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Detecting defect requirements in animation-based reading learning using perspective-based reading

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ABSTRACT

Defects in the requirements specification can have severe consequences throughout the software development life cycle. Some of these can result in poor product quality due to incorrect or missing quality characteristics, such as the design of the user interface. The goal of this study is to detecting defect requirements in animation-based reading learning using perspective-based reading. But often the design is not in line with the specifications of the requirements of users and developers when developing this application. Therefore we use a user persona approach to find out what needs are needed in animation learning and Perspective Based Reading (PBR) for verification or validation effective from the development of this learning application user interface, from the results of this study a total of 1 defect was obtained for the UI development of animation-based reading learning, and from the user's perspective there were no defects, and it is hoped that from this research to improve develop learning applications that are more interactive and in accordance with the requirements of stakeholders.

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Introduction

The Covid-19 pandemic that spread almost all over the world has its own impact and challenges on the ongoing process in the education sector, especially in Indonesia. Coronavirus is a family of diseases caused by viruses through mild to severe symptoms. Coronaviruses are diseases known to cause symptoms such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). Since Covid-19 entered Indonesia, the Government issued a decision not to do face-to-face learning, but to conduct distance learning using e-learning. E-learning with animation is an approach to developing learning materials that combines animation technology with educational content. In e-learning with animation, animated elements, such as moving Figures, video animations, and interactive simulations, are used to illustrate complex concepts, visualize difficult processes or phenomena, and enhance the understandable appeal and interactivity of online learning. This animation-based learning to read is expected to help students in the current online learning process and can be suitable for various levels of education and various subjects including basic education. Learning is very dependent on the ability of teachers and school facilities both offline and online) (Yu, 2021).

Learning is an increase in skills and knowledge of the best public policies in the learning process in schools. Learning media in the form of information technology developments that can be used are (learning, online).

The role of learning media in the teaching and learning process is an inseparable part of the world of education. Learning media are facilities or instruments that encourage the effectiveness and efficiency of learning activities, especially when students are required to study from home during the corona virus pandemic (COVID 19). Computer networks are interconnected with other computer networks throughout the world which are defined as online learning. The process that occurs during learning activities is that students tend to seem reluctant to express opinions and only become listeners and tend to be passive(Vishkaie, 2020). In the learning process at home, the media is also very much needed to determine learning outcomes, students and online learning teachers have their respective roles, students have a role as a constructor of knowledge, while the teacher has a role as a facilitator and guide in learning activities.

The management of animation-based learning activities helps students and teachers to take advantage of the distance learning model. Learning resources for the evaluation of efficient learning with information technology serves as a medium that provides between students and teachers. The progress of the times and science and technology can create different ways of thinking, especially regarding learning theory, which has encouraged and inspired many learning innovations(Moorhouse & Wong, 2022). The ideal condition that causes renewal in learning is the existence of one of the determining factors for the success of the teaching and learning process in the classroom because of the use of animation media applications in learning as an appropriate innovation of facilities and infrastructure. because the application of animation media in learning is adjusted to the characteristics of students, materials, and supporting infrastructure (Tkacová et al., 2022).

So that if the application of animation media in learning is used properly, then the learning objectives in the cognitive, psychomotor domain will be achieved. While the facts on the ground that are not in accordance with these ideal conditions cause the learning outcomes achieved by students are not as expected. One of the contributing factors is the use of the application of animation media in learning that is less/inappropriate and the use of the application of animation media in learning that does not vary. Because there are two things that cause the phenomenon of using appropriate and non-variative learning models, it is necessary to present a discussion of various learning models in the hope of providing additional knowledge, so that they can be implemented in teaching and learning activities(Flores & Swennen, 2020).

Learning using animation or visualization in the context of e-learning has several benefits such as increasing understanding of concepts, strengthening memory, increasing engagement and motivation, increasing interactive learning experiences, bringing the real world into learning, increasing learning accessibility (Yuliani et al., 2020). However, the use of animation or visualization in e-learning must be done wisely and in accordance with the learning context (Setyaningsih et al., 2020). Excessive or irrelevant animations or visualizations can distract from the focus or reduce the effectiveness of learning (Khotimah et al., 2019). Therefore, it is necessary to pay attention to the principles of effective learning design in the use of animation or visualization in e-learning(Hamzah et al., 2013).

Distance learning is carried out by teachers through online media such as Whatsapp, Google Meet, Google Form and other types(Indiani, 2020). However, this system requires special learning designs and techniques in order to be implemented. Policy evaluation needs to be carried out to evaluate the distance learning system that has been implemented in schools at all levels of education. Based on the observations made by the authors, it is found that distance learning is considered ineffective and maximal if it is applied to schools with inadequate infrastructure. This is because technology-based distance learning requires a different approach in terms of planning, implementation and evaluation(Palvia et al., 2018). In implementing distance learning, students need special attention, especially the infrastructure used, an adequate internet network and self-motivation to be able to follow the learning process independently. Distance learning problems include uneven internet network access, inadequate equipment, highcost quotas, uneven mastery of science and technology among educators or teachers, unprepared implementation of the teaching and learning process using distance learning methods, and difficulties for parents. in accompanying their children. In carrying out teaching and learning activities, children become obstacles faced during the distance learning process(Karakolidis et al., 2021). The COVID-19 pandemic has had a significant psychological impact on vulnerable groups, especially students.

During an interview with one of the stakeholders, namely the teacher, the collection of assignments was still carried out in the wa group which was vulnerable to cheating because in the wa group, all members in the wa group could see the files that were sent and were vulnerable to file loss because in the wa group the files could be deleted. with a cleaner from cellphones and chat files sent can also be stacked with the latest chats, for learning to read still use google meet and zoom where not all students have gadgets. and some students are also less enthusiastic due to less interactive learning at home. Learning is also assisted by parents of students who are also less effective because of busy parents.

