the appearance of the application.

a. Hierarchy plus input process output (HIPO)

Design of English learning media using augmented reality application applies HIPO diagram. HIPO diagrams are used to visualize the progression of apps from conception to completion.

1) Visual table of contents

Visual table of contents (VTOC) consists of one or more hierarchical diagrams. This diagram seeks to show how the various functions relate to one another at each level. Both a detailed and organized description of the full HIPO program can be found in VTOC. The HIPO program's names and numbers are shown in the this figure the hierarchical structure of the diagrams package and the functional linkages are also recognized below:

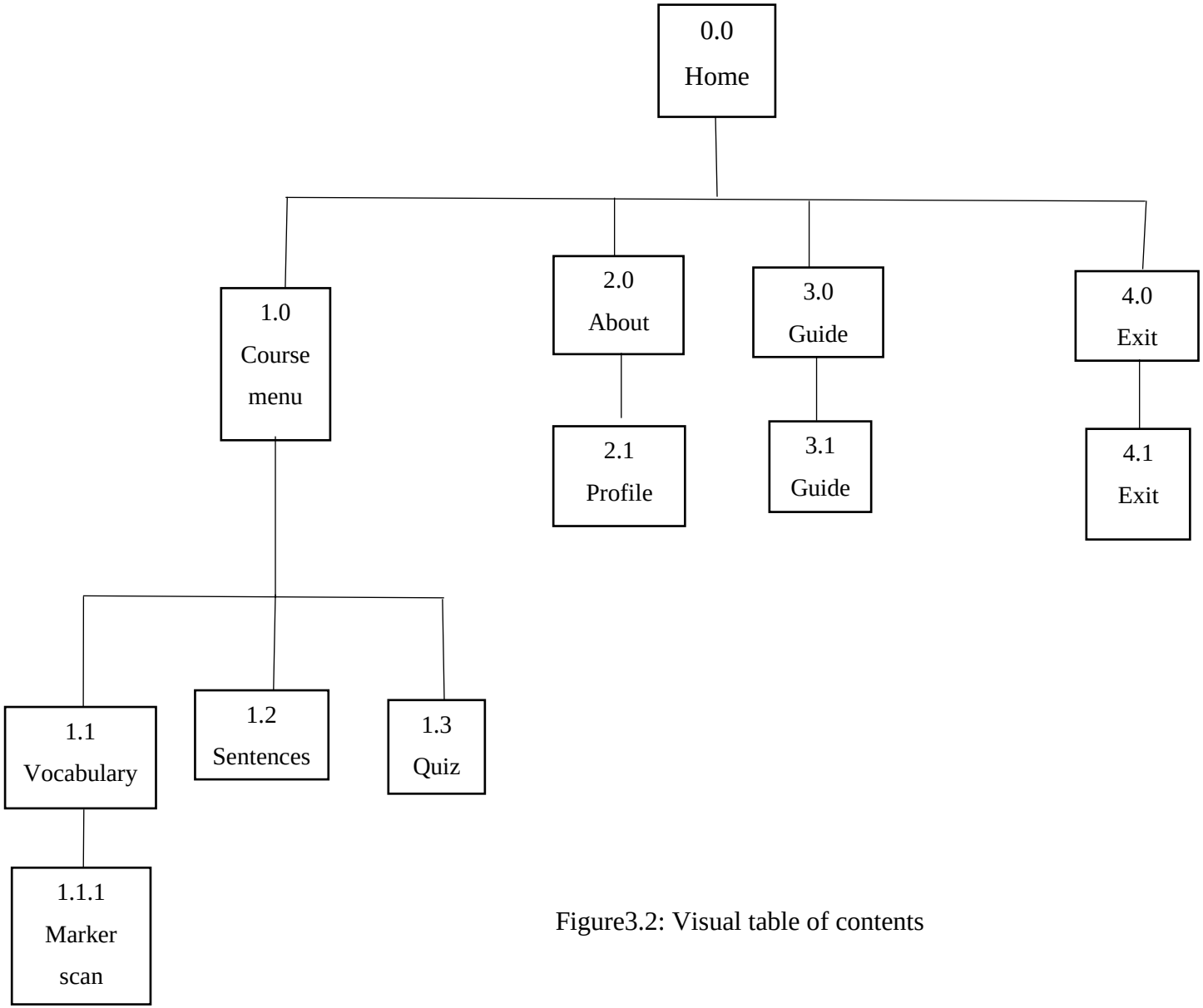

Figure3.2: Visual table of contents

2) Overview diagram

An overview diagram shows the connections between input, process, and output. The data items utilized by the process section are displayed in the input section, while the output part comprises objects, such as data produced by the process steps, the process section contains a number of stages that describes the function's process.

INPUT	PROCESS	OUTPUT
• Course button • About button • Guide button • Exit button	• Choose course options vocabulary button, sentences button, and quiz button • Access Profile • Access guide • exiting	• Shows the target page • Shows 3D object • Shows the developer's profile • Shows guide • Exited from the application

Figure3.3 overview diagram.

b. Display design

1) User interface design

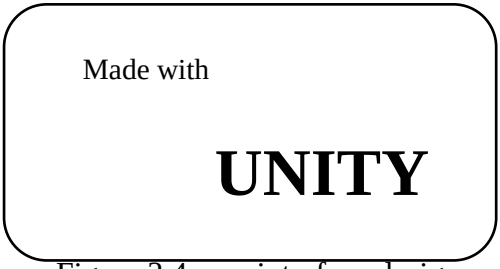

Figure 3.4 user interface design

The user interface is the first display when opening the application.

2) Main page display design

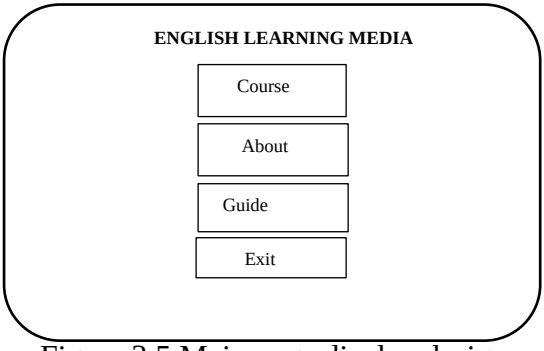

Figure 3.5 Main page display design

On the main page there 5 buttons. Course button, camera button, about button, guide button and exit button.

3) Course page display design

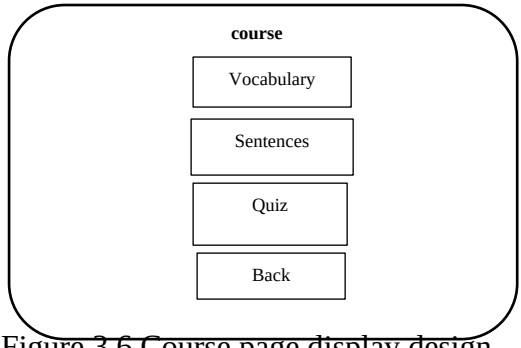

Figure 3.6 Course page display design

On the course page display design there 4 buttons. vocabulary button, vocabulary definition button, quiz button and back button.

4) Guide page display design

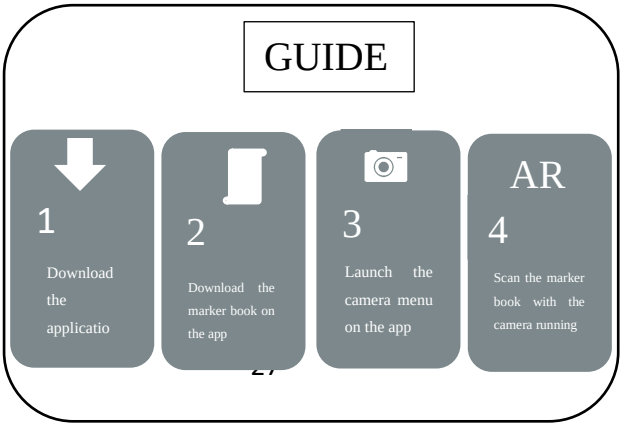

Figure 3.7 guide page display design

To learn how to use the application, refer to the guide page. Users can execute the application.

5) About page display design

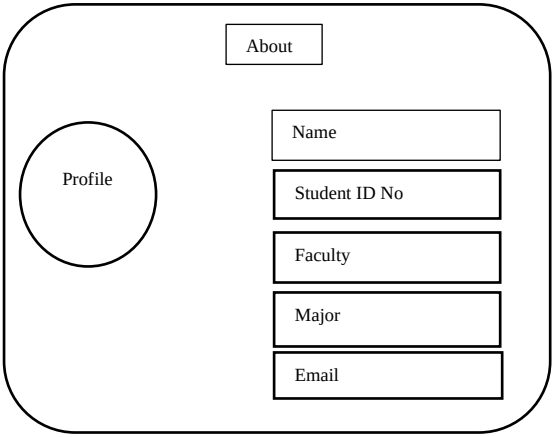

Figure 3.8 about page display design

On this page it is about the developer's bio which includes name, student id number, major, faculty and email.

6) Quiz page display design

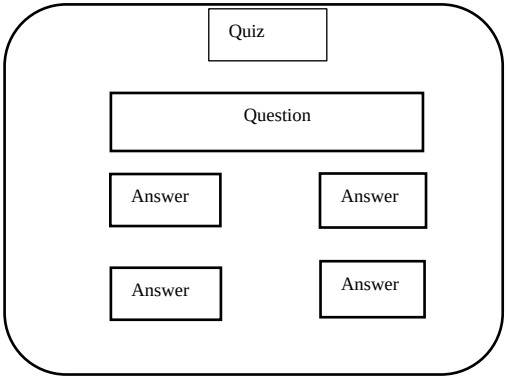

Figure 3.9 quiz page display design

This page contains practice questions in it. there are 10 questions. This quiz is in the form of multiple choice with 4 answer choices.

