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Design and Development of an Edugame Arabic for Learning Media

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Abstract*— Learning media provides significant advantages to students by improving their learning experience through the use of multimedia applications, resulting in a more engaging and fascinating learning environment while reducing the monotony associated with traditional manual learning techniques. Digital learning material, provides a platform for interesting learning activities, encouraging a delightful and cost-effective learning experience. The impact of learning media is especially noticeable in the subject of the Arabic language. Arabic is traditionally regarded as a difficult language, and many students dislike this language course. However, the Edugame Arabic was created to overcome this issue. Using the GDLC process, which includes phases of initialization, pre-production, production, testing, and publishing. This game-learning application was evaluated through a testing phase that included groups of school students who were actively involved in Arabic language lessons. Edugame Arabic has successfully been installed and runs smoothly on various Android smartphones. Moreover, the game's offline capability allows users to continue their learning without an internet connection. The questionnaire responds, with users strongly agreeing that the app has an appealing design, an intriguing game premise, good material delivery, and considerable aid in learning Arabic. Furthermore, users generally acknowledged that the Edugame is simple to use and helps with vocabulary learning.

Keywords*—Android; digital learning material; game; GDLC; learning experience

1 INTRODUCTION

Arabic is used as an everyday language in Arab countries in the Middle East. Apart from that, Arabic is a language used as a unified language in the Islamic religion, which is spread through physical media in the form of the Al-Quran. In this language, the Al-Quran was revealed to be used as a reference for guidelines for life in the Islamic religion. In subsequent developments, Arabic was used as an international language along with English, French, Spanish, Russian, and Chinese in January 1971, so Arabic was not only a language used in Arab countries. Arabic is often a difficult language to learn compared to other languages because it has a different alphabet, grammar and vocabulary [1]. Also, Arabic script is written from right to left, which makes it difficult for those who are used to reading from left to right. Learning resources that are still manual-based frequently become a barrier because students find them tedious and uninteresting. It is hoped that the use of digital learning can create a pleasant and conducive atmosphere [2], [3]. Furthermore, digital learning materials also have the advantage of flexible learning activities, creating conditions that support the learning process by providing images and sound, and are quite cheap [4].

The necessity for learning with multimedia application-based technology is growing as a result of innovation's beginnings in the educational setting. According to Putra and Sujatmiko, the use of media in the learning process is very necessary to attract students' attention and make learning activities more interesting and effective. Effective learning resources will yield precise results, such as modifications in the conduct of students [5]. Students in the digital age need to be innovative when it comes to learning materials. Students gain new perspectives from the media