There are main problems of online learning that sometimes students are less enthusiastic in learning, so to overcome some of the problems above, the following hypothesis is obtained create android app to hold videos, create interactive learning reading animation, socialization about technology to students

From this, it is expected to solve several problems, and the following are the objectives of making animation and its application, submission of subject matter can be uniformed, improve the quality of learning outcomes, the learning process becomes clearer and more interesting, and also the use of animated video learning media also increases motivation, interest and student learning outcomes(Sakti et al., 2021)

The reason for using Android to store animated media is that in this technological era, technological developments have shown a significant impact. Especially in the field of education which is now colored by the influence of globalization. One of the very rapid technological developments and is used as a learning medium is a smartphone. Learning becomes more fun and not boring with supporting media such as smartphones. Smartphones are an alternative for teaching and learning for students and teachers with modern and very practical concepts(Le, 2022).

The learning animation system makes it very easy for students to do learning without direct interaction. The presence of a smartphone as a medium to support the learning process is needed for system implementation. Accompanied by the internet, the sophistication of smartphones to access various kinds of information will be faster and easier. The learning process between teachers and students will also be more interactive. Students will also be more enthusiastic in receiving learning materials that are not boring.

So that in developing this software it is necessary to know the main needs of the system by knowing by understanding the expectations, expectations of the user in order to improve the quality of the user experience in the system created. User persona is one method to find out and explore the needs of the user. By using the Activity User requirement with HCI method, we can understand users by understanding their expectations, their needs, or solutions to the problems they feel. The HCI method also has several problems, namely must satisfy the primary persona and disappoint other personas, the design of the app puts too much emphasis on primary personas, then only for secondary, lack of precision about users or personas can lead to a lack of clarity about how the product should behave, it is difficult to clearly communicate human behavior and relationships.

For Detecting requirement defects using the Perspective based reading PBR method to obtain high quality software, various documents related to software development such as Requirements Specifications must be verified and validated. The person performing the verification or validation effectively must understand these documents. Reading is the main technical activity to understand a document and one of the effective reading techniques is called Perspective-based reading (PBR). The goal of this study is to detecting defect requirements in animation-based reading learning using perspective-based reading.

Method

We use a user persona approach to find out what needs are needed in animation learning and Perspective Based Reading (PBR) for verification or validation effective from the development of this learning application user interface.

Hypothesis

A hypothesis is a proposition or conjecture that has not been proven. This means that the allegations are still tentative. The conjecture explains facts or phenomena, as well as possible answers to research questions. In this activity, a hypothesis is carried out on the persona to find out the needs and problems by interviewing stakeholders.

Identify Behavioral Variables

This activity aims to identify any variables related to the problems faced, in the form of a list of these conditions, the more detailed the conditions, the more detailed the problems of the stakeholders, the domain of these problems is obtained from the interview process. The purpose of identify behavioral variables is to identify any variables related to the problems faced, in the form of a list of these conditions, the more detailed the conditions, the more detailed the problems of the stakeholders, the domain of these problems is obtained from the interview process.

Map Interview Subjects to Behavioral Variables

In this activity, mapping (compiling) variables with a certain vulnerability after being collected from variables obtained from the interview process, this activity aims to group behavior patterns with existing values.

The accuracy of this mapping is not as important as identifying the placement of the interviewees in relation to one another. In other words, it doesn't matter if the interviewee falls right on the 45% or 50% scale (there's often no good way to measure this accurately having to rely on hunches based on observations of the subject). This is the way multiple subjects cluster on each axis of a significant variable.

Identify Significant Behavior Pattern

In this Activity, the identification of significant groups is carried out, the identification of variables is made in the form of percentages and Likert scales to be significant, the purpose of this activity is to obtain significant percentage groupings and behavioral patterns.After mapping the interview subjects, you will see certain subject groups that occur in various ranges or variables. A set of subjects clustered on six to eight different variables is likely to represent a significant pattern of behavior that will form the basis of the persona.

Synthesize Characteristics and Relevant Goals

Synthesize Characteristics and Relevant Goals is done When we get a need When all stakeholders have the same needs then it's okay, but when the Stakeholders have different goals, Synthesize Characteristics will do the identification of fragments from the survey results and identify their characters.

Check For Redundancy and Completeness

In this Activity, redundancy checks and the completeness of the mapping are carried out. Using validation documents and conducting interviews to verify and check the results of redundancy and completeness. Here the validation document ensures that all subjects fill in and validate with the respondent, checking using the rule of five to find missing information.

Expand The Description of Attributes and Behaviors

In this activity, it is carried out to describe the user personas who have been interviewed into the personas foundation document in the form of persona identification, namely personal data from the user persona such as name and age, roles & tasks, namely to identify data from the duties and jobs of the user persona, objectives are to identify the goals of stakeholders, segment is to identify the demographics of the general persona.

The components that will be identified in the user component that will be displayed in the user persona are, Persona Identification, Roles & Tasks, Objectives, Skill And Knowledge, Context Environment (Salma et al., 2012).

Designate Persona Types

In this Activity, a user persona is created which is obtained from interviews with the related user persona, the creation of this user persona aims to describe the characteristics of the user (user), here are the things to do when creating a user persona:1) Get Stakeholder Segmentation; 2) Doing research; 3) Looking for User Pattern; 4) Using Templates.

Build Use Cases

In this activity, use cases are made based on user personas and filled with narration and information obtained in previous activities, namely 7 use cases made in the form of diagrams and specifications, use cases function to see interrelated interactions between actors (user personas). with the system, and also shows the relationship with the primary and secondary personas (Cao et al., 2020).