7) Vocabulary page display design

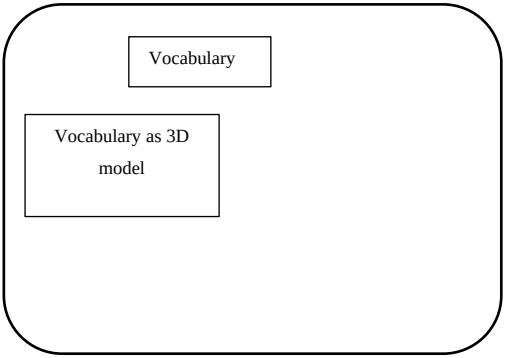

Figure 3.10 vocabulary page display design

On this page is where you can see the vocabulary as 3d and you can access the audio button to hear the pronunciations

8) Sentences page display design

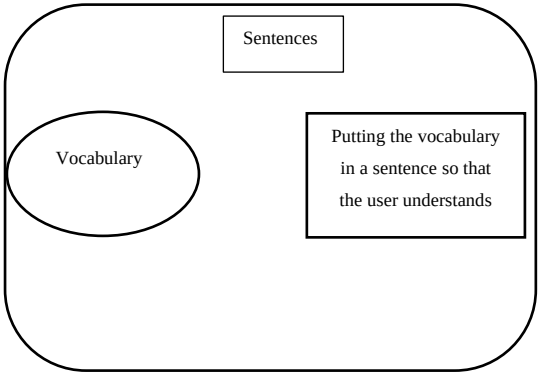

Figure 3.11 sentences page display design

On this page it is about putting vocabulary in a sentence so that the user understands.

3.1.3. Coding

The next stage is coding or programming. This stage is result from the transfer from design to predefined language programming. In this step the researcher used Software unity3D and Microsoft visual studio code with C# programming language.

3.1.4. Test

The testing phase is when users are exposed to learning media, before the application is tested on users, the content of the generated application's material must first be evaluated on User Acceptance Test (UAT) method to establish the value of applications as a teaching tool.

3.2. Research Location and Subject

3.2.1 Research Location

The research location for English Learning Media Using Augmented Reality Technology is carried out at Mico Integrated Academy Their address is off Eastern Bypass Road to Utawala, Kenya.

Figure 3.12 school logo

3.2.2 Research Subject

The subjects of this study were 1(one) teacher and 1 (one) class the researcher chose the school based on the observation that the media used in learning are still in the form of printed books which makes students unenthusiastic about reading.

3.3. Data Collection Techniques and Instrument

3.3.1 Data Collection Techniques

a. Expert Validation

The validation data is obtained through an assessment from a material expert (validator) regarding. The Results of the expert assessment will be analyzed because this assessment is needed for better application development.

b. Test

This test is in the form of a pre-test and post-test on the material classification of English Vocabularies. The results of the pre-test are initial values that are carried out before using the developed application. Meanwhile, the post-test is the value taken after learning by using the application.

c. Data Collection Instruments

d. Analysis Questionnaire

The analysis questionnaire is structured according to the information to be sought. The teacher needs analysis questionnaire contains the media applied in the classroom during the learning process, obstacles in the learning process, and suggestions for learning media that will be developed by researchers.

While the student needs to analyze the questionnaire contains questions about the media used in the learning process and student response during learning, the analysis questionnaire will be given to 3 students.

a. Students and Teacher Response to Questionnaires

This questionnaire contains opinions from users regarding the learning application developed, this questionnaire is given to users who use the developed application.

e. Data Analysis Techniques

1. Teacher expert validation

Validation results from material experts obtained. then analyzed using 5 levels assessment criteria (Kinanti, 2018). The following criteria, expert validation assessment:

Table 3.3 teacher expert validation scoring rules

Answer	Description	Score
SWI	So worth it	5
W	Worthy	4
QD	Quite decent	3
NWI	Not worth it	2
NF	Not feasible	1

Then data is calculated by the formula

Table 3.4 teacher expert validity equation formula

$$\text{Worth of material} = \frac{\text{Allowed score}}{\text{maximum score}} \times 100\ \%$$

Statement:

Worth of material = percentage of material eligibility value.

Allowed score = number of scores allowed with indicators.

Maximum score = maximum score with indicators.

The results that have been obtained in the form of percent are converted back into qualitative form by the rules that have been described to determine the eligibility category of learning videos.

Test results by experts can be declared feasible if they meet the minimum category that is feasible with the percentage in the table below.

Table 3.5 learning eligibility category interpretation

Score %	Qualification	Description
0 – 20	Not feasible	Failed
20 – 40	Not worthy	Major product revision
40 – 60	Quite decent	Revise by re-examining carefully and refined
60 – 80	Worthy	The product can run by adding something messing is necessary
80 – 100	So worth it	The product is ready to be used in the field of learning.

2. Testing application

In order to determine how well the system under development is received, this testing phase uses User Acceptance Testing (UAT).

The evaluation criteria listed below are displayed in the table below:

Table 3.6 UAT scoring criteria

Answer	Description	Score
SDA	strongly disagree	1
DA	Disagree	2
E	Enough	3
A	Agree	4
SA	Strongly agree	5

Each response point is multiplied by a predefined score and a value score once the data has been collected. Following is the calculation:

- Total score of respondents who answered SA X 5
- Total score of respondents who answered A X 4
- Total score of respondents who answered E X 3
- Total score of respondents who answered DA X 2
- Total score of respondents who answered SDA X 1

Total score SA+A+E+DA+SDA

The results of the respondent's answers above can then be calculated for the highest value and the lowest value as following:

- Highest value = number of respondents X number of items questions X 5 (if all answers SA)
- Lowest value = number of respondents * number of items question * 1 (if all answers SDA)

If the total score of the respondents is obtained, the respondent's assessment of the system is the value generated using the following formula:

Table 3.7 application testing equation formula

Application eligibility = $\frac{score\ of\ answers}{highest\ score} \times 100\ \%$

Application eligibility = percentage of application eligibility values.

Score of answers = total score of answers obtained.

Highest score = highest score value of answers.

The results of this test can be used concluded, whether the system that being tested is acceptable or not. The following are the eligibility score criteria:

Table 3.8 eligibility score criteria

Feasibility score	Criteria
0% - 20%	Not feasible
20% - 40%	Not worthy
40% - 60%	Quite decent
60% - 80%	Worthy
80% - 100%	So Worth it

source: (suprianta, 2018)

3. Application effectiveness data analysis

The efficiency of the program created by the dandies is demonstrated by test results information on English learning media data, as seen from the pretest and posted values. If the application grows, it might be said to be increases average value (Jazilah, 2016).

The formula for the pretest and the posttest truth value is as follows:

Table 3. 9 Application Effectiveness Equation Formulas

effectiveness = $\frac{A}{B} \times 100\ \%$

Statement:

Effectiveness = the truth value of the answer

A = number of correct answers

B = total number of questions

Then the data results from the post-test will be compared with the results from the pretest. From the results of this comparison, the effectiveness of the application will be known (jazilah, 2016).

CHAPTER IV
Results and Discussion

This chapter discusses the implementation, validation and testing of the system that has been built.

This test aims to find out whether the results of the system have been running as expected. In addition to this test conducted to determine the effectiveness of the application as English learning media for English lesson class 3 at Mico Integrated Academy.

Effectiveness of this application is measured by comparing the average value of the pretest and post-test.

4.1 Software Implementation

Software implementation is an application software used to build the system. Following are the software specification:

Table 4.1 software implementation

No	Software Name	Specification
1	Operating system	Window 11
2	Unity 3D	Unity 2021.3.18f1
3	Vuforia	vuforia-package-10-15-4
4	Integrated Development Environment (IDE)	Visual studio code
5	Graphic editor	Core1Draw Graphic suit X8

Based on table 4.1 above, the usability of the devices are explained as follows:

1. Unity 3D, is the software used developers to create Augmented Reality applications.
2. Vuforia is used by developers to create target images
3. In this study the IDE used is visual studio code and its programing language is C#.

4. Graphic editor used is Core1Draw Graphics suit X8

4.2 Hardware Implementation

Hardware implementation is a device that used by researchers in building systems. Device the hardware used is as follow:

Table 4.2 hardware implementation

No	Software name	Specification
1	Processor	Intel® Core™ i7
2	Hard disk	930GB
3	RAM	8GB
4	Monitor	15inch
5	Mouse	Standard

4.3 Results of Implementation of book marker

The implementation of the marker book is the stage for displays the marker book that was created on the stage planning. This marker book contains a guide usage, developer profile, QR code and link for download the

application, and also the main markers are 16 vocabularies The results of the implementation of the marker book can be seen in full.

4.4 Application Implementation Results

Display implementation is the stage for displays the results of the application that has been designed previously.

Here is the view that has been in implement into the application:

1. User interface

User interface is the display loading process on application. This user interface is the default process from the Unity3D application. User interface display can be seen in figure 4.1 below:

Figure 4.1 user interface

2. Main page

The following is the main page after user interface, on the main page there is several buttons that can be selected to be able to continue to the next process. Among them namely course button, guide button, about button and exit button.

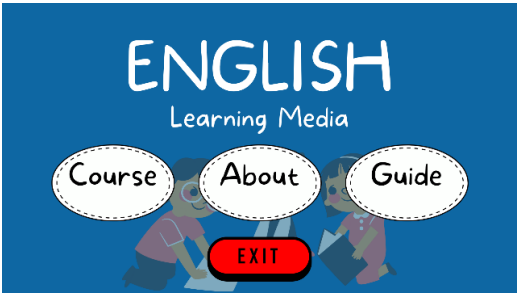

Figure 4.2 main menu

3. Course page

On the course page there are several buttons, namely: vocabulary button, sentences button, quiz button and back button.

Figure 4.3 course page

4. About page

About page is a page that contains about the profile and identity of the developer, including name, student number, study program, faculty and e-mail.

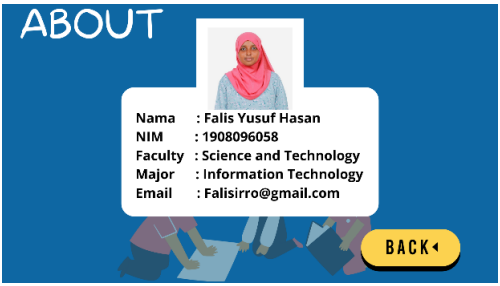

Figure 4.4 course page

5. Guide page

This page is a user guide there are 4 steps in displaying 3D objects that are:

a. Download the application
b. Download the marker book on the app
c. Launch the camera menu on the app
d. Scan the marker book with the camera running

Figure 4.5 guide page

6. Quiz page

Quiz is a feature so that users can evaluate learning with existing material on application. On this page there are 10 multiple choice questions double each question is answered with correct then get 10 points.

