Jurnal Manajemen dan Bisnis
Vol. 13, No. 1, June 2024, pp. 108-117
INSTITUT TEKNOLOGI DAN BISNIS INDRAGIRI
https://journal.itbind.ac.id/index.php/jmbi

DESIGN AND DEVELOPMENT OF AN EDUCATIONAL SIMULATION GAME FOR TEACHING AN ENGLISH TO CHILDREN

Julinaldi[1)], Sri Guntur[2)]
[12]Teknik Sipil, Institut Teknologi dan Bisnis Indragiri
julinaldi@itbind.ac.id, sriguntur10@gmail.com

ABSTRACT

In this study, the author developed an educational game-based application to support English language learning for children. The target users selected are children, considering the challenges of theoretical learning processes at this age group, which tend to favor playing activities over conventional learning methods. The implementation of educational games is expected to provide an effective solution to overcome these obstacles. The application includes two specially designed games: a Vocabulary game for children aged 5-7 years and a Grammar game for children aged 8-10 years. The development of this application integrates multimedia concepts, educational game criteria, and user requirements analysis. The study utilizes the Action Script programming language and was developed using Macromedia Flash software. This application is highly interactive and can serve as a teaching aid in English language learning, either for independent use by users or as a supplement to classroom instruction. Furthermore, the application has the potential for further development to enhance its quality and effectiveness in the future.

Keywords: Educational game, English language, Multimedia application

ABSTRAK

Dalam penelitian ini, penulis mengembangkan sebuah aplikasi berbasis permainan edukatif untuk mendukung pembelajaran bahasa Inggris pada anak-anak. Target pengguna yang dipilih adalah anak-anak, dengan mempertimbangkan tantangan dalam proses pembelajaran teoretis pada kelompok usia ini, yang cenderung lebih menyukai aktivitas bermain daripada pembelajaran konvensional. Implementasi permainan edukatif diharapkan dapat menjadi solusi efektif untuk mengatasi hambatan tersebut. Aplikasi ini mencakup dua jenis permainan yang dirancang khusus, yaitu permainan Vocabulary untuk anak-anak berusia 5-7 tahun dan permainan Grammar untuk anak-anak berusia 8-10 tahun. Pengembangan aplikasi ini dilakukan dengan mengintegrasikan konsep multimedia, kriteria permainan edukatif, serta analisis kebutuhan pengguna (user requirements). Penelitian ini menggunakan bahasa pemrograman Action Script dan dikembangkan melalui perangkat lunak Macromedia Flash. Aplikasi ini memiliki sifat interaktif yang tinggi dan dapat berfungsi sebagai alat bantu pengajaran dalam pembelajaran bahasa Inggris, baik digunakan secara mandiri oleh pengguna maupun sebagai pendukung proses pembelajaran di kelas. Selain itu, aplikasi ini masih memiliki potensi untuk dikembangkan lebih lanjut guna meningkatkan kualitas dan efektivitasnya di masa yang akan datang.

Kata Kunci: permainan edukasi, bahasa inggris, aplikasi multimedia

INTRODUCTION

Teaching English to children presents unique challenges, particularly because they are more engaged by play activities than by conventional learning methods. Therefore, an innovative approach that combines educational elements with play is crucial to enhance teaching effectiveness.

This study aims to design and develop an educational simulation game specifically for teaching English. The game integrates key aspects of language learning, such as vocabulary and grammar, with engaging and interactive game elements. By leveraging multimedia technology, the game not only serves as a teaching aid but also plays a role in increasing children's learning motivation. It is hoped that this simulation game will become an effective and enjoyable learning medium for children at the primary level.

LITERATURE REVIEW

Computer-Assisted Instruction (CAI) is an effective method in the teaching and learning process as it enhances the efficiency and effectiveness of education (Sigit et al., 2008). With the advancement of technology, especially in Information Technology, educators need to be more innovative in optimizing the learning process using CAI systems. CAI involves computers in the learning activities, either individually or in groups, where students interact directly with the computer and have full control over their learning (Wihardjo, 2017).

The goals of using computers in education encompass cognitive, psychomotor, and affective aspects, as explained by Sidik et al. (2018). Furthermore, there are five types of CAI, including Drill & Practice, Tutorial, Simulation, Problem Solving, and Educational Games (Strickland Patterson and Eva Handriyantini, 2019). The development stages of multimedia-based CAI involve six main steps: concept, design, material collection, assembly, testing, and distribution (Luther and Sutopo, 2019).