Implement and Evaluate Prototypes

In this Activity, a mockup/prototype is developed according to the use case that has been made from activity 9, the mockup is also made from the basic needs that have been found from the previous activity, after that the mockup is evaluated and vadisi to stakeholders to see if the mockup /prototype created is as needed.

Perspective-based reading

For Detecting requirement defects using the Perspective based reading PBR method to obtain high quality software, various documents related to software development such as Requirements Specifications must be verified and validated. The person performing the verification or validation effectively must understand these documents. Reading is the main technical activity to understand a document and one of the effective reading techniques is called Perspective-based reading (PBR). Requirement defect detection has several functions and objectives, namely: 1) PBR Increases the flaw detection rate for individual reviewers and review teams working with unknown application domains; 2) HBWs work from a defined procedure, and not the reviewer's own experience in identifying defects, new reviewers can receive training in the steps of the procedure. Goal oriented and customizable. PBR helps detect the following types of requirement defects: a)Missing Information; b) Ambiguous Information; c) Inconsistent Information; d) Foreign Information.

Results and Discussions

State Hypotheses

The purpose of this activity is to find out personas by identifying problems and making hypotheses, to find out the differences and needs between personas.

Table 1. State Hypotheses

Hypotesis	Personas	Descriptions
01	Student	Love interactive reading lessons such as animations
02	Teacher	Still stuttering on technology and need socialization in terms of technology
03	Parent	Parents help teach their children to read, but there are still many who are technology stutterers

During the interview with one of the stakeholders, the teacher has obtained 3 hypotheses, namely:1) Students love interactive reading lessons such as animations; 2) Most of the teachers are still technologically savvy and need to be socialized in terms of technology; 3) Parents help teach their children to read, but there are still many who are technology savvy.

And there are also main problems from offline learning that sometimes students are less enthusiastic in learning, so to overcome some of the above problems obtained from the hypothesis are as follows: 1) Create an application to accommodate videos; 2) Create interactive learning to read animations; 3) Socialization about technology to students.

From this it can be expected to solve several problems, and the following are the objectives of making animation and its application: 1) Can introduce information technology to stakeholders; 2) Make reading learning more interactive and interesting for students.

Identify Behavioral Variables

Here are made 3 tables based on 3 stakeholders, and in 3 tables there are several behavioral variables along with an explanation of the table and the behavioral variables. In the student table there are several behavioral variables, namely: 1) Agree with the current learning model, which aims to check whether students agree with the current learning model whether the model is suitable or not; 2) Learning through meet, here aims to check how many students can agree or not to learn through meet; 3) Understanding the use of smartphones, here aims to check how many students understand the use of smartphones; 4) Student learning through animation, here aims to check how many students are enthusiastic and like learning through animation media.

In the teacher's table there are several behavioral variables, namely: 1) Agree with the current learning model, which aims to check how many teachers match the online learning method with the curriculum; 2) Agree with the collection via wa group, here the aim is to check whether the teacher agrees with sending via wa group when there is a collection of reading assignments; 3) Student learning through animation, here aims to check how many teachers support and like learning through animated media.

In the parent table there are several behavioral variables, namely: 1) Having the opportunity to help students in learning activities, which aims to check how many parents have the opportunity to support or assist students in learning to read; 2) Agree with the collection via wa group, here it is intended for parents to agree with sending via wa group when there is a collection of reading assignments; 3) Student learning through animation, here aims to check how many parents support and like learning through animated media.

Table 2. Identify Behavioral Variables (Student)

Observed Behavioural Variables	*Scale*
Agree with the current learning model	Strongly agree↔Agree↔Doubtful↔Disagree↔Strongly Disagree
Learning through meet	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Agree with collecting via wa group	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Student learning through animation	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree

Table 3. Identify Behavioral Variables (Teacher)

Observed Behavioural Variables	Scale
Agree with the current learning model	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Agree with collecting via wa group	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Student learning through animation	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree

Table 4. Identify Behavioral Variables (Parent)

Observed Behavioural Variables	Scale
Agree with the current learning model	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Agree with collecting via wa group	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree
Student learning through animation	Strongly agree↔ Agree ↔ Doubtful ↔ Disagree ↔ Strongly Disagree