Figure 4.6 quiz page

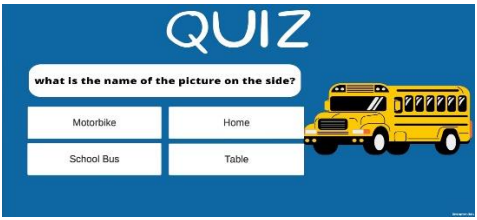

Figure 4.7 quiz 1

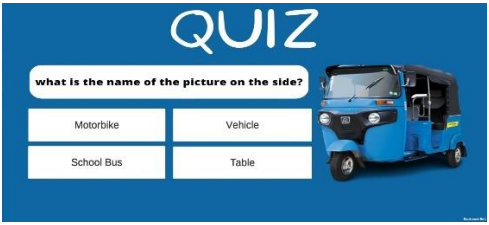

Figure 4.8 quiz 2

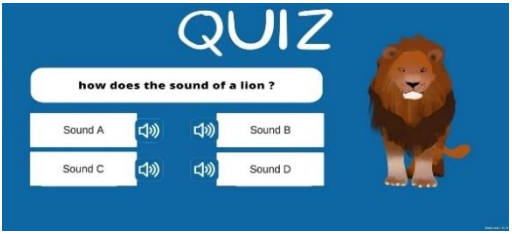

Figure 4.9 quiz 3

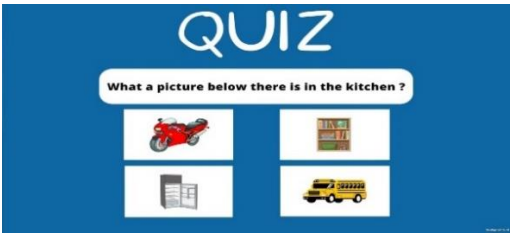

Figure 4.10 quiz 4

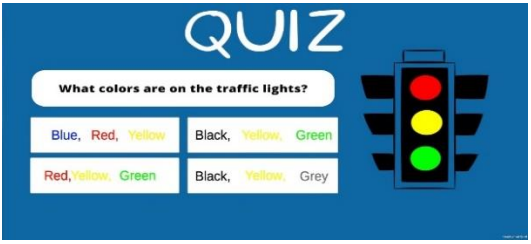

Figure 4.11 quiz 5

7. Vocabulary page

On this page is where you can see the vocabulary as 3d and you can access the audio button to hear the pronunciations

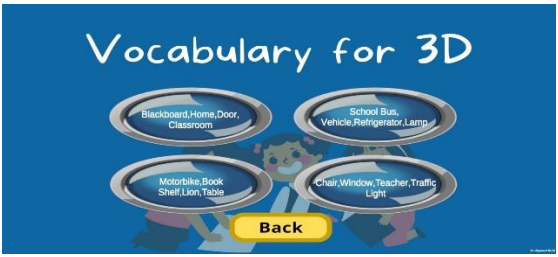

Figure 4.12 vocabulary page

8. Blackboard, home, door, and classroom button

Figure 4.13 camera

Figure 4.14 blackboard

Figure 4.15 classroom

Figure 4.16 door

Figure 4.17 home

9. School bus, vehicle, refrigerator and lamp button

Figure 4.18 camera

Figure 4.19 lamp

Figure 4.20 school bus

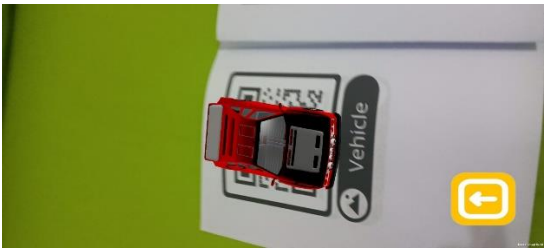

Figure 4.21 vehicle

Figure 4.22 refrigerator

10. Motorbike, bookshelf, lion and table button

Figure 4.23 camera

Figure 4.24 book shelf

Figure 4.25 lion

Figure 4.26 motorbike

Figure 4.27 table

11. Chair, window, teacher and traffic light button

Figure 4.28 camera

Figure 4.29 chair

Figure 4.30 teacher

Figure 4.31 window

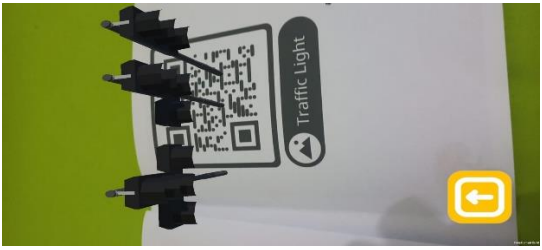

Figure 4.32 traffic light

12. Sentence page

On this page it is about putting vocabulary in a sentence so that the user can understand.

Figure 4.33 sentence 1

Figure 4.34 sentence 2

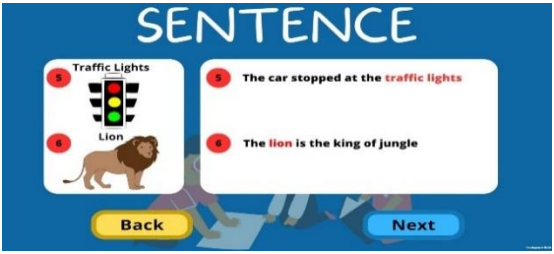

Figure 4.35 sentence 3

Figure 4.36 sentence 4

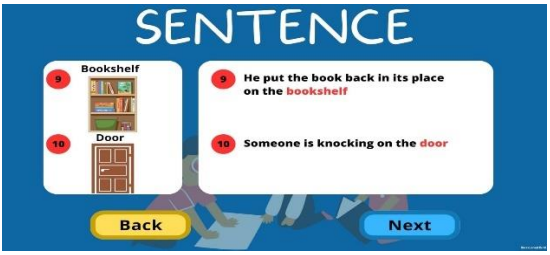

Figure 4.37 sentence 5

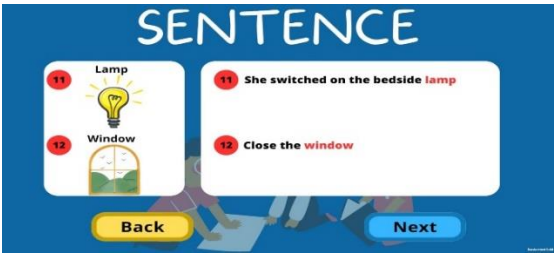

Figure 4.38 sentence 6

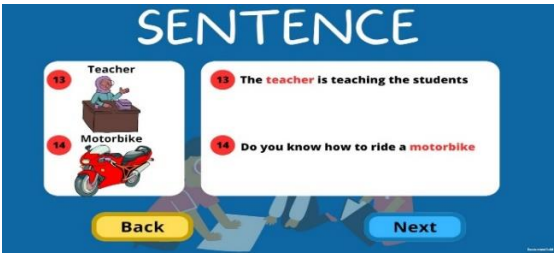

Figure 4.39 sentence 7

Figure 4.40 sentence 8

4.5 Teacher expert validation

Material validation is done to see if the material contained in the application is in accordance with the need for English lessons about vocabulary by distributing questionnaires validation to the validator. This validation process is carried out by micro integrated academy

English teacher. The data that has been obtained from the validation questionnaire, then represented by the equation formula on. The following is the data from the teacher expert validation results after adding up:

Table 4. 3 teacher expert validation results

Validator	**Indicator**	**Total Max Score.**	**Score**	**(%)**	**Average**	**description.**
Validator 1	accuracy	15	13	87%	80%	So Worth it
	Scope	20	15	75%		
	suitability	15	12	80%		
Validator 2	Accuracy	15	13	87%	80%	So worth it
	Scope	20	15	75%		
	Suitability	15	12	80%		
Average of indicator	Accuracy	15	26	87%	80%	So Worth it
	Scope	20	30	75%		
	Suitability	15	24	80%		

The final results of the validation by the material experts above are shown in table 4.4:

Table 4. 4 teacher expert validation last results

No	Testing Aspects	Indicator	Number of Items	(%)	Description
1	Teacher validation	Accuracy	3	80%	So worth it
2		Scope	4	80%	So Worth it
3		Suitability	3	80%	So Worth it

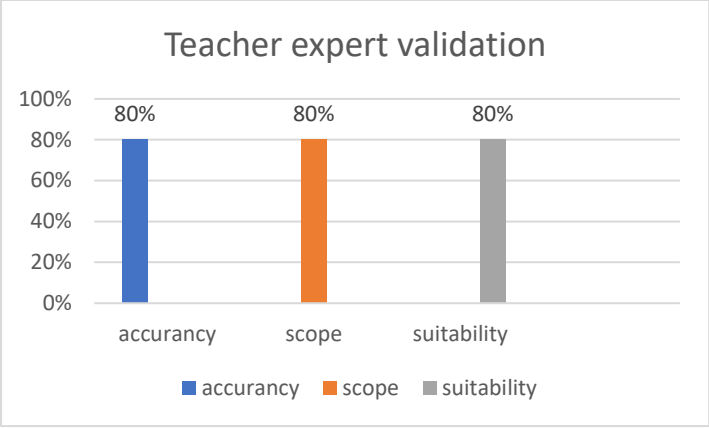

Figure 4. 41 Teacher expert validation graph

4.6 Application testing results

1. Device Testing

Application testing on several different devices is carried out to determine the functional application. This

application was tested on 5 different devices that have the Android operating system. The test steps on this device are as follows:

1) Install the English learning media application on the device

2) Then run the application

3) Test the buttons contained in the application

4) Test the camera by pointing the camera at the marker book

5) Then observe whether the application can run properly and can detect markers so that it can display 3D objects.