CAI offers various advantages, such as enhancing student attention and concentration, tailoring material to student capabilities, and reducing the time required to deliver content (Wiharjo, 2017). The use of multimedia in education is also increasing as conventional methods often fail to meet learners' needs (Sigit et al., 2018). Multimedia, which combines text, images, sound, and animation, can create interactive and engaging applications (Vaughan, 2014; Gayestik and Idris, 2018).

Educational Games, designed to teach specific learning objectives, motivate users by combining interactive and enjoyable elements (Hurd and Jenuings, 2019). The concept of multimedia and educational games is closely related because multimedia provides essential elements that support interactive design in educational games (Vaughan, 2014; Hurd and Jenuings, 2019).

Macromedia Flash is a popular application among designers and multimedia developers due to its ability to create animations and interactive applications (Philipus, 2018). In using

Flash, fundamental concepts such as objects, text, symbols, sound, animation, and movie must be understood.

Teaching English vocabulary to children involves not only focusing on words but also incorporating objects and images to engage their interest in learning (Scott and Ytreberg, 2016: 5).

According to Sigit et al. (2018), multimedia criteria include the use of multiple convergent media, such as combining audio and visual elements. Multimedia must be interactive, meaning it should be able to respond to user input. Additionally, it should be self-contained, allowing users to effectively use the application without needing external guidance.

Sigit et al. (2018) classify multimedia into two main types. Linear multimedia is sequential and does not offer user control, such as television and films. On the other hand, interactive multimedia provides control tools that allow users to choose and dictate the process, as seen in video games and interactive learning.

Townsend, as cited by Idris (2018), identifies several advantages of using multimedia in education. Multimedia enhances the learning experience by providing practical applications, enabling self-expression and ownership of the learning process. This creates an active learning environment and facilitates communication between learners and instructors, and is commonly used in everyday life, such as in video games and television.

The application of educational games began with the rapid development of video games, which have become effective interactive media. Given the popularity of games, educators sought to leverage game design elements in curricula, emphasizing interactive and enjoyable interface design (Hurd and Jenuings, 2019).

Educational games are specifically designed to teach users various concepts and skills while motivating them to engage with the game (Hurd and Jenuings, 2019). According to Hurd and Jenuings (2019: 5), effective educational game design should meet criteria such as overall value, usability, accuracy, appropriateness, relevance, objectivity, and feedback.

The relationship between multimedia concepts and educational game applications is quite close. Vaughan defines multimedia as a combination of digital elements like text, images, sound, and animation. Hurd and Jenuings emphasize that interactive and enjoyable design is key in educational games, which inherently relies on multimedia principles.

Flash is a widely used application among designers and multimedia developers for its ability to create engaging animations and applications. It is considered a professional standard for high-quality web experiences (Philipus, 2018).

In developing applications with Macromedia Flash, several basic concepts need to be understood, including objects, text, symbols, sound, animation, and movies. Flash offers various tools to create and manage these elements and uses ActionScript 2.0 for scripting in animation and application development.

RESEARCH METHODS

In the application development process, analysis is a crucial step that must precede the design phase. Application designers need to evaluate the various requirements essential for developing the software. The design phase encompasses knowledge and skills related to computers, graphic arts expertise, music, and the ability to conceptualize the flow of information logically, all directed towards creating something tangible. Designing involves thinking, selecting, creating, and finalizing (Vaughan, 2016, p. 336).

For the development of the Education Game application for teaching English to children, the primary requirements include various image, audio, and animation files, as well as software like Macromedia Flash used for building the application. These elements must be integrated into the design to ensure that the resulting application aligns with the concepts of software development, multimedia, educational games, and teaching English to children.

The application design covers the overall application layout, the stages used in the design, and the storyboard. The application's layout explains the concept and functionality of the application, representing the initial stage in the design process. This application features four main menus as follows:

1. Home: Contains a tutorial introducing the education game and a brief explanation of the application's usage and available games.
2. Games: This menu allows users to play two types of games: vocabulary and grammar games.
3. Profile: Displays the profile of the application creator.
4. Exit: Used to close the application.

