

Android-Based Musical Instrument Recognition Application For Vocational High School Level

Yusuf Kurnia^{1)*}, Toga Parlindungan Silaen²⁾, Dera Susilawati²⁾

¹⁾²⁾ Universitas Buddhi Dharma

Jl.Imam Bonjol No. 41 Karawaci Ilir, Tangerang, Indonesia

¹⁾yusuf.kurnia@ubd.ac.id

²⁾togaparlin.s@gmail.com

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Abstract

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With the old way of learning and methods, Vocational High School students will be bored, especially in the field of Arts and Culture, which on average are considered difficult and not liked by most students. Therefore, it is necessary to make other learning media based on Android so that learning becomes more interesting and enjoyable. In addition, with this learning media, it is hoped that it can help children's creativity and thinking power, because it is equipped with several important components that can hone children's imaginative power such as pictures, videos in the material provided. Therefore, the authors design and create an application about interactive learning media that includes these components. This application will be aimed at the Vocational High School level with the title "Android-Based Musical Instrument Recognition Application for Vocational High School Level". Therefore, research was conducted at the Vocational High School level. Users want attractive images of each musical instrument such as guitar, bass, drums, keyboard, have video links, there are questions in the application, a menu in the form of icons, and attractive colors. After designing, manufacturing, and testing this application, several conclusions can be drawn. First, with this application, Vocational High School students can easily learn musical instruments in different ways. In addition, with this learning method, students become enthusiastic, and learning becomes fun in studying cultural arts lessons in the field of musical instruments, especially musical instrument techniques and chords of musical instruments. Second, this application can hone the cognitive abilities of students because in this application there are practice questions, the questions are integrated with the material provided, so that students can easily practice their abilities through the practice questions available in this application. Third, and lastly, according to the author, this application is lacking in terms of animation in the application that was made late. Hopefully this application can be a learning material for students who want to take a thesis with a title related to learning musical instruments. The author really expects criticism and suggestions because this design system still has many shortcomings.

I. INTRODUCTION

History with the development of information technology, humans are increasingly needed in obtaining information. And the human need for information that is increasingly facilitated by the presence of the internet and is currently added with the smartphone as a communication medium, where we can exchange information between people with one another. Likewise in the world of education, technological developments play a very important role in advancing and improving teaching and learning activities in schools and smartphones can now be used as educational media as well as the introduction of musical instruments used at this time where students are educated from an early age to get to know them better. far about these musical instruments, what are the musical instruments, parts of musical instruments, introduction of chord notes, to techniques in playing musical instruments. Teachers try

* Corresponding author

to guide and foster their students so that they can quickly master this kind of material by using guidebooks like in school when teachers introduce subject matter using manuals or display material through a projector screen. And in general, teachers have difficulty at this time if their students feel bored with the explanation of the material given. In the end, teachers have to persuade their students to be able to return to teaching and learning activities and re-read the material that has been given.

Starting from the above, namely with learning difficulties and the need for alternative media to convey information to students, it is associated with advances in information technology with smartphones which are now widely used among young people in accessing the information they want. It is necessary to design an interactive android-based teaching device with an attractive appearance. So that with this teaching device, it is hoped that students will be more active in getting to know everything that smells of information, and still not forgetting all kinds of tones and techniques in playing musical instruments, which of course many people forget. Therefore, it is hoped that students will not depend on teachers alone at school, but these students can study on their own at home.

Android as a system is a Java-based operating system that runs on the Linux 2.6 kernel. Android applications are developed using java and easily adapt to new platforms [1]. Android is a complete collection of software that can be in the form of an operating system, middleware, and key applications for mobile devices (Smartphones).

Multimedia is a combination of text, photos, graphic arts, sound, animation, and video elements that are digitally manipulated and delivered via computers or other electronic devices [2].

II. METHODS

This application is made with Eclipse-based Multimedia, which is accompanied by an attractive display for students. differences. [3] Writes, "Eclipse is an IDE (Integrated Development Environment) for developing software and can be run on all platforms-independent". Following are the properties of Eclipse:

1. Multi-Platform
Eclipse target operating system is Microsoft Windows, Linux, Solaris, AIX, HP-UX, Mac OS X.
2. Multi Language
Eclipse was developed with the Java programming language, but Eclipse supports the development of applications based on other programming languages, such as C/C++, Cobol, Python, Perl PHP, and so on.
3. Multi-role
In addition to the IDE for application development, Eclipse can also be used for activities in the software development cycle, such as documentation, software tests such as documentation, web development software tests and so on.