The following is a list of devices used to perform application testing, which can be seen in table 4.5 below:

Table 4. 5 List of application testing devices

No	Brand	OS and Chipset	RAM	Resolution
1	Samsung A13	Android 12, Exynos 850 (8nm)	5GB	1600 × 720 pixels

2	Samsung M32	Android 11, Mediatek MT6853 Dimensity 720 (7 nm)	6GB	1080 x 2400 pixels
3	Samsung galaxy A32	Android 11, Mediatek MT6769V/CU Helio G80 (12 nm)	4GB	720 × 1600 pixels
4	Samsung Galaxy A14	Android 13, Exynos 1330 (5nm) - SM-A146B	8GB	1080 x 2408 pixels
5	Samsung galaxy A13	Android12, Exynos 850 (8nm)	4G	1080 x 2408 pixels

The test results on the device can be seen in table 4.6 below:

Table 4. 6 Application device test results

Component	Test result				
	Device1	Device2	Device3	Device4	Device5
Opening the app	✔	✔	✔	✔	✔
Seeing User interface	✔	✔	✔	✔	✔
Seeing main menu	✔	✔	✔	✔	✔
Opening course menu	✔	✔	✔	✔	✔
Opening guide menu	✔	✔	✔	✔	✔
Opening about menu	✔	✔	✔	✔	✔
Opening vocabulary menu	✔	✔	✔	✔	✔
Opening sentence menu	✔	✔	✔	✔	✔

Opening quiz menu	✓	✓	✓	✓	✓
3D objects can be seen	✓	✓	✓	✓	✓

Based on the table above, it shows that the English learning Augmented Reality application can run well on devices with Android versions from Android 11 to Android version 13 and can be seen all the buttons and also the camera appear also can be seen the markers.

2. UAT Test Case

This test is a test that aims to determine the acceptance of the application that has been developed. The following is a list of micro-integrated academy teachers who tested the Augmented Reality application, which can be seen in table 4.7:

Table 4. 7 List of teachers who conducted the test

No	Tester name	Tester result	Conclusion

1	Felistus Kilonzo	According to the test document	Succeed
2	Mariam Makenzi adra	According to the test document	Succeed

The following are test cases carried out on Augmented Reality applications using the User Acceptance Testing (UAT) technique, for detailed documentation in sheet 6

1) Testing application specifications

Table 4. 8 Testing application specifications

Cases and Test Results		
Input data	Expectation	Conclusion
Make the Observations of the application	It suits the needs	Succeed

Based on table 4.8 above, the testers make observations of the specifications of the applications that have been

installed. And from the test results, the application specifications are in accordance with the requirements.

2) writing test (font)

Table 4.9 writing test (font)

Cases and Test Results		
Input data	Expectation	Conclusion
Reading every written	Writing (font) is easy to read by the user	Succeed

Based on table 4.9 above, the examiner reads every text contained in the application. And from the test results, it shows that the writing (font) can be read easily by the user.

3) Error testing on the application

Table 4. 10 Error testing in applications

Cases and Test Results		
Input data	Expectation	Conclusion
Observing the running of the application	there are no errors with the application	Succeed

Based on table 4.10 above, the examiner observes the running of the application. From the test results, this application managed to run well and there were no errors

4) the consistency of the button layout

Table4. 11 Testing the consistency of the button location

Cases and Test Results		
Input data	Expectation	Conclusion
Make observations of the location of the buttons in the application	The button layout is consistent on each menu page	Succeed

Based on table 4.11 above, the examiner made observations of the location of the buttons in the application. And from the test results, a consistent button layout on each page was successful.

5) Application efficiency testing

Table 4. 12 Application efficiency testing

Cases and Test Results		
Input data	Expectation	Conclusion
Running applications for learning outside the classroom	Applications can be used anywhere	Succeed

(not only in the classroom)		

Based on table 4.12 above, the testers run applications for learning outside the classroom. And from the test results, the application can be used anywhere.

6) the ease of the application

Table 4. 13 Testing the ease of application

Cases and Test Results		
Input data	Expectation	Conclusion
Make observations of the application	Its ease to use the application	Succeed

Based on table 4.13 above, the testers made observations of the application. And the test results show that the application is easy to use by users.

7) Camera distance testing

Table 4. 14 Camera distance testing

Cases and Test Results		
Input data	Expectation	Conclusion
Scan the marker at a distance of 15-30 cm	Will find the target image and 3D object can be displayed	Succeed

Based on table 4.14 above, the tester scans the marker with a distance of 15-30 cm. And from the test results, the target image was found and successfully displayed 3D objects.

8) scan time

Table 4. 15 Scan time testing

Cases and Test Results		
Input data	Expectation	Conclusion
Performs a marker scan	The scan time required to display	Succeed

	objects is less than 3 seconds	

Based on table 4.15 above, the examiner scans the marker. And from the test results, the scanning time needed to display 3D objects is less than 3 seconds successfully carried out.

3. Results of Student and Teacher Response Questionnaires

The assessment of student and teacher response questionnaires aims to determine the responses of students and teachers to the application of Augmented Reality for English learning media.

This assessment was carried out on class 3 students as many as 20 students and English teacher. The data obtained from this test is an assessment in the form of a questionnaire with 10 statements with 4 answer choices.

The data that has been obtained is then represented by the equation formula Table 3.7 above. The following is the data from the student questionnaire results after being added up in table 4.16 below:

Table 4. 16 Student and Teacher Questionnaire Results

Indicator	Question	Answer Frequency				
		SA	A	E	DA	SDA
Course	Q1	10	10	2	-	-
	Q2	11	8	3	-	-
	Q3	3	9	10	-	-
	Q4	11	8	3	-	-
	Q5	13	8	1	-	-
Presentation	Q6	15	5	2	-	-
	Q7	17	5	-	-	-
	Q8	10	10	2	-	-
	Q9	15	6	1	-	-
	Q10	4	13	5	-	-
	Q11	20	2	-	-	-
	Q12	19	2	1	-	-
	Q13	19	3	-	-	-
Overall Function	Q14	13	6	3	-	-
	Q15	8	13	1	-	-
	Q16	15	5	2	-	-
	Q17	14	7	1	-	-
	Q18	19	3	-	-	-
	Q19	18	4	-	-	-

Total	254	127	37	0	0

From the data that has been obtained then analyzed by calculating the average answer based on the score of the questionnaire answers. Based on the score that has been set, it can be calculated as follows:

- Total score that answered SA = 254x5 = 1.270
- Total score that answered A = 127x4 = 508
- Total score that answered E = 37x3 = 111
- Total score that answered DA = 0x2 = 0
- Total score that answered SDA = 0x1 = 0

Total score = 1.889

The results of the answers above can then be calculated for the highest and lowest values as follows:

- Highest results = 22x19x5 = 2.090 (if all answered SA)
- Lowest result = 22x19x1 = 418 (if all answered SDA)

From the calculation above it is known that the highest value is 2.090, so the percentage can be found as follows:

$$\frac{1889}{2090} \; x \; 100 \; \% = 90\%$$

Based on the feasibility score criteria, the percentage results obtained above are very feasible, namely the percentage is 90%.

- Score Total = 5 x total respondent (22)

  (Total score : total score ideal) x 100%

  - Average score In percentage

    The ideal score = 5 x 22 = 110

1) The material in this application is easy to understand

Table 4. 17 Easy-to-understand material

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	10	10x 5= 50	96
Agree	10	10x4= 40	
enough	2	2x 3 = 6	
Disagree	0	0	
Strongly disagree	0	0	

Percentage	$\frac{96}{110}$ x 100 = 87%

Based on the percentage results obtained in table 4.18 above, it is known that the answers from students' and teachers' responses to easily understood material are very feasible, namely with 87%.

2) The material in the application is as needed

Table 4. 18 The material is as needed

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	11	11x 5=55	96
Agree	8	8x4=32	
enough	3	3 x 3 = 9	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{96}{110}$ x 100 = 87%		

Based on the percentage results obtained by the table

4.19 above it is known that the answers from students and teachers to material according to needs are very feasible, namely with a percentage.

3) The contents of the course in the application are as needed

Table 4. 19 Material according to learning needs

answer category	Questionnaire Results		Total
	Amount	Score	83
Strongly agree	3	3x 5=15	
Agree	9	9x4=36	
enough	10	10 x 3 = 30	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{83}{110}$ x 100 = 73%		

Based on the percentage results obtained in table 4.20 above, it is known that the answers from students and teachers to the material according to learning needs are feasible, namely with 73%.

4) The material is in accordance with social values

Table 4. 20 Material according to social values

answer category	Questionnaire Results		Total
	Amount	Score	96

Strongly agree	11	11x 5=55	
Agree	8	8x4=32	
enough	3	3 x 3 = 9	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{96}{110}$ x 100 = 87%		

Based on the percentage results obtained in the table above, it is known that the answers from students and teachers to the material are in accordance with social values, which is very feasible, namely 87%.

5) The material on the application is useful

Based on the percentage results obtained in table 4.21 above, it is known that the answers from students and teachers to useful material to add insight are very feasible, namely with 90%.

Table 4. 21 Useful course to add insight

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	13	13x 5=65	100
Agree	8	8x4=32	
enough	1	1 x 3 = 3	

Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{100}{110}$ x 100 = 90%		

6) The application presents competencies that must be mastered

Table 4. 22 Presents the competencies that must be mastered

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	15	15x 5=75	101
Agree	5	5x4=20	
enough	2	2 x 3 = 6	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{101}{110}$ x 100 = 91%		

Based on the percentage results obtained in table 4.22 above, it is known that the answers from students and teachers regarding the presentation of the competencies that must be mastered are very feasible, namely with 90%.

7) The presentation of the material is well described

Table 4. 23 The material is well described

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	17	17x 5=85	105
Agree	5	5x4=20	
enough	0	0	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{105}{110}\ x\ 100 = 95\%$		

Based on the percentage results obtained in table 4.23 above, it is known that the answers from students and teachers to the material described well are very feasible, namely with 95%.

8) The language used is easy to understand

Table 4. 24 Easy-to-understand language

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	10	10x 5=50	96

Agree	10	22x4=40	
enough	2	2 x 3 = 6	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{96}{110}$ x 100 = 87%		

Based on the percentage results obtained in the table above, it is known that the answers from students and teachers to 4.24 language that is easy to understand is very feasible, namely with a value of 87%.

9) Images, writing, and designs are easy to understand

Table 4. 25 Images, writing, designs are easy to understand

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	15	15x 5=75	
Agree	6	6x4=24	
enough	1	1x3 = 3	102
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{102}{110}$ x 100 = 92%		

Based on the percentage results obtained in table 4.25 above, it is known that the answers from students and teachers to pictures, writing and easy-to-understand designs are very feasible, namely with 92%.