Map Interview Subjects to Behavioral Variables

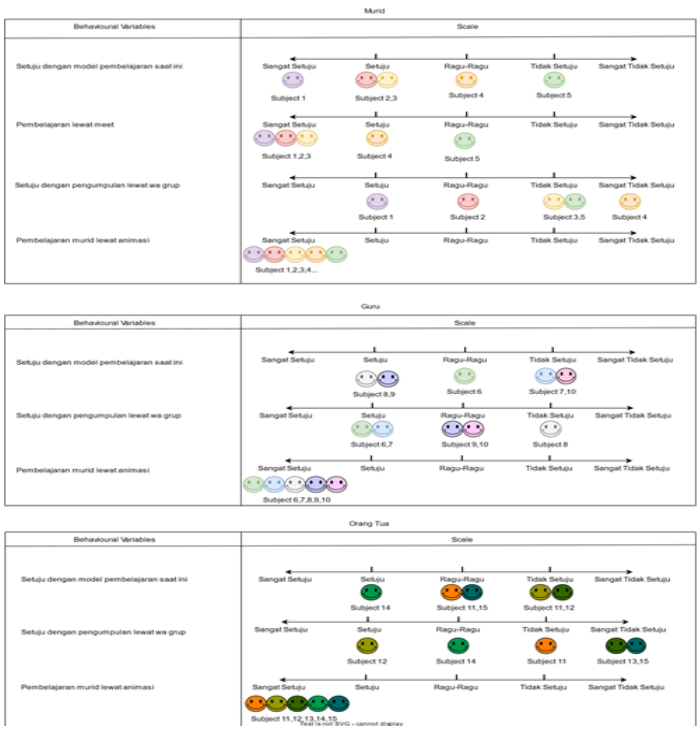

Figure 1. Mapping Fragment

In the mapping fragment Figure above, the results obtained from each choice of variables from each stakeholder, namely students, teachers, parents. In the identification of the first variable for most students and the majority answered agree, only subjects 4 and 5 answered undecided and disagreed. In the identification of the second variable for most students and the majority answered agree, only 5 subjects answered disagree. In the identification of the third variable for most students and the majority answered disagree, only subjects 1 and 2 answered undecided and agreed. On the identification of the fourth variable for most students and overall answered strongly agree. In the identification of the first variable for teachers, it is almost the same who answered disagree and agree. In the identification of the second variable, almost the same teachers answered agree and hesitate. In the identification of the third variable, most and overall teachers answered strongly agree. The identification of the first variable for parents was almost the same who answered disagree and hesitated. In the identification of the second variable for most teachers and the majority answered disagree, only subjects 12 and 14 answered disagree and hesitate. On the identification of the third variable for parents, most and overall answered strongly agree.

Identify Significant Behavior Patterns

Table 5. Likert Scale from Respondent

	Likert Scale from Respondent				
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	1	2	1	1	0
Learning via Google Meet	3	1	1	0	0
Agree with collection via whatsapp	0	1	1	2	1
Student learning through animation	5	0	0	0	0
Class 2 homeroom teacher					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	2	1	0	0
Agree with collection via whatsapp	0	1	1	0	0
Student learning through animation	1	0	0	0	0
Indonesian teacher					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	0	1	0	0
Agree with collection via whatsapp	0	1	0	0	0
Student learning through animation	1	0	0	0	0
Math teacher					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	1	0	0	0
Agree with collection via whatsapp	0	0	1	0	0
Student learning through animation	1	0	0	0	0
English teacher					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	0	0	1	0
Agree with collection via whatsapp	0	0	1	0	0
Student learning through animation	1	0	0	0	0
Citizenship Education Teacher					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	0	0	1	0
Agree with collection via whatsapp	0	0	0	1	0
Student learning through animation	1	0	0	0	0
Parents					
Behavioural Variables	Strongly agree	Agree	Doubtful	Disagree	Strongly Disagree
Agree with the learning model	0	1	2	2	0
Agree with collection via whatsapp	0	1	1	1	2
Student learning through animation	5	0	0	0	0

Here there are interviews with 15 people from each stakeholder, namely students, teachers, parents, of which there are several respondents from elementary school, who have been interviewed through media meet, namely: 1) Student table, here are 5 respondents from grade 2 students where the problem was found, namely learning to read online which was less interactive. 2) Teacher table, here there are 5 respondents from teachers of Indonesian, mathematics, English, homeroom 2, and civic education, taken from interviews assisted by homeroom 2; 3) Parents table, here are 5 respondents from parents of grade 2 students who have been interviewed.

Synthesize Characteristics and Relevant Goals

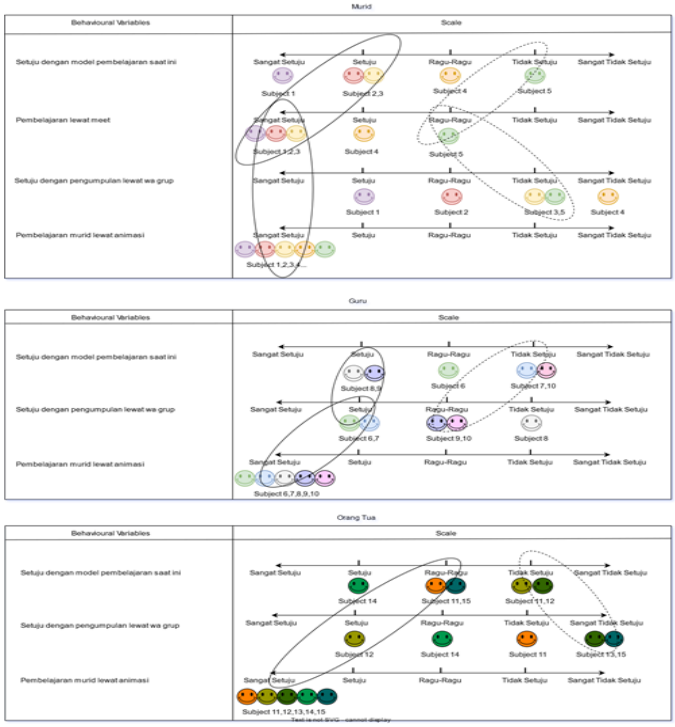

Figure 2. Mapping Fragmen

In the Figure 2, it can be interpreted that the relevant answers for stakeholders, both students, teachers, parents, relate to variables so that they can identify a consistent persona.

Check for Redundancy and Completeness

Table 6. Table Scale Percentage of First Interview

Student		
Observer Behavioural Variables	**Scale**	**Percetage**
Agree with the current learning model	Strongly Agree	20%
	Agree	40%
	Doubtful	20%
	Disagree	20%
	Strongly Disagree	0%
Pembelajaran lewat meet	Strongly Agree	60%
	Agree	20%
	Doubtfull	20%
	Strongly Disagree	0%
Agree with collecting via wa group	Strongly Disagree	0%
	Strongly Agree	0%
	Agree	20%
	Doubtful	20%
	Disagree	40%
	Strongly Disagree	20%
Student Learning with Animation	Strongly Agree	100%
	Agree	0%
	Doubtful	0%
	Disagree	0%
	Strongly Disagree	0%
Teacher		