Similarly, defined by other authors: "Judging from the history of the early history of Eclipse was developed by IBM to replace, IBM Visual Age for Java4.0 software". This product was first released by IBM on November 5, 2001. At that time, IBM invested a lot of money. Even reached 45 million US dollars for its development. After that the Eclipse Foundation consortium took over for the further development of Eclipse and managing its organization, since version 3.0 Eclipse is basically a kernel that relies heavily on plug-ins to perform its actions. The features inside Eclipse are functions of the plug-ins that are already installed [1]. This is a paradigm of Eclipse called Rich Client Platform (RCP). Here are the components that make up RCP:

1. Core Platform
2. OSGi
3. SWT (Standard Widget Toolkit)
4. Jface
5. Eclipse Workbench

Eclipse is always equipped with JDT (Java Development Tools) which is a plug-in that allows Eclipse to be used to develop java programs, and there is also a PDE (Plug-in Development Environment) that can be used to create new plug-ins, Eclipse and its plug-ins. in implemented in the Java programming language. Eclipse was developed with the concept of an IDE that is open (Open) easily extensible (Extensible) for anything not just for something specific. So, Eclipse is not only for developing java programs but can be used for various purposes such as Android programming. "The only way is to install the required plug-ins. If you want to develop C/C++ programs, there is a CDT C/C++ Development tools plug-in" [4].

Based on the RE results from several Vocational High Schools of 16 (sixteen) teachers and 4 (four) students, the researchers designed an android-based musical instrument learning application. The details of user needs contained in the application made by the User Needs Identification researcher:

TABLE 1
USER NEEDS ANALYSIS

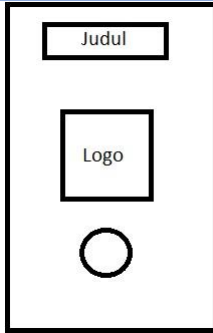

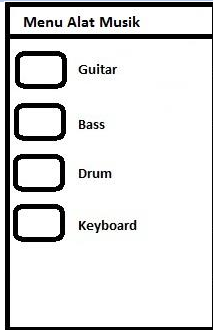
No.	User Needs	Information
1	There is a picture of a musical instrument	√
2	Has menus in the form of icons	√
3	Has attractive colors	√
4	Easy to operate and understand	√
5	Showing the material being taught	√
6	Displays questions, scores from the answers that have been selected	√
7	Have a material video link	√
8	Can be used on android gadgets	√





III. RESULTS

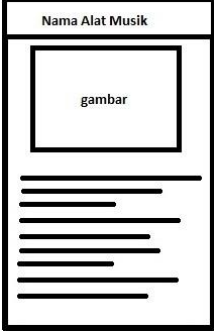
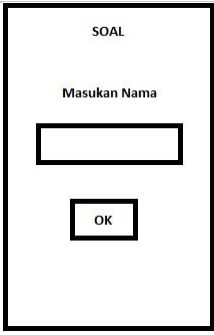
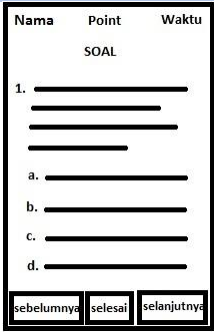
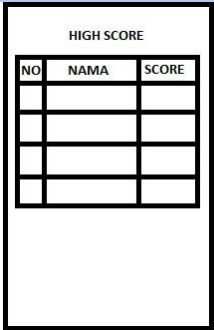
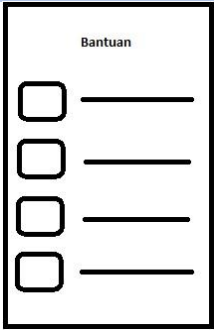
Storyboard is a graphic organization, for example, is a series of illustrations or images that are displayed sequentially for the purposes of initial visualization of a file, animation or sequence of interactive media, including interactivity on the web [5].

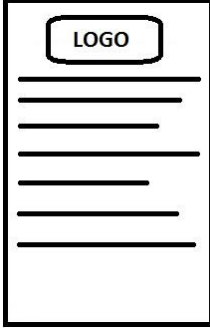
In this section, the concept of the application that will be implemented will be explained later. The following is the design of the story board on the application of the introduction of these musical instruments:

TABLE 2
DESIGN STORY BOARD

Scheme	Description	Design	Information
Screen Beginning	Before entering the display of the Android-based musical instrument learning application in vocational high schools, there is an initial display		In this view there is a title and logo on the application
Home	On the home screen or the main menu, there are 5 buttons, namely the Musical Instruments button, Questions, help buttons, about buttons, and exit buttons		In this view there is a menu that can be selected
Musical Instrument Material	On the display of musical instrument material there are 4 buttons, namely guitar buttons, bass guitar buttons, drum buttons, and keyboard buttons		In this view, there are material buttons that can be selected