After selecting the games menu, each chosen game menu displays the following submenus:

1. Play: To start the game.
2. Level: To select the difficulty level of the game, including easy, medium, and hard. The difference between levels lies in the number of questions presented during the game. Higher levels present more questions, and with a countdown timer of the same duration at each level, the difficulty differences between levels become apparent.
3. High Score: Shows the highest scores saved.
4. Help: Provides instructions or procedures regarding the game rules.
5. Exercise: Initiates exercises related to the game's content. The exercise function aims to enhance users' understanding of the educational material within the game and can also serve as a trial for users before starting the game.

During gameplay, a pause button is provided to temporarily halt the game, a stop button to end the game and return to the main menu, a music on/off button to toggle the music, and

the high score and help submenus remain visible.

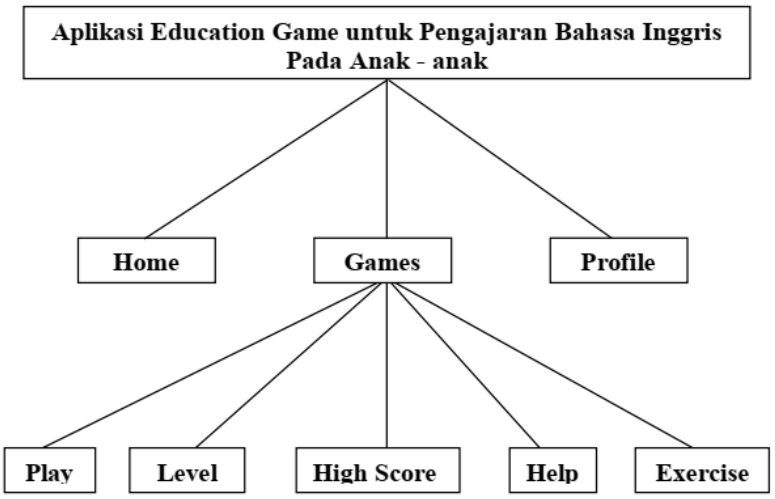

Figure 1: Tree Diagram of Educational Game Design
(Source: Research Data)

Flowchart in the design of this application will illustrate the data flow within the application, depicting the relationships between different data flows. Based on the applied learning approach, this application is classified as an educational game. It features two types of games: Game Vocabulary, designed for children aged 5-7 years, and Game Grammar, aimed at children aged 8-10 years.

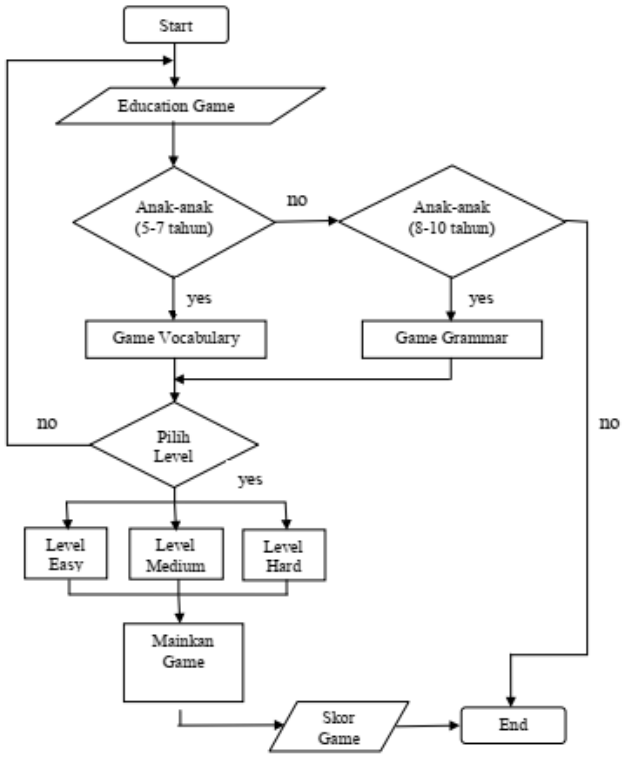

Figure 2: Flowchart with Educational Approach
(Source: Research Data)