Observer Behavioural Variables	**Scale**	**Percetage**
Agree with the current learning model	Strongly Agree	0%
	Agree	40%
	Doubtful	20%
	Disagree	40%
	Strongly Disagree	0%
Agree with collection via whatsapp group	Strongly Agree	0%
	Agree	40%
	Doubtful	40%
	Disagree	20%
	Strongly Disagree	0%
Student learning through animation	Strongly Agree	100%
	Agree	0%
	Doubtful	0%
	Disagree	0%
	Strongly Disagree	0%

Parent

Observer Behavioural Variables	**Scale**	**Percetage**
Agree with the current learning model	Strongly Agree	0%
	Agree	20%
	Doubtful	40%
	Disagree	40%
	Strongly Agree	0%
Agree with collecting via wa group	Strongly Agree	0%
	Agree	20%
	Doubtful	20%
	Disagree	20%
	Strongly Disagree	40%
Pembelajaran murid lewat animasi	Strongly Agree	100%
	Agree	0%
	Doubtful	0%
	Disagree	0%
	Strongly DIsagree	0%

Student

Observer Behavioural Variables	**Scale**	**Percetage**
Agree with the current learning model	Strongly Agree	0%
	Agree	60%
	Doubtful	20%
	Disagree	20%
	Strongly Disagree	0%
Learning through meet	Strongly Agree	80%
	Agree	0%
	Doubtful	20%
	Disagree	0%
	Strongly Disagree	0%
Agree with collecting via wa group	Strongly Agree	0%
	Agree	20%
	Doubtful	20%
	Disagree	40%
	Strongly Disagree	20%
Student learning through animation	Strongly Agree	100%
	Agree	0%
	Doubtful	0%
	Disagree	0%
	Strongly Disagree	0%

Teacher		
Observer Behavioural Variables	**Scale**	**Percetage**
	Strongly Agree	0%
	Agree	40%
Agree with the current learning model	Doubtful	0%
	Disagree	60%
	Strongly Disagree	0%
	Strongly Agree	0%
	Agree	40%
Agree with collecting via wa group	Doubtful	40%
	Disagree	20%
	Strongly Disagree	0%
	Strongly Agree	100%
	Agree	0%
Student learning through animation	Doubtful	0%
	Disagree	0%
	Strongly Disagree	0%
Parent		
Observer Behavioural Variables	**Scale**	**Percetage**
	Strongly Agree	0%
	Agree	0%
Agree with the current learning model	Doubtful	60%
	Disagree	40%
	Strongly Disagree	0%
	Strongly Agree	0%
	Agree	20%
Agree with collecting via wa group	Doubtful	20%
	Disagree	0%
	Strongly Disagree	60%
	Strongly Agree	100%
	Agree	0%
Student learning through animation	Doubtful	0%
	Disagree	0%
	Strongly Disagree	0%

After conducting interviews to verify and check the results of redundancy and completeness, 5 different people were re-interviewed from the student, teacher, and parent stackholders from the data for fragments of significant behavioral patterns the same as the first interview seen from the percentage of grouping from interview 1 and 2 there are some differences, the following are the differences:

Student Stakeholder Table

From the Stakeholders, the students interviewed were still from grade 2 students but 5 people differed from the first interview, in this second interview there were 4 differences from the first interview but not too significant: 1) Agree with the current learning model, Strongly Agree Interview 1 20% Interview 2 0%; 2) Agree with the current learning model, Agree Interview 1 40% Interview 2 60%; 3) Learning through meet, Strongly Agree Interview 1 60% Interview 2 80%; 4) Learning through meet, Agree Interview 1 20% Interview 20%.

Teacher Stakeholder Table

From the teacher stakeholders who were interviewed from teachers of Arts and Culture, physical education, physical education, social science, science, religion, Islam, in this second interview there were 2 differences from the first interview but not too significant: 1) Agree with the current learning model, Hesitating Interview 1 20% Interview 2 0%; 2) Agree with the current learning model, Disagree Interview 1 40% Interview 2 60%.

Parent Stakeholder Table

From the parent stakeholders interviewed from the parents of the students interviewed in the second interview, in this second interview there were 4 differences from the first interview but not too significant: 1) Agree with the current learning model, Agree Interview 1 20% Interview 2 0%. 2) Agree with the current learning model, Hesitating Interview 1 40% Interview 2 60%. 3) Student learning through animation, Disagree Interview 1 20% Interview 2 0%. 4) Student learning through animation, Strongly Disagree Interview 1 40% Interview 2 60%.

Validation Document

1) Are there things that are lacking in conducting personas mappings, characteristics, and objectives that need to be added? -There isn't any; 2) To fulfill stakeholder assumptions or requests, is it necessary to add another

persona? - None, because students, teachers, and parents are the main problems in this case study; 3) Are there two different personas only for socio-demographic variables? -There isn't any; 4) Do all personas have minor (similar) characteristic differences? - After being seen for the difference is not too significant and for fragments of significant behavioral patterns the same for both interviews; 5) From the whole persona created, is it sufficient to present the differences in behavior and needs in the reality on the ground? - Enough because the 3 stake holders for interviews 1 and 2 have the same resemblance

Conclusion: After looking at the differences, the differences are not too significant and the fragments of significant behavioral patterns are the same for both interviews, so the interview test results from the respondents have been validated and correct.

