Edugame development for introduction chord basic guitar

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Abstract. Playing guitar is one of the activities that can hone the brain's ability and emotions. Learning to play guitar can be done directly or indirectly. Learning indirectly can be done using several media. One of them is by using a game application on a mobile device. The purpose of this study is to build an android based chord basic guitar learning game application. The methodology used the Digital Game Base Learning - Instructional Design, which consists of four stages: analysis, design, development, and quality assurance. The results showed that the basic guitar chord educational game could be used to facilitate the learning process for individuals who are currently or will be learning guitar. Also, additional facilities, namely the try-it feature in the bonus round, can stimulate users to directly practice the results of learning basic guitar chords into a song that has been provided according to the chord that has been taught before.

1. Introduction

Hobbies playing musical instruments is one hobby that teaches patience and perseverance [1-5]. One of them is a musical guitar instrument. With the many variations of the chord in playing the guitar, to be proficient or just to sing harmonious melodies while being clear needs perseverance and patience. Therefore, teachers are needed or teaching materials that can facilitate the learning of guitar musical instruments [6,7]. Along with the development of the times, how to learn guitar can be done not only from instructors near the neighbourhood [8,9] but can be done through the internet [10,11].

In addition to knowledge from the internet, through the use of educational applications, someone who wants to learn can get experience [3,12]. To maximize learning activities, the design of educational games can also be a learning media that package in the concepts of practice and play [1,13-16]. In addition, the use of technology in the form of smartphones in which there are multimedia causes the delivery of material to be attractive so that it is readily accepted by users [3].

There has been a lot of research on guitar learning, one of which is done by Traube et al. [15], in this study introduces how to learn instrumental music, in this case the guitar, by utilizing web technology. The other research is Balasubramanian et al. [5]. In this study propose an embedded system and a smartphone application that allow guitar students to practice guitar, without music sheet, by lightening LEDs on the corresponding positions at the guitar fretboard. The user can operate the game in a number of modes with different objectives, and can play mini-games at all game levels. These studies have not utilized the game in the delivery of material. As stated Vega Vitiansih [17], that game status, instructions, and tools provided by the game will actively guide players to explore information so that they can enrich their knowledge and strategies while playing.
This study aims to design an educational game for introducing basic guitar chords using the Android platform which can be used as a medium for guitar chord learning for beginners. The methodology used in designing this game is the Digital Game Base Learning - Instructional Design (DGBL-ID) [18-20].

2. Methodology

Work breakdown structure is a decomposition of the overall scope of work that must be done by the project team to achieve project objectives. Based on the literature review and supported by existing theories, the WBS was compiled by following the stages in the DGBL-ID methodology, as shown in Figure 1.

![Work Breakdown Structure](image)

**Figure 1.** Work breakdown structure.

Referring to the stages of Figure 1, it implied that there are stages of analysis, design, development, and quality assurance.

It was starting with the analysis phase, which at this stage has the activity of analysing the problem. After that, determine the characteristics of the user. These activities include for whom the game will be made and how it will affect it. Then learn how the game will create. After that, determine the concept of the game that will create, and of course, also specify the platform that will apply to the game made.

The design phase is the modelling stage. This stage has stages of instructional design and game design. At the instructional design stage, the emphasis is on what instructions should make, while the in-game map is more about modelling the appearance of the game. This stage makes in Adobe Photoshop CC 2017.

What do next is the development stage, which is the stage of implementing the previous phases into the programming language. The programming language used is action script 3, with Adobe Flash CC 2014 as an IDE. And the next stage, namely quality assurance. At this stage, the quality and content of the game check, or it can be regarded as the stage of game testing, while also improving the quality of the game.

3. Results and discussion

Referring to the WBS that has made, resulting in a basic guitar chord educational game with the DGBL-ID model, which consists of stages of analysis, design, development, to quality assurance.

3.1. Analysis

In this stage, a review of the problem, user characteristics, concepts, and how the game works, and the platform to be used by the game made.
- Problem Analysis. Guitar chords are varying, so people sometimes forget the pattern. Also, asking others causes awkwardness because they ask too many questions, especially if they ask to teach privately. And although when we find the guitar chord that sought, we are not sure about the truth of the chord sound.

- Determining User Characteristics. Learning guitar chords will be very useful if someone needs that knowledge. Especially if someone does indeed work directly related to musical guitar instruments.

- Learning Objectives. Guitar will be beneficial because it uses appropriately. Besides, someone who will study is not confused with how to start learning guitar because of the in-game learning that will create starts at the essential stage.