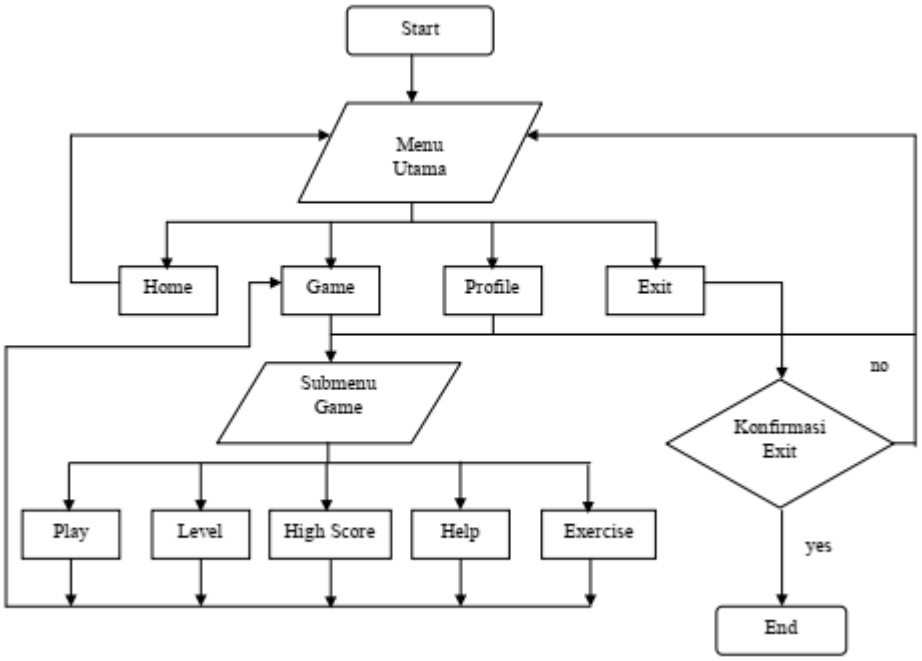

Figure 3: Flowchart of Application Usage Stages
(Source: Research Data)

This flowchart illustrates the general data flow during application usage, including the functions of the menus within the application.

The flowchart can be explained as follows:

1. When the user opens the application, the main interface is displayed, featuring the primary menus: Home, Games, Profile, and Exit.
2. Selecting the Home or Profile menu presents the respective data from those menus, after which the user can return to the main menu.
3. Choosing the Games menu reveals a set of submenus: Play, Level, High Score, Help, and Exercise. If the user selects the Exit menu, a confirmation prompt will appear to verify whether the user wishes to close the application.

FINDINGS AND DISCUSSION

The main interface of this application displays the initial screen when the application is first opened. The game background utilizes bright colors to cater to its target users, who are children. The main interface includes four primary menus: Home, Games, Profile, and Exit.

Figure 3: Main Menu Interface of the Educational Game
(Source: Research Data)

Application testing aims to evaluate the performance of the application and identify any errors that may exist. The parameters used in this testing are based on the criteria for educational games and user requirements previously outlined. By applying these parameters, a comprehensive evaluation of the application can be conducted.

The testing process involves two main techniques: alpha testing and beta testing. Alpha testing is carried out by the application developers and individuals involved in the application's creation. The goal of this testing is to detect any errors or deficiencies in the application before it is released to users. During alpha testing, the author worked with several colleagues and identified issues, such as errors in the game's scoring system, which were subsequently corrected before the application was tested by end users.

Beta testing involves end users who were not involved in the application's development. The purpose of beta testing is to gather feedback from users and identify any issues encountered during the application's use. Beta testing is divided into two stages: a demo of the application and questionnaire completion. In the demo stage, the application is introduced to users, and its functionality, including menu buttons and other features, is tested. Following the demo, a questionnaire is completed by 10 children, including 5 aged 5-7 years and 5 aged 8-10 years, according to the game's age categories. The questionnaire uses an interval scale to assess the application, with categories ranging from poor (0-25%) to excellent (76-100%). The results are presented in the following table:

Table 1: Summary of Application Feasibility Testing Results Using the Questionnaire

Rating Category	Percentage (%)	Number of Responses	Description
Poor (0-25%)	1.33	2	Aspects rated as poor based on user feedback.
Fair (26-50%)	12	18	Aspects rated as fair, indicating room for improvement.
Good (51-75%)	70	105	Aspects rated as good, reflecting positive user evaluation.
Excellent (76-100%)	16.66	25	Aspects rated as excellent, showing high user satisfaction.

Source: Research Data

This table provides a summary of the results from the feasibility testing of the application using the questionnaire. The percentages represent the distribution of responses across the different rating categories.

Based on the table above, it can be observed that: 2 aspects were rated as poor, 18 aspects were rated as fair, 105 aspects were rated as good, and 25 aspects were rated as excellent.