10) Presenting interesting 3D objects

Table 4. 26 Presenting interesting 3D objects

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	4	4x 5=20	87
Agree	13	13x4=52	
enough	5	5 x 3 = 15	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{87}{110}$ x 100 = 79%		

Based on the percentage results obtained by the table 4.26 above it is known that the answers from students and teachers to serving interesting 3D objects are very feasible, namely with 79%.

11) Attractive app layout

Table 4. 27 Attractive display layout

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	20	20x 5 =100	108
Agree	2	2x4=8	
enough		0	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{108}{110}$ x 100 = 98%		

Based on the percentage results obtained in table 4.27 above, it is known that the answers from students and teachers to an attractive display layout are very feasible, namely with 98%.

12) Instructions for using the application are presented clearly

Table 4. 28 The instructions for using the application are clear

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	19	19x 5=95	106
Agree	2	2x4=8	
enough	1	1 x 3 = 3	

Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{106}{110}$ x 100 = 96%		

Based on the percentage results obtained in the table above, it is known that the answers from students and teachers to 4.28 clear instructions for use it is very

Feasible 96%.

13) The buttons on the app are easy to use

Table 4.29 The buttons on the application are easy to understand

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	19	19x 5=95	107
Agree	3	3x4=12	
enough	0	0	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{107}{110}$ x 100 = 97%		

Based on the percentage results obtained in table 4.29 above, it is known that the answers from students and

teachers to easy-to-understand buttons are very feasible, namely with 97%.

14) Easy to use app

Table 4. 30 Easy-to-use applications

answer category	Questionnaire Results		Total
	Amount	Score	98
Strongly agree	13	13x 5=65	
Agree	6	6x4=24	
enough	3	3 x 3 = 9	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{98}{110}$ x 100 = 89%		

Based on the percentage results obtained in table 4.30 above, it is known that the answers from students and teachers to applications that are easy to use are very feasible, namely with 89%.

15) Placement of the menu makes it easier for students

Table 4. 31 Menu placement

answer category	Questionnaire Results	Total

	Amount	Score	
Strongly agree	8	8x 5=40	95
Agree	13	13x4=52	
enough	1	1 x 3 = 3	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{95}{110}$ x 100 = 86%		

Based on the percentage results obtained in table 4.31 above, it is known that the answers from students and teachers regarding menu placement are very feasible, namely with 86%.

16) Interesting practice questions

Table 4. 32 Interesting practice questions

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	15	15x 5=75	101
Agree	5	5x4=20	
enough	2	2 x 3 = 6	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{101}{110}$ x 100 = 91%		

Based on the percentage results obtained in the table 4.32 above, it is known that the answers from students and teachers to the attractiveness of the practice questions is very feasible 91%.

17) This application encourages students' curiosity

Table 4. 33 Applications encourage student curiosity

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	14	14x 5=70	101
Agree	7	7x4=28	
enough	1	1 x 3 = 3	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{101}{110} x$ 100 = 91%		

Based on the percentage results obtained in table 4.33 above, it is known that the answers from students and teachers to applications that can encourage curiosity are very feasible, namely with 91%.

18) Application benefits for learning

Table 4. 34 Benefits of applications for learning

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	19	19x 5=95	107
Agree	3	3x4=12	
enough	0	0	
Disagree	0	0	
Strongly disagree	0	0	
Percentage	$\frac{107}{110} x\ 100 = 97\%$		

Based on the percentage results obtained in table 4.34 above, it is known that the answers from students and teachers regarding the benefits of the application for learning are very feasible, namely with 97%.

19) Fun learning atmosphere

Table 4. 35 Fun learning Atmosphere

answer category	Questionnaire Results		Total
	Amount	Score	
Strongly agree	18	10x 5=90	106
Agree	4	4x4=16	
enough	0	0	
Disagree	0	0	

Strongly disagree	0	0	
Percentage	$\frac{106}{110}$ x 100 = 96%		

Based on the percentage results obtained in table 4.35 above, it is known that the answers from students and teachers towards a pleasant learning atmosphere are very feasible, namely with 96%.

From the processing above, a summary of the processing results can be seen in table 4.37 below:

Table 4. 36 Processing results of student and teacher questionnaires

Indicator	Questions	Questionnaire Results	
		Score	(%)
Course	Q1	96	87%
	Q2	96	87%
	Q3	83	73%
	Q4	96	87%
	Q5	100	90%
Presentation	Q6	101	91%
	Q7	105	95%
	Q8	96	87%

	Q9	102	92%
	Q10	87	79%
	Q11	108	98%
	Q12	106	96%
	Q13	98	89%
Overall Function	Q14	98	89%
	Q15	95	86%
	Q16	101	91%
	Q17	101	91%
	Q18	107	97%
	Q19	106	96%

Then the final results of testing student and teacher responses are shown in table 4.37 below:

Table 4. 37 Final results of student and teacher response questionnaires

No	Assessment Aspects	indicator	Number of Items	(%)	Description
1	App Rating	Course	5	84%	So worth it
2		Presentation	8	90%	So worth it
3		Overall Function	6	91%	So worth it

The results of application testing conducted by students and teachers show that this application in terms of course indicators have a value of 84% presentation 90% and overall function 91% with very feasible criteria.

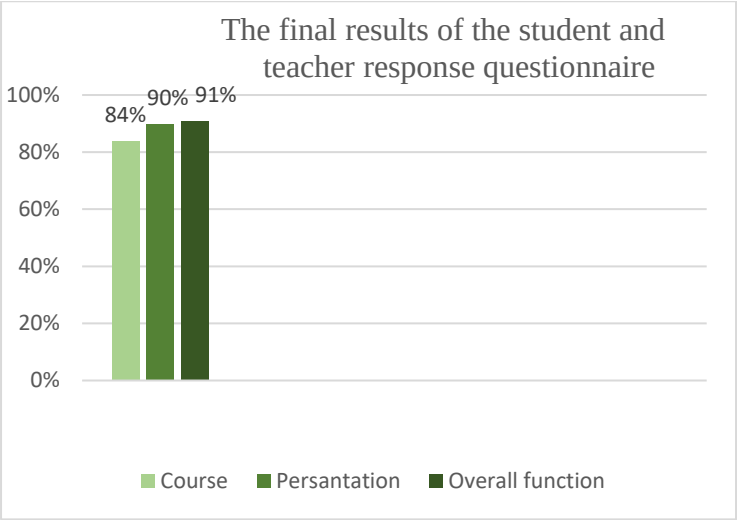

Figure 4.42 The final results of the student and teacher response questionnaire.

4.7 Learning Media Application Effectiveness

The effectiveness of learning media applications is proven by conducting tests on 20 students in class 3 of the micro integrated academy. This test was conducted to determine

the effectiveness of the Augmented Reality application as a learning medium. Before this application is tested on students, students first do a pretest. This pretest was conducted to determine students' understanding before using the application.

After all students have done the pretest, then students are introduced to the Augmented Reality English learning media application and are tested at the same time.

The percentage correctness of the pre-test and post-test is obtained by the formula in Table 3.9 above. The following is the average value of the students' pre-test and post-test results:

Table 4. 38 The average increase in student learning

No	Name	Pre-test	Post-test
1	Adullahi Ahmed	65	85
2	Muhsin Abdi	51	80
3	Harif Ibrahim	44	88
4	Salim Abdikarim	70	88
5	Abdirizak Aliow Khala	61	79

6	Mahir Yarow	50	87
7	Salman Aden	62	78
8	Abdihaafid Hassan	60	80
9	Mohammed Abdulahi	61	83
10	Nasteha Ali	55	85
11	Naima Maulid	50	70
12	Ashwaq Ibrahim	53	73
13	Anfal Omar	50	76
14	Iklas Mohamed	60	75
15	Kawthar Jamal	49	80
16	Hamda Abdullahi	40	80
17	Ridhwan Abdi	50	83
18	Ummaymah Yussuf	54	80
19	Filza Abdi	60	70
20	Anisa Karie	59	72
average value		55,2	79,6

From the results above, it is known that the average pretest and post-test scores have increased from 55,2 to 79,6 with an increase percentage of 24,4% The graph of the average pretest and post-test values can be seen in

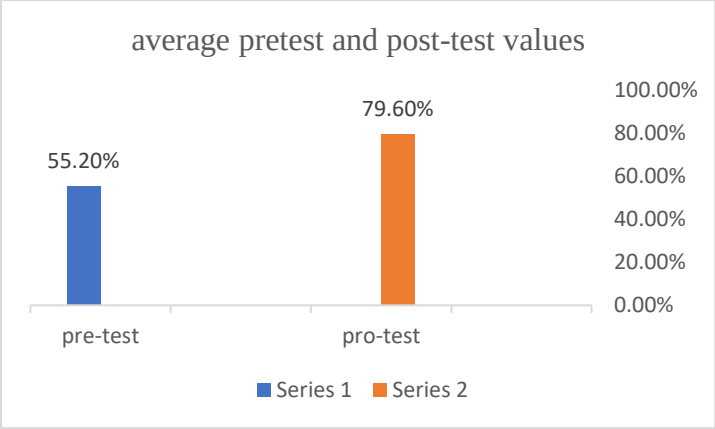

Figure 4.43 Graph of average pretest and post-test values

CHAPTER V
Conclusion and Recommendation

5.1 Conclusion

Based on the research results of the English Learning Media Using Augmented Reality Technology with Marker Based Tracking can be concluded as follow:

1. The Augmented Reality application was successfully built using Unity3D and Vuforia software, and it also includes a marker book. It can run smoothly and display 3D. And the waterfall model used in this research is the oldest and the most well-known SDLC model. It goes down through the phases of requirement analysis, design, development, testing, and maintenance.
2. The effectiveness of Augmented Reality learning media in English learning is regarded as successful. The material validation test produced extremely good results, as seen on above the average pretest and post-test scores have increased from 55,2 to 79,6 with an increase percentage of 24,4%.

5.2 Recommendation

In research on the application of Augmented Reality English learning media, there are still some deficiencies that need to be addressed. Some recommendations are:

1. To improve the learners understanding to make a vocabulary explanation.

2. To add in the quiz button a spelling quiz and to add a guess vocabulary quiz.

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Sheets

1. Proposal Approval Letter

Ratification sheet

The following proposal:

Title :English learning media using Augmented Reality Technology

Author :Falis Yusuf Hassan

Student ID :1908096058

Major :Information Technology

has been tested in a comprehensive examination by the board of examiners of the faculty of science and technology UIN WALISONGO and can be accepted as one of the requirements for obtaining a bachelor's degree in information technology.