- Game Ideas. Learning will be more effective when there are learning materials and quizzes. Of course, the exam adjusts to the stages and starts from the primary material. Thus the individual will quickly memorize chords as a result of repetition in the quiz.

- Game Platform. Because learning together directly with the use of guitars will be troublesome, so it needs to be juxtaposed with a more practical device like a mobile gadget (android).

3.2. Design
At this stage, there are two stages, instructional design, and game design.

- Instructional Design. After users play this guitar chord educational game, users can understand the basic chord and can play it in real guitar. For users to understand this, basic guitar chords made in the form of images. Besides the material, there are also quiz type games and drag & drop. The questions in the quiz are related to the basic guitar chord, and before starting the exam, the chord material will be given in the form of pictures and sounds according to what will question.

- Game Design. This game is an educational introduction to the basic guitar chord. This game consists of several menus, such as the main menu (level), settings, guides, about, exit. The language used is dominant Indonesian. In addition to understanding the material presented, there is also a unique mission that is collecting trophies in the game. This game has a question session (quiz), which will consist of several levels. Before the quiz starts, several chords will be displayed, which will ask at that level. Each level consists of 3 questions and gives a time of 10 seconds. Each correct answer is 10, so to complete one degree, the user must collect the value of 30. That way, the trophy will be obtained after the level complete.

Because this game has several levels and menus, so it made several scenes. The list of scenes list in Table 1:

| No | Scenes              | About                                | Information                                      |
|----|---------------------|--------------------------------------|--------------------------------------------------|
| 1  | Splash Screen (scene 1) | The intro (application animation)    | Will appear at the beginning before entering the initial menu |
| 2  | Main Menu (scene 2)  | Six main menu                        | Start, guide, chords, about, settings, exit      |
| 3  | Play (scene 3)      | Game levels from 1 to 4              | For starters, only level 1 is opened, apart from that it is still locked |
| 4  | Guidance (scene 4)  | Guide to how to play in general      | There is a quiz guide, a drag & drop guide       |
Table 1. Cont.

| No | Scenes                     | About                                      | Information                                                      |
|----|----------------------------|--------------------------------------------|------------------------------------------------------------------|
| 5  | About (scene 5)            | Maker identity and other source identities in the game | Name, description of the game, source of music & images           |
| 6  | Pre-Start (scene 6)        | Guidance to how to play each level         | Gameplay guidance                                                |
| 7  | Start playing (scene 7)    | Game per level                            | Level 1-2 (quiz), level 3 (drag & drop), level 4 / bonus         |
| 8  | Settings (scene 8)         | Sound settings                             | Setting on/off game sound                                        |
| 9  | Bonus (scene 9)            | Lyrics, music, and chords                 | Like karaoke, music and lyrics are added with the guitar chord   |
| 10 | Chords (scene 10)          | A-G basic chord collection                 | Chord A-G (minor and major) in the form of images with a combination of the position of each finger |

The interface in the game is made simple and easy to use. The button is placed in the same place, just as the back button always puts on the top left of the screen. Besides, in terms of colors used gradient style with a standard color blend or not focusing on more masculine or more girly colors, as shown in figure 2.

![Figure 2. Game interface design.](image)

To run this game on an Android device, it must meet the main requirements, including: have or have downloaded Adobe Air; and it has more than 10MB of memory storage.

3.3. Development

Multimedia elements such as images made in Adobe Photoshop CC 2017, then the sound obtained from the results of the recording change in WavePad Sound Editor. Then, the implementation of the design into code (action script 3.0) made in Adobe Flash CC 2014. The texts store following the functions in each existing scene.

3.4. Quality assurance

The entire game is checked/tested at this stage, both in terms of appearance or the code applied. At this stage, play testing, alpha testing, and beta testing carry out. Alpha testing does find out if the game can
be played from beginning to end. Alpha testing is done using a black-box method that focuses on testing software functions. This test is done simply by paying attention to whether each task has been going well as expected without seeing the flow of program implementation. Then beta testing is done to determine user acceptance or end user testing. Alpha test results show that the application is functioning properly, while the beta test results show a value of 91% which is very good value. This shows that learning chord basic guitar by using the game can be accepted and interesting for the user.

4. Conclusion
Based on the results and discussion delivered, conclusions drawn from the design of the educational game introduction to the basic chord of mobile-based guitars are as follows:

- This research has succeeded in achieving the goal of making a basic guitar chord educational game so that it can use to facilitate the learning process for individuals who are currently or will be learning guitar.
- This application equipped with additional facilities, namely the try-it feature in the bonus round. This feature will stimulate users to directly practice the results of learning basic guitar chords into a song that has provided by the chords that have taught before.

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