Expand the Description of Attributes and Behaviors

PERSONAS FOUNDATION DOCUMENT

1. Persona Identification
- Name : Ardianta
- Age : 6 Years

2. Roles & Tasks
- Ardianta has a profession as a student
- He has an obligation to learn

3. Objectives
- Understand the material learned in school

4. Segment
- Ardianta lives in Pare, Indonesia
- Ardianta's last education was SD

5. Skills and Knowledge
- Understand whatsapp usage
- Understand youtube usage

6. Environment context
- Study in the morning and afternoon at 07.30 – 11.30
- Study at Home with online (online) media google meet

7. Personal And Psychological Details
- Ardianta has an introverted personality where he tends to like spending time with other people

PERSONAS FOUNDATION DOCUMENT

1. Persona Identification
- Name : Atik Shari'atul Jannah
- Age : 29 Years

2. Roles & Tasks
- Atik has a profession as a teacher
- He has an obligation to Teach Disciples

3. Objectives
- Teaching student material in school

4. Segment
- Atik lives in Pare, Indonesia
- Atik's last education is S1 Education

5. Skills and Knowledge
- Understand whatsapp usage
- Understand the use of google
- Understand the use of Microsoft office
- Understand the creation of google meet rooms

6. Context Environment
- Teach in the morning and afternoon 07.30 – 11.30
- Teaching at Home with online (online) media google meet

7. Personal And Psychological Details
- Atik has an extroverted personality where he likes to spend time with other people, and he likes technological developments

PERSONAS FOUNDATION DOCUMENT

1. Persona Identification
- Name : Nchie Makari
- Age : 35 Years

2. Roles & Tasks
- Nchie has a profession as a housewife
- He has an obligation to help students understand the material obtained

3. Objectives
- Teaching student material at home

4. Segment
- Nchie lives in Pare, Indonesia
- Nchie's last education was high school

5. Skills and Knowledge
- Understand whatsapp usage

6. Environment context
- At home all the time.
- Teaching at Home after school hours.

7. Personal And Psychological Details
- Nchie has an introverted personality where he likes to spend less time with other people, and he likes technology development

Designate Persona Types

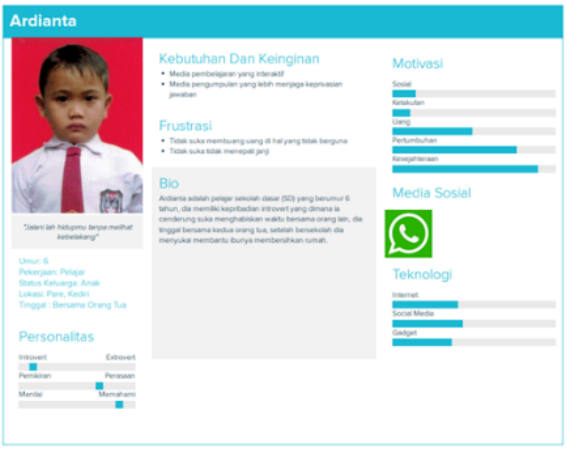

Figure 3. User Persona 1 (Student)

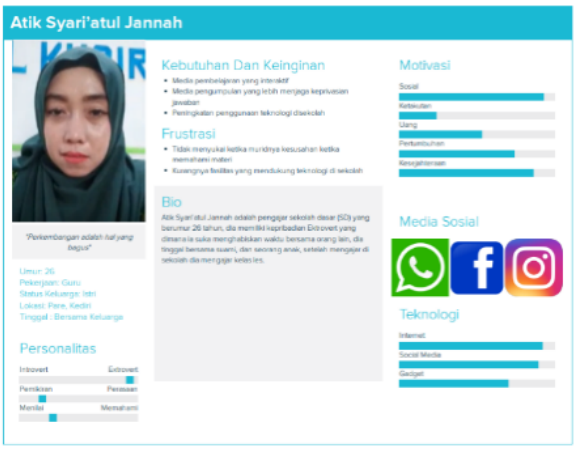

Figure 4. *User Persona* 3 (Teacher)

Figure 5. User Persona 5 (Parent)

Build Use Cases

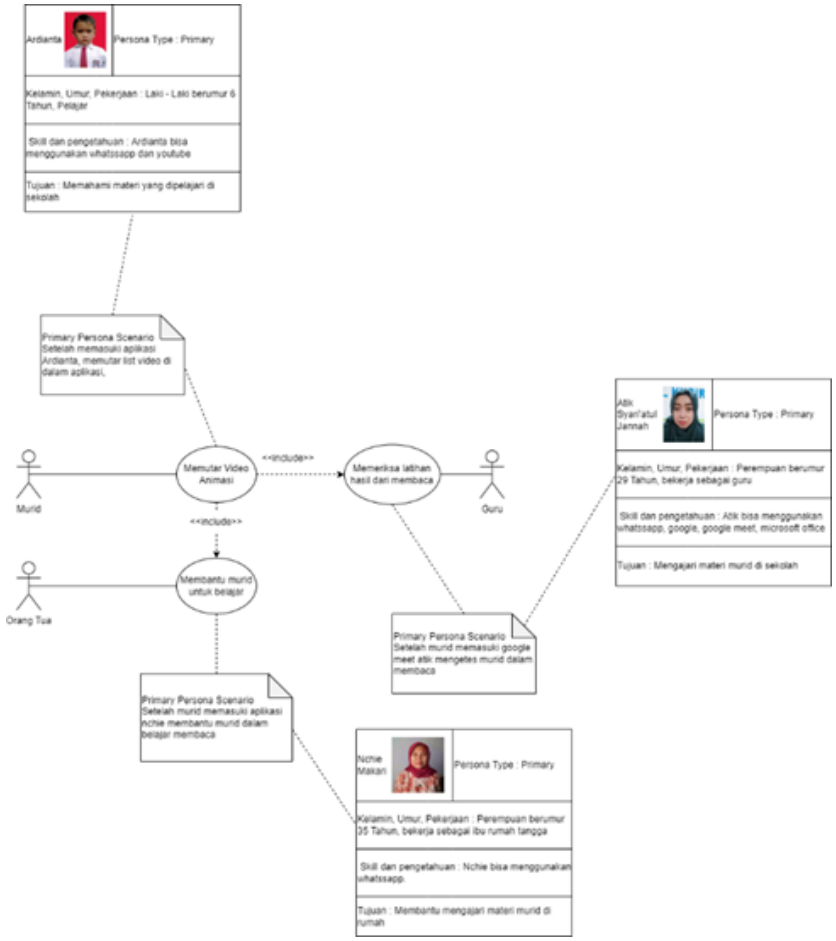

Figure 6. Use Case Animated Learning-Based Reading Applications

***Use Case*: Playing Animation Video**
***Principal Actor*:**
- Ardianta

***Stakeholder And Goals*:**
- Murid : Ardianta want to play Animation Video

Principal Success Scenario:

1	Opening the application
2	Click the menu of Video Application
3	The menu will show: • Videos 1 • Videos 2 • And so on
4	Select the animated learning video you want to open
5	Click the play icon
6	Animated video will play

Use Case: Helping students to learn
Principal Actor: Nchie Makari
Stakeholder And Goals:
- Parent : Nchie Wants to help students learn through animated videos

Principal Success Scenario:
1 Open the app
2 Clicking animation video menu
3 The menu will show:
   - Videos 1
   - Videos 2
   - And so on
4 Select the animated learning video you want to open
5 Click the play icon
6 Animated video will play
7 When the video rotates, parents will help students spell from learning to read in the animated video

Use Case: Check Exercise result and read
Principal Actor: Atik Syari'atul Jannah
Stakeholder And Goals:
- Teacher : Atik wants to check the result of reading practice
- Student : Presenting reading ability

Principal Success Scenario:
Online Scenario
1 Opening the google meet
2 Click New Meetin
3 Start Instan Meeting
4 Share the meeting link through Whats App
5 Call the student who want to take the reading test skill
6 Click on Layout
7 Click start sharing
8 Open the application
9 Click the menu of video application
10 Menu will show :
   - Video 1
   - Video 2
   - Etc.
11 Select the animated learning video you want to open
12 Click the play icon
13 Animated video will play
14 Test students' reading skills through animated videos

Offline Scenario
1 Calling students who want to be tested for their reading ability
2 Test students' reading ability
3 Opening the application
4 Click the animation Video
5 Menu will show :
   - Video 1
   - Video 2
   - Etc.
6 Select the animated learning video you want to open
7 Click icon play/putar
8 Video Animation will playing
9 Test students' reading skills through animated practice videos

Implement and Evaluate Prototypes

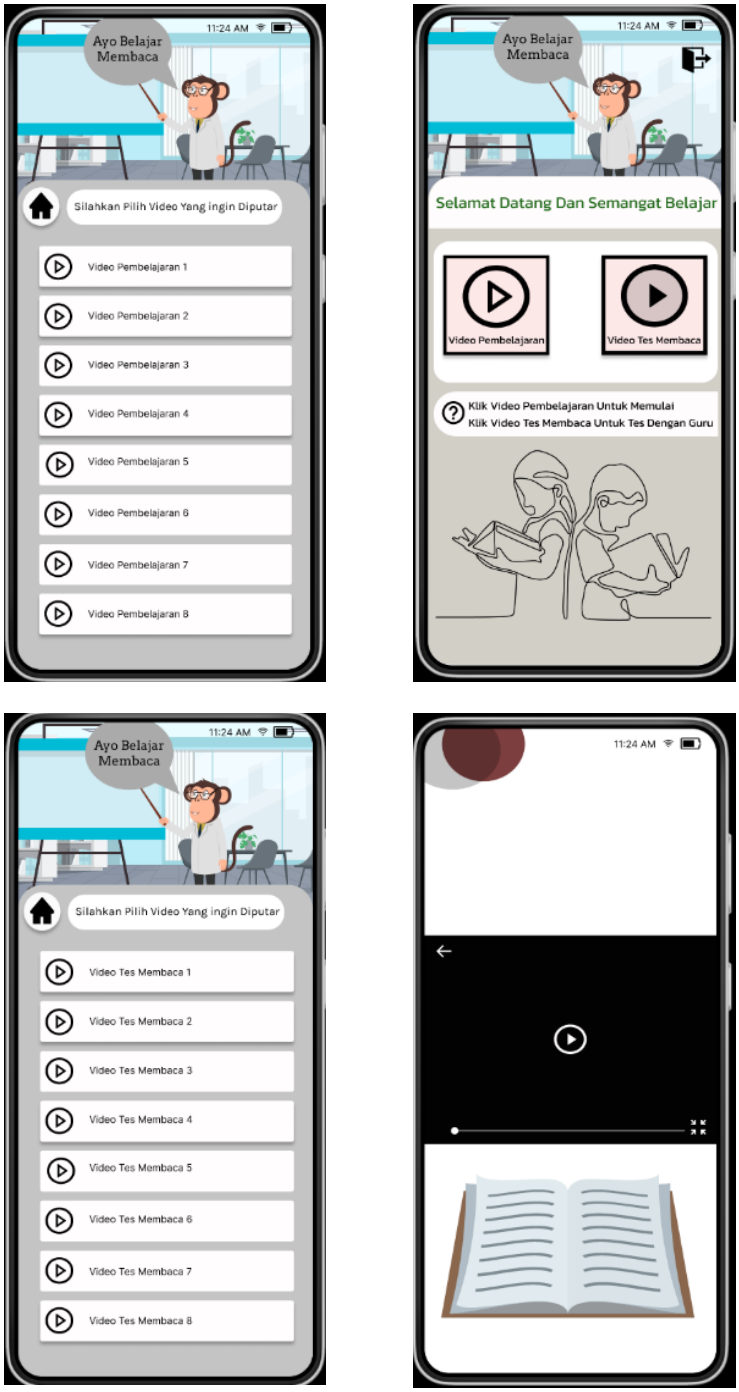

Figure 7. Dashboard, Learning Video Menu, Reading Test Video Menu, Non-Learning Videos Landscape