Semarang,……

Emaniners Board

Examiner I

Masy Ari Ulinuha, M.T

NIP.19810812 201101 1007

Examiner II

Nur Cahyo Hendro Wibowo, S.T., M.Kom

NIP. 19731222 200604 1 001

Examiner III

Wenty Dwi Yuniarti, S. Pd., M. Kom

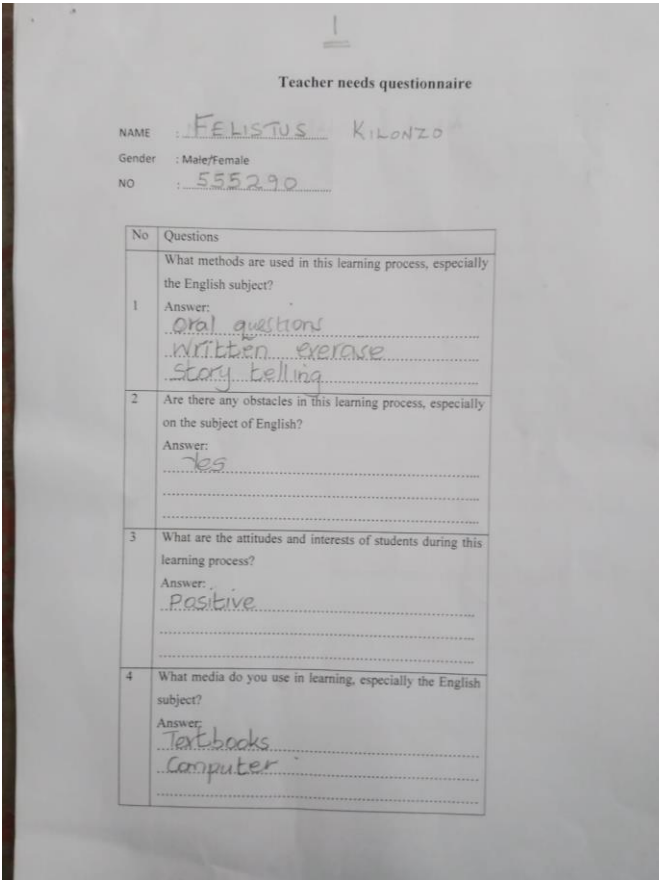
NIP. 19770622 200604 2 005

Examiner VI

Hery Mustofa, M.Kom

NIP. 19870317 201903 1 007

2. Teacher Needs Analysis



1

Teacher needs questionnaire

NAME : FELISTUS KILONZO

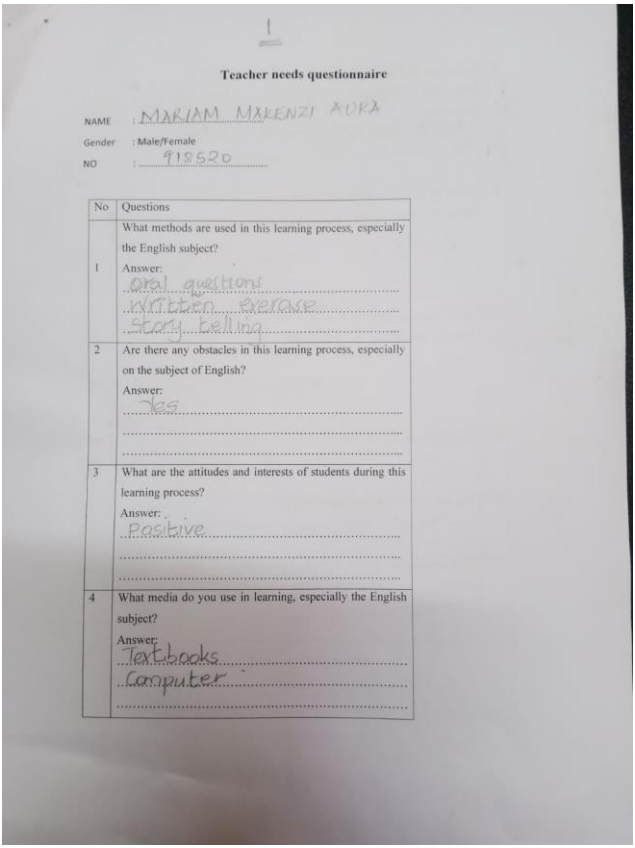
Gender : Male/Female

NO : 555290

No	Questions
1	What methods are used in this learning process, especially the English subject? Answer: Oral questions written exercise story telling
2	Are there any obstacles in this learning process, especially on the subject of English? Answer: Yes
3	What are the attitudes and interests of students during this learning process? Answer: Positive
4	What media do you use in learning, especially the English subject? Answer: Textbooks Computer

2

5	What are the short comings of the learning media used on this subject of English? Answer: Some learners were unable to read.
6	What do you think using Augmented Reality can improve students learning skills? Answer: Yes it can.
7	Have you ever created or developed learning media for the learning process? Answer: Yes
8	Have you ever used Augmented Reality in learning? o Yes ✓ o No
9	Did you know about Augmented reality? o Yes ✓ o No
10	Does Augmented Reality need to be developed on this subject? o Yes ✓ o No



1

Teacher needs questionnaire

NAME : MARIAM MAKENZI AURA

Gender : Male/Female

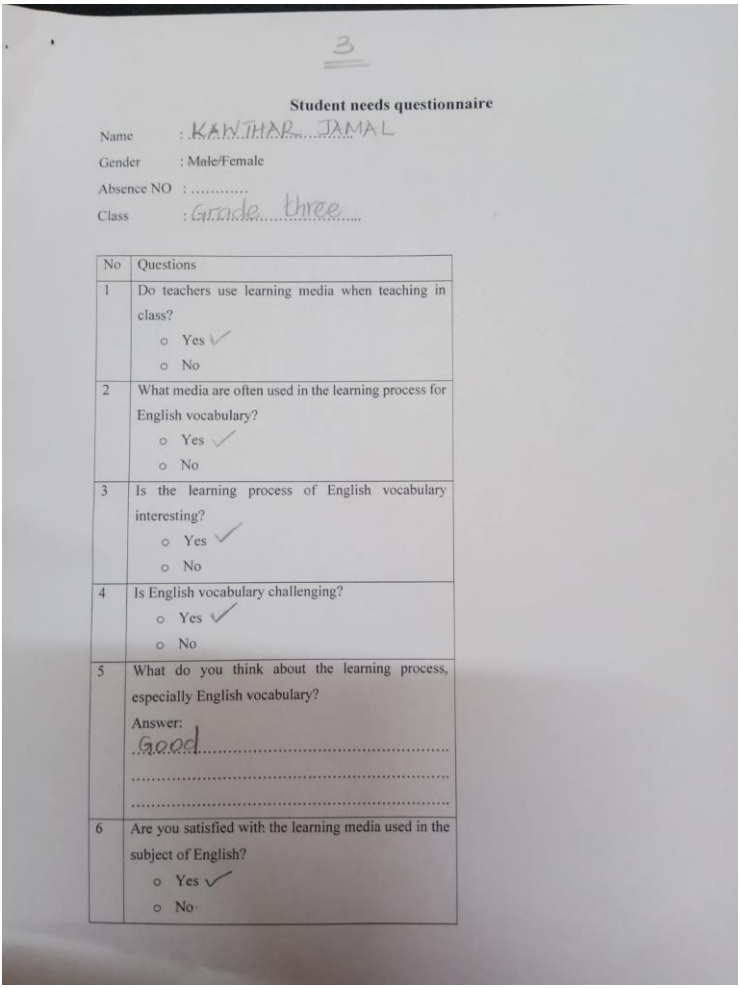
NO : 918520

No	Questions
1	What methods are used in this learning process, especially the English subject? Answer: oral questions written exercise story telling
2	Are there any obstacles in this learning process, especially on the subject of English? Answer: Yes
3	What are the attitudes and interests of students during this learning process? Answer: Positive
4	What media do you use in learning, especially the English subject? Answer: Textbooks Computer

2

5	What are the short comings of the learning media used on this subject of English? Answer: Some learners were unable to read.
6	What do you think using Augmented Reality can improve students learning skills? Answer: Yes it can.
7	Have you ever created or developed learning media for the learning process? Answer: Yes
8	Have you ever used Augmented Reality in learning? o Yes ✓ o No
9	Did you know about Augmented reality? o Yes ✓ o No
10	Does Augmented Reality need to be developed on this subject? o Yes ✓ o No

3. Student Needs Analysis



3

Student needs questionnaire

Name : KAWTHAR JAMAL

Gender : ~~Male~~/Female

Absence NO : .....