The percentage calculation for the application aspects is as follows:

1. The percentage of aspects rated as poor is 2/150 * 100% = 1.33%
2. The percentage of aspects rated as fair is 18/150 * 100% = 12%
3. The percentage of aspects rated as good is 105/150 * 100% = 70%
4. The percentage of aspects rated as excellent is 25/150 * 100% = 16.66%

From these calculations, it is evident that the percentage of aspects rated as poor is 1.33%, the percentage rated as fair is 12%, the percentage rated as good is 70%, and the percentage rated as excellent is 16.66%. Overall, the application received the highest percentage in the "good" category, indicating that the Education Game for Teaching English to Children can be classified as a good application.

CONCLUSION

Based on the results, the application meets the criteria for an educational game as follows:

1. Overall Value: The application provides an interactive interface and features such as a timer for managing game duration.
2. Usability: The application has a user-friendly interface that facilitates ease of use.
3. Accuracy: The application’s design aligns with the planned game concept.
4. Appropriateness: The menus and features of the application match the initial design and function effectively.

5. Relevance: The use of bright colors, animations, children's songs, and sound effects is appropriate for the target audience, which is children.
6. Objectives: Users are able to understand the English language learning material presented in the game.
7. Feedback: Feedback features, such as button sounds, enhance the usability of the application.

Therefore, it can be concluded that the Education Game for Teaching English to Children is rated positively and meets the criteria for an educational game.

LIMITATION & FURTHER RESEARCH

This research focuses specifically on an Education Game application designed for teaching English to children aged 5-10 years, without extending the study to other age groups. The evaluation is restricted to education game criteria such as interactivity, ease of use, accuracy, and the relevance of features for children, excluding any additional aspects that might be present. Testing is confined to the core features of the application, such as menus and games, and employs alpha and beta testing methods with a small user group, omitting additional testing methods like direct observation. The study is conducted in a controlled environment and does not include the use of the application in different situations or locations. Evaluation is carried out using a specific interval scale and predefined aspects, without exploring other potentially relevant dimensions of assessment.

ACKNOWLEDGEMENTS

Special thanks are extended to all individuals involved in this research and those who provided financial support. All data and resources were obtained through highly effective and productive team collaboration.

REFERENCES

Artsiyanti, Diba, E,P., S.S. 2012. *Bagaimana Meningkatkan Mutu Hasil Pelajaran Bahasa Inggris di Sekolah.* Jakarta: PIKMI Ganesha.

Enterprise, Jubilee. 2016. *6 Aplikasi Ampuh flash 8*. Jakarta: PT. Elex Media Komputindo.

Handriyantini, Eva, S.Kom, M.MT.2019. *Permainan Edukatif (Educational Games) Berbasis Komputer untuk Siswa Sekolah Dasar*. *Malang*: Sekolah Tinggi Informasi & Komputer Indonesia.

Hurd, Daniel dan Jenuings, Erin. 2019. *Standardized Educational Games Ratings: Suggested Criteria*. Karya Tulis Ilmiah.

Idris, Husni. 2018. *Perkembangan Multimedia Pembelajaran Berbantuan Komputer.* http://scribd.com/perkembanganmultimedia.htm. Diakses tanggal: 5 April 2020.

Jen, Shirley Ling, 2014. *The Use of Language Games in ESL Clasrooms.* Malaysia: Universiti Teknologi Malaysia.

Jeprie, Mohammad. 2014. *Membuat Games dengan Flash MX*. Jakarta: PT. Elex Media Komputindo.

Lukito, Herman. 2000. *Rahasia Membuat Berbagai Efek dengan Photoshop 5.5.* Jakarta: PT. Elex Media Komputindo.

Nugroho, Kurniawan Yudhi. 2017. *The Use of CircLe Games as a Strategy to Improve The Student;s Mastery in English Vocabulary*. Semarang: Universitas Negeri Semarang.

Philipus. 2018. *Animasi Web dengan Macromedia Flash.* Yogyakarta: ANDI.

Rajib, Muhammad. 2019. *Perancangan Aplikasi Pembelajaran Berbantuan Komputer Berbasis Multimedia dengan Studi Kasus: Barisan dan Deret Aritmatika*. Skripsi. Medan: Universitas Sumatera Utara.

Scott, Wendy A. & Ytreberg, Lisbeth H. 2016. *Teaching English to children.* London: Longman.