<p>Guitar Music Material Menu</p>	<p>In the music menu display, there are 6 buttons, namely the Introduction to the guitar, the Guitar Parts button, the Scale button on the Guitar, the Chord button on the guitar, the guitar Arpeggio Technique.</p>		<p>In this view there are buttons that can be selected</p>
<p>Bass Music Material Menu</p>	<p>On the music menu display there are 5 buttons, namely the Introduction to bass instruments, the Guitar Parts button, Arpeggio Bass, Fingering Bass, Basic Scale for Bass</p>		<p>In this view there are buttons that can be selected</p>
<p>Drum Music Material Menu</p>	<p>In the music menu display there are 4 buttons, namely the Introduction to the Drum music instrument button, the Drum Parts button, the musical notes on the drum, Single Stroke Drum</p>		<p>In this view there are buttons that can be selected</p>
<p>Keyboard Music Material Menu</p>	<p>On the display of the music material menu there are 6 buttons, namely the Introduction to musical instrument keyboard buttons, the Keyboard Parts button, the Chord button on the keyboard, the Scale button on the keyboard</p>		<p>In this view there are buttons that can be selected</p>

<p>Music content menu</p>	<p>On the menu view, the content of the music material contains images, the contents of the material, buttons, namely the video link button and the next button</p>		<p>In this view there are buttons that can be selected</p>
<p>Question start menu</p>	<p>On the initial screen there is a question, a field box to enter a name and an ok button</p>		<p>In this view there are buttons that can be selected</p>
<p>Question menu</p>	<p>In this question menu display there are time, points, questions and there are 4 multiple choice answers.</p>		<p>In this view there are buttons that can be selected</p>
<p>Score Results Menu</p>	<p>In this Score Results display, it only displays the last score results from answering questions from the application.</p>		<p>In this view there is no selected button</p>
<p>Help Menu</p>	<p>There is a description on the buttons</p>		<p>In this view there are buttons that can be selected</p>

<p>About Music</p>	<p>The About Music view contains things about the music application and the back button</p>		<p>In this view there is a back button to return to the main menu</p>
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IV. CONCLUSIONS

[6] Whitebox testing is testing the software in terms of design and program code whether it is able to produce functions, inputs, and outputs in accordance with the required specifications.

White box testing in this application uses Cyclomatic Complexity. In the context of path testing-based methods, the value calculated for cyclomatic complexity determines the number of independent paths in the base set of a program and provides the minimum number of tests that must be performed to ensure that all statements have been executed at least 1 (one) time. Independent path is each path in the program that shows 1 (one) new group of new process or condition statements.

The flow graph of this alphabet and object recognition application is as follows:

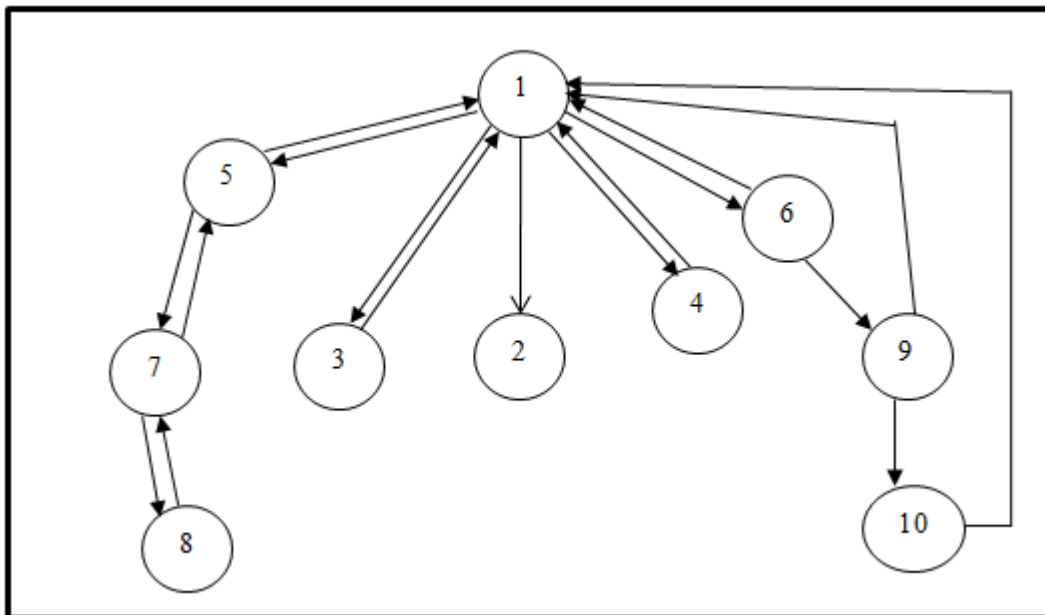


Fig. 1 White Box Testing

The path or path of the program in this alphabet and object recognition application is as follows:

$$\begin{aligned}
 V(G) &= E - N + 2 \\
 &= 17 - 10 + 2 \\
 &= 9 \\
 \text{Path 1} &= 1-2 \\
 \text{Path 2} &= 1-3-1-2 \\
 \text{Path 3} &= 1-4-1-2 \\
 \text{Path 4} &= 1-5-1-2 \\
 \text{Path 5} &= 1-5-8-5-1-2
 \end{aligned}$$

	<p>e. Button Basic scales for bass f. Back button on cellphone</p>		
Drum musical instrument material	<p>On this drum instrument material page there is a backsound, and 5 buttons on guitar material: a. Drum introduction button b. Drum parts button c. The musical notes button on the drum d. Single stroke drum button e. Back button on cellphone</p>	<ul style="list-style-type: none"> Go to Introductory Materials for drums Go to the material for the drum parts Go to musical notes on the drum Go to Single stroke drum material Back to musical instruments page 	<ul style="list-style-type: none"> In accordance In accordance In accordance In accordance In accordance
Keyboard musical instrument material	<p>On this keyboard musical instrument material page there is a backsound, and 7 buttons on guitar material: a. Keyboard musical instrument recognition button b. Keys Keyboard section c. Keys Chords keyboard chords d. Keyboard Notepad e. Fingering keyboard f. Major scale keyboard keys g. Back button on cellphone</p>	<ul style="list-style-type: none"> Go to Material Introduction to keyboard musical instruments Go to the material for the keyboard parts Go to chord material – keyboard chords Go to keyboard musical notes Go to fingering keyboard material Go to major scale keyboard material Back to musical instruments page 	<ul style="list-style-type: none"> In accordance In accordance In accordance In accordance In accordance In accordance In accordance
Contents of musical instrument	<p>On the content page of this musical instrument there is a backsound, and 2 buttons: a. Button back on Mobile b. Material video link button</p>	<ul style="list-style-type: none"> Return to previous page Go to the video link for musical instruments 	<ul style="list-style-type: none"> In accordance In accordance
Exercise	<p>On this question page there is a backsound, a box to enter a name and there are 2 buttons: a. OK button b. Button back on the cellphone</p>	<ul style="list-style-type: none"> Go to the questions page for musical instruments Return to main menu page 	<ul style="list-style-type: none"> In accordance In accordance
Fill in the question	<p>On the content page of this question there is a backsound, questions about musical instruments, and there is 1 radio button and 4 buttons: a. Radio buttons a, b, c, d b. Next button c. Done button d. Previous button e. Button back on the cellphone</p>	<ul style="list-style-type: none"> Determine the answer choices from the questions View the next question number Towards the score results of the questions View previous question numbers Return to main menu page 	<ul style="list-style-type: none"> In accordance In accordance In accordance In accordance In accordance
Score	<p>On this Score page there are score results from users who answer questions about musical instruments, and there are 3 buttons: a. Exit Button b. Retry button c. Save button</p>	<ul style="list-style-type: none"> Go to the main menu page Answering questions again from the material of musical instruments Save and go to high score display of users who have answered 	<ul style="list-style-type: none"> In accordance In accordance In accordance
About	<p>In this About Music frame, it describes the application of musical instruments, and there is a back button on the cellphone on the About page.</p>	<ul style="list-style-type: none"> Go to the main menu page 	<ul style="list-style-type: none"> In accordance

With this application, Vocational High School students, can easily learn musical instruments about learning from each modern musical instrument in a different way, namely with an application that uses Android. This learning method also makes students enthusiastic and more fun in the teaching and learning process at school. This introduction application helps improve abilities, understanding and has made it easier for users to learn musical instruments, in other words this application also guides children to work more in the field of music. Students can add

knowledge and insight about the musical instruments that users have been playing. Based on the questionnaires that have been distributed and filled out by users, it can be said that this android-based musical instrument learning application is good, and useful for many people, especially children at an early age. To add insight and knowledge of musical instruments today.

In using this application, it is expected to run smoothly. So that the use of this application can be maximized, the author gives some suggestions, such as adding images, videos, animations and sounds to make it more interesting. Adding musical instruments so that users understand more about musical instruments, adding materials from each tool. music so that users better understand and increase knowledge in musical instruments, add sounds from questions in musical instrument applications, this interactive learning will be better if when the user answers the quiz questions incorrectly, there is a notification about the correct answer.

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