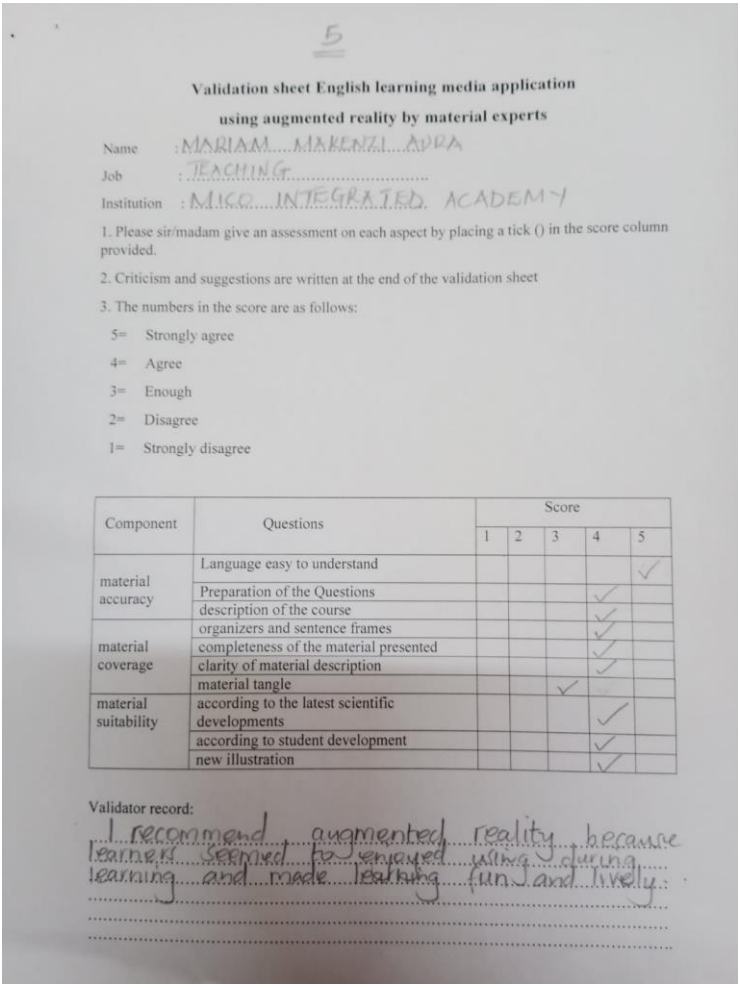
Class : Grade three

No	Questions
1	Do teachers use learning media when teaching in class? o Yes ✓ o No
2	What media are often used in the learning process for English vocabulary? o Yes ✓ o No
3	Is the learning process of English vocabulary interesting? o Yes ✓ o No
4	Is English vocabulary challenging? o Yes ✓ o No
5	What do you think about the learning process, especially English vocabulary? Answer: Good
6	Are you satisfied with the learning media used in the subject of English? o Yes ✓ o No

4

7	Did this learning process help you to improve your English skills? o Yes ✓ o No
8	Did you know learning media Augmented Reality? o Yes o No ✓
9	Has your school ever used the media Augmented reality in the learning process of English vocabulary? o Yes ✓ o No
10	Does Augmented Reality learning media need to be developed in the learning process of English vocabulary? o Yes ✓ o No

4. Material teacher eligibility



5

Validation sheet English learning media application

using augmented reality by material experts

Name : MARIAM MAKENZI ADDA

Job : TEACHING

Institution : MICO INTEGRATED ACADEMY

1. Please sir/madam give an assessment on each aspect by placing a tick () in the score column provided.

2. Criticism and suggestions are written at the end of the validation sheet

3. The numbers in the score are as follows:

5= Strongly agree

4= Agree

3= Enough

2= Disagree

1= Strongly disagree

Component	Questions	Score				
		1	2	3	4	5
material accuracy	Language easy to understand					✓
	Preparation of the Questions				✓	
	description of the course				✓	
material coverage	organizers and sentence frames				✓	
	completeness of the material presented				✓	
	clarity of material description				✓	
	material tangle			✓		
material suitability	according to the latest scientific developments				✓	
	according to student development				✓	
	new illustration				✓	

Validator record:

I recommend augmented reality because learners seemed to enjoyed using during learning and made learning fun and lively.

6

Conclusion

Based on the assessment above this application:

A. have not been able to use it and are still doing repairs and consultations

B. can be used with revisions

C. can be used without revision

Mariam M. Awa

Validator

(.....)

Validation sheet English learning media application

using augmented reality by material experts

Name : FELISTUS KILONZO

Job : TEACHING

Institution : MICO INTEGRATED ACADEMY

1. Please sir/madam give an assessment on each aspect by placing a tick () in the score column provided.

2. Criticism and suggestions are written at the end of the validation sheet

3. The numbers in the score are as follows:

5= Strongly agree

4= Agree

3= Enough

2= Disagree

1= Strongly disagree

Component	Questions	Score				
		1	2	3	4	5
material accuracy	Language easy to understand					✓
	Preparation of the Questions				✓	
	description of the course				✓	
material coverage	organizers and sentence frames				✓	
	completeness of the material presented				✓	
	clarity of material description				✓	
	material tangle			✓		
material suitability	according to the latest scientific developments				✓	
	according to student development				✓	
	new illustration				✓	

6

Conclusion

Based on the assessment above this application:

A. have not been able to use it and are still doing repairs and consultations

B. can be used with revisions

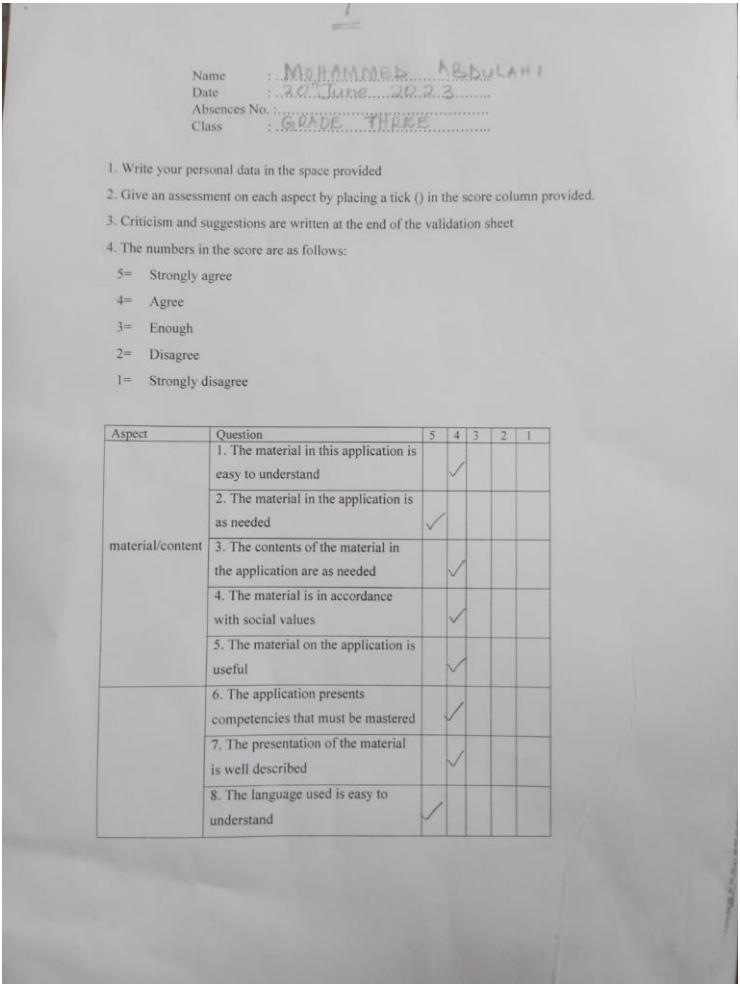
C. can be used without revision

FELISTUS KILONZO

Validator

(.....)

5. Student Response Questionnaire



Name : MOHAMMED ABDULAHI
Date : 20th June 2023
Absences No. :
Class : GRADE THREE

1. Write your personal data in the space provided
2. Give an assessment on each aspect by placing a tick () in the score column provided.
3. Criticism and suggestions are written at the end of the validation sheet
4. The numbers in the score are as follows:
   - 5= Strongly agree
   - 4= Agree
   - 3= Enough
   - 2= Disagree
   - 1= Strongly disagree

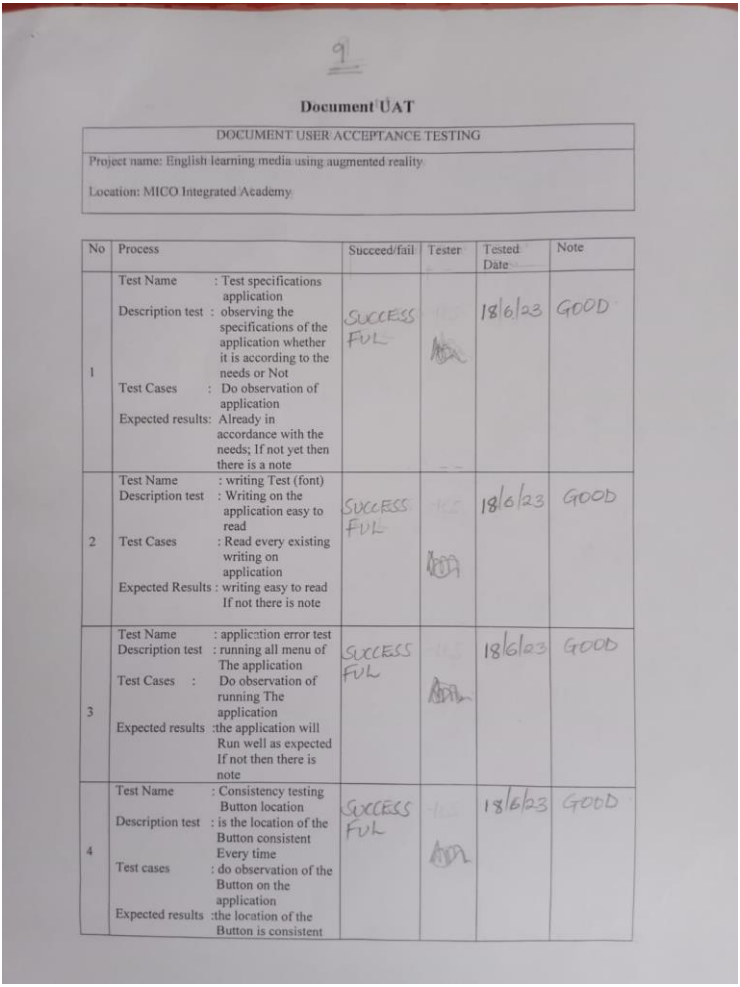
Aspect	Question	5	4	3	2	1
material/content	1. The material in this application is easy to understand		✓			
	2. The material in the application is as needed	✓				
	3. The contents of the material in the application are as needed		✓			
	4. The material is in accordance with social values		✓			
	5. The material on the application is useful		✓			
	6. The application presents competencies that must be mastered		✓			
	7. The presentation of the material is well described		✓			
	8. The language used is easy to understand	✓				

presentation	9. Images, writing, and designs are easy to understand		✓			
	10. Presenting interesting 3D objects		✓			
	11. Attractive app layout		✓			
	12. Instructions for using the application are presented clearly		✓			
	13. The buttons on the app are easy to use			✓		
overall function of the application	14. Easy to use the application		✓			
	15. Placement of the menu makes it easier for students		✓			
	16. Interesting practice questions	✓				
	17. This application encourages students' curiosity	✓				
	18. Application benefits for learning		✓			
	19. Fun learning atmosphere		✓			

Student

(.....)