Figure 8. Video Player Landscape

Table 7. Requirements Validation Mockup

Stakeholder Needs (Teachers)	Validate With Mockup
Animated Learning Features Features Reading Test Playing Video	
*Stakeholder*Needed (Parent) Learning Animation Features Reading Test Features Playing Video	Validation with*Mockup*
*Stakeholder*Needed (Student) Animation Learning Features UI/UX Interesting Playing the Video	Validation with*Mockup*

Colour (Latin)	Colour	Meaning of the colour
Green		In accordance
Yellow		Quite appropriate
Red		Not Appropriate

Here it is validated from the needs of 3 stakeholders, teachers, students, parents, who: 1) Here, from the needs of stakeholders (teachers), the animated learning feature is already included in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature to play reading learning videos; 2) Here, from the needs of stakeholders (parents), the animated learning feature is already included in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature to play reading learning videos; 3) Here from the needs of stakeholders (students), the animated learning feature is already included in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature to play reading learning videos, here also the UI/UX is made as attractive and comfortable as possible for children aged 5 -6 years, Video playback is also included in the mockup.

So from the conclusion to the validation of the suitability of the mockup with the needs of stakeholders.

Detecting Requirement Defect

For each requirement, create a test or set of test cases, using the questions provided below to identify errors in the requirements from a developer perspective scenario:

P1. Do the requirements make sense from what you know about the application or from what is specified in the general description?
Ans: The requirements for an animation-based learning application with which I know are reasonable.
P2. Do you have all the information needed to identify the inputs to the requirements? Based on your general requirements and domain knowledge, is this input correct for these requirements?
Ans: For enough information but there are some that are lacking, especially stakeholder information for making user personas, I think the input is correct
P3. Was any required input omitted?
Ans: Maybe the input from the documentation is all good and nothing needs to be omitted.
P4. Are there any specified inputs that are not required for this requirement?
Ans: : Maybe all input from the documentation is needed and nothing is not needed
P5. Are these requirements (recruitment) in the document section appropriate?
Ans: for the requirements of the document with the suitability of writing is appropriate.

And here's the scenario from the user's perspective:
P1. Do the requirements make sense from what you know about the application or from what is specified in the general description?
Ans: The requirements for animation-based learning applications are appropriate and reasonable with the description of the features.
P2. Was any required input omitted?
Ans: None.
P3. Does the mockup result for this document meet your needs?
Ans: : from the results of the animated learning mockup feature, there are already in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature for playing reading learning videos is in accordance with needs.

Discussion

In the identification of the first variable for most students and the majority answered agree, only subjects 4 and 5 answered undecided and disagreed. In the identification of the second variable for most students and the majority answered agree, only 5 subjects answered disagree. In the identification of the third variable for most students and the majority answered disagree, only subjects 1 and 2 answered undecided and agreed. On the identification of the fourth variable for most students and overall answered strongly agree. In the identification of the first variable for teachers, it is almost the same who answered disagree and agree. In the identification of the second variable, almost the same teachers answered agree and hesitate. In the identification of the third variable, most and overall teachers answered strongly agree. The identification of the first variable for parents was almost the same who answered disagree and hesitated. In the identification of the second variable for most teachers and the majority answered disagree, only subjects 12 and 14 answered disagree and hesitate. On the identification of the third variable for parents, most and overall answered strongly agree.

Animation or visualization can help students understand complex or abstract concepts in a way that is easier to understand(Setyawati et al., 2020). By using visual elements such as moving pictures, diagrams, or animated graphics, difficult concepts can be explained visually, which can help students understand concepts better. Animation or visualization can help strengthen students' memory. Information presented in the form of animation or visualization tends to be more interesting and can trigger students' interest, thereby helping them to remember information better and last longer(Anas, 2014). The use of animation or visualization in e-learning can increase student engagement and motivation(Sutama & Fajriani, 2022). Interesting and interactive visual elements can make learning more interesting and fun, and encourage students to actively participate in the learning process. Interactive animation or visualization in e-learning can provide a more interactive learning experience for students. Learners can interact directly with animated or visualization elements, controlling and manipulating them, which can help them understand concepts more deeply.

Animation or visualization can be used to bring the real world into learning(Senduk & Karouw, 2016). For example, animated simulations can be used to simulate processes or phenomena that are difficult to access directly, such as scientific experiments, production processes or hazardous environments. This can provide a realistic experience for learners without having to face any real risks or costs. Animation or visualization in e-learning can increase the accessibility of learning for students with various types of learning(Cahyono, 2015). Visualization can help students who have visual learning preferences or have barriers in understanding written texts to understand concepts better.

From the needs of stakeholders (teachers), the animated learning feature is already included in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature to play reading

learning videos. from the needs of stakeholders (students), the animated learning feature is already included in the mockup (prototype), namely from 2 menus containing learning animation videos, namely the feature to play reading learning videos, here also the UI/UX is made as attractive and comfortable as possible for children aged 5 -6 years, Video playback is also included in the mockup. So from the conclusion to the validation of the suitability of the mockup with the needs of stakeholders. Based on the Detecting Requirement Defects with the PBR (Perspective-Based-Reading technique) method above, there is 1 defect where there is a lack of stakeholder information for making user personas, so there is a total of 1 defect for documentation documents - animation-based reading learning.

Conclusions

In the research that has been done, it is found that a problem is learning to read that is less interactive during the pandemic which causes learning to read less than optimal. Therefore, from the research and problems found, an animation learning system is needed which from the learning system can increase the interactiveness of learning and students will also be more interested in learning to read. Learning animation systems makes it very easy for students to do learning without direct interaction, and from the defects found from the developer's perspective, there is a lack of stakeholder information for making user personas, so there is a total of 1 defect for the UI development of animation-based reading learning, and from the user's perspective. there is no defect.

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