6. UAT Document



9

Document UAT

DOCUMENT USER ACCEPTANCE TESTING
Project name: English learning media using augmented reality
Location: MICO Integrated Academy

No	Process	Succeed/fail	Tester	Tested Date	Note
1	Test Name : Test specifications application Description test : observing the specifications of the application whether it is according to the needs or Not Test Cases : Do observation of application Expected results: Already in accordance with the needs; If not yet then there is a note	SUCCESS FUL		18/6/23	GOOD
2	Test Name : writing Test (font) Description test : Writing on the application easy to read Test Cases : Read every existing writing on application Expected Results : writing easy to read If not there is note	SUCCESS FUL		18/6/23	GOOD
3	Test Name : application error test Description test : running all menu of The application Test Cases : Do observation of running The application Expected results :the application will Run well as expected If not then there is note	SUCCESS FUL		18/6/23	GOOD
4	Test Name : Consistency testing Button location Description test : is the location of the Button consistent Every time Test cases : do observation of the Button on the application Expected results :the location of the Button is consistent	SUCCESS FUL		18/6/23	GOOD

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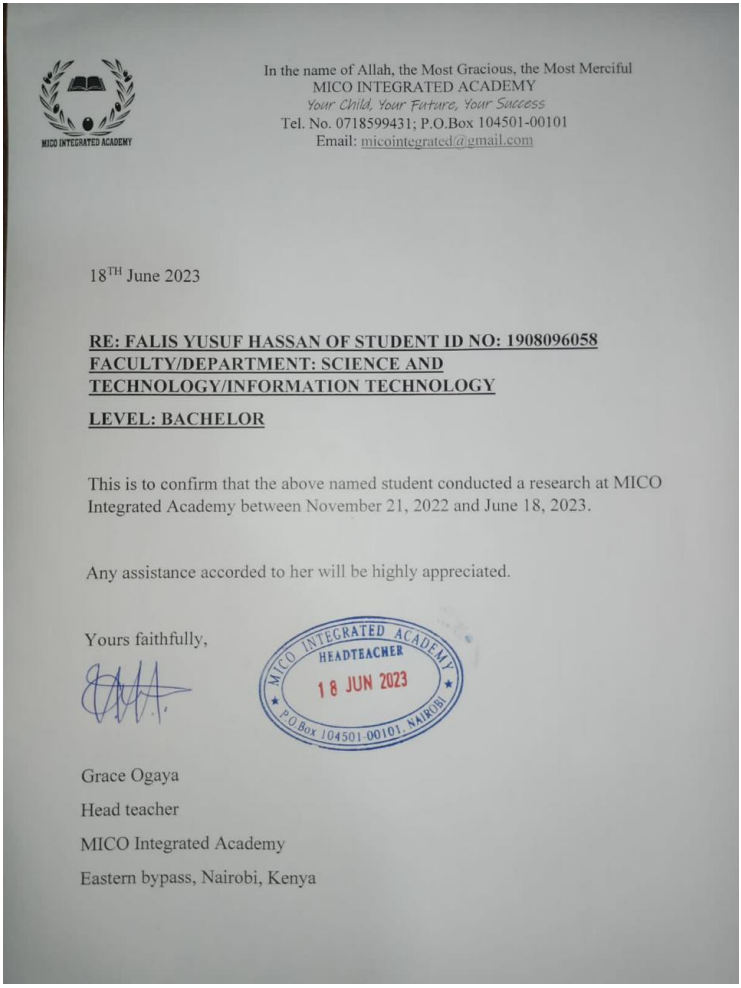
		In every menu if not Then there are buttons that are not the same				
5	Test Name Description test Test cases Expected results	: application Efficiency Testing : easy to use application To study anywhere : running applications For learning outside The classroom :the application can be Used anywhere; if it Fails the application Can only be used in Class	SUCCESS FUL		18/6/23	GOOD
6	Test Name Description test Test cases Expected results	:Ease testing application :is this application easy To operate :do observation of the application :easy to use application; If it fails then this Application is difficult To use	SUCCESS FUL		18/6/23	GOOD
7	Test Name Description test Test cases Expected results	:scan time test :the marker scanning Process is carried out By observing the time :perform a scan markers :the time it takes to Display a 3D object is Less than 3second	SUCCESS FUL		18/6/23	GOOD
8	Test Name Description test Test cases Expected results	:camera distance testing :scan the marker with Certain distance :performs a marker scan With a distance 15-30cm :targets and object can Be displayed; if it fails The object is not displayed	SUCCESS FUL		18/6/23	GOOD

7. certificate of completion of research



In the name of Allah, the Most Gracious, the Most Merciful
MICO INTEGRATED ACADEMY
Your Child, Your Future, Your Success
Tel. No. 0718599431; P.O.Box 104501-00101
Email: micointegrated@gmail.com

18TH June 2023

RE: FALIS YUSUF HASSAN OF STUDENT ID NO: 1908096058
FACULTY/DEPARTMENT: SCIENCE AND TECHNOLOGY/INFORMATION TECHNOLOGY

LEVEL: BACHELOR

This is to confirm that the above named student conducted a research at MICO Integrated Academy between November 21, 2022 and June 18, 2023.

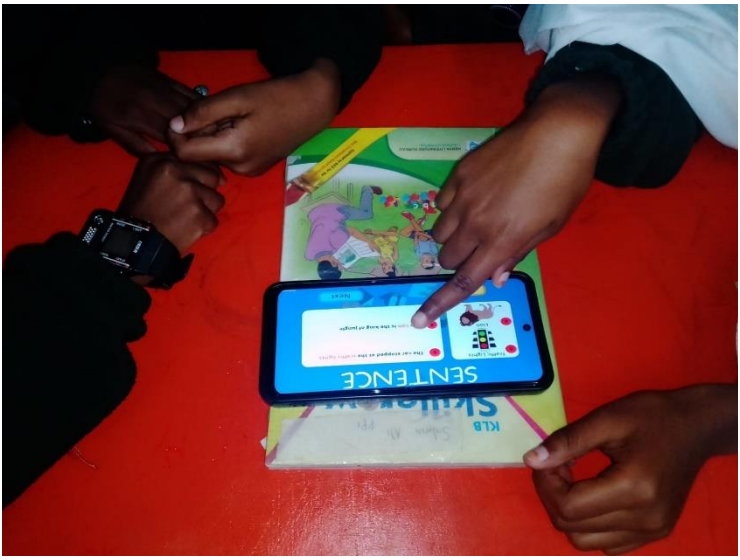
Any assistance accorded to her will be highly appreciated.

Yours faithfully,

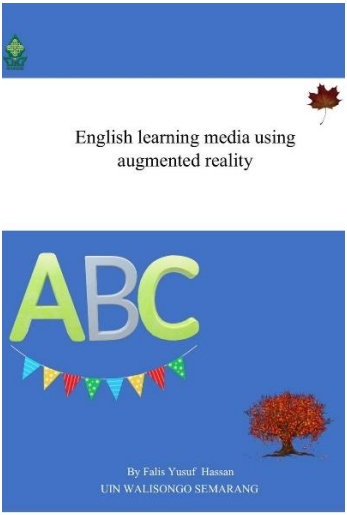
MICO INTEGRATED ACADEMY
HEADTEACHER
18 JUN 2023
P.O Box 104501-00101, NAIROBI

Grace Ogaya
Head teacher
MICO Integrated Academy
Eastern bypass, Nairobi, Kenya

8. research documentation


SENTENCE

9. Marker Book



Classroom

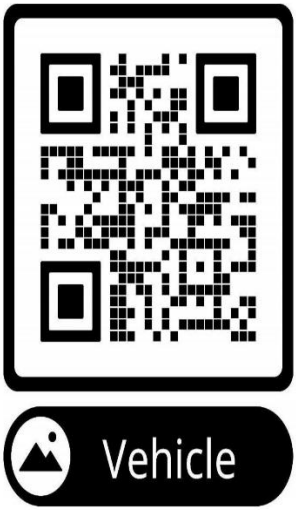
Blackboard

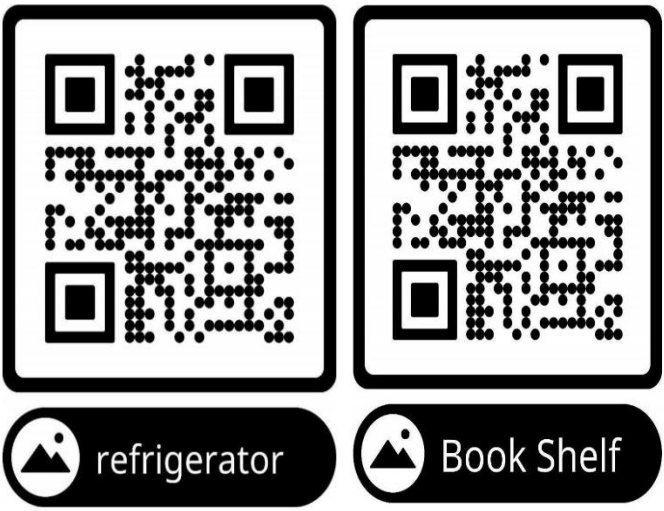
Door


Home


Lamp


Schoolbus


Vehicle


refrigerator
Book Shelf
Lion
Motorbike


Table


Window


Teacher


Chair


Traffic Light

10. Curriculum Vitae sheet

A. SELF IDENTITY

Name : Falis Yusuf Hassan

Place and Date of birth: Mogadishu, 30-03-2001

Address :Hodan, Benaadir, Mogadishu, Somalia

B. Family dentity

Father's name : Yusuf Hassan Mohamud

Mother's name : Fartun Mohamud Duqow

Sister : Nura'aini, Iman, Salma, Sabrina, Shukri, Su'ad

Brothers : Yonis, Ahmed, Mohamed

Address : Hodan, Benaadir, Mogadishu, Somalia

C. Education

Primary school :HAMAR BOARDING SCHOOL

Middle school :HAMAR BOARDING SCHOOL

SECONDARY :HAMAR BOARDING SCHOOL

Thus I write this curriculum vitae in truth to be used properly.

Semarang, 22 June 2023

Writer,

Falis Yusuf Hassan

Student ID: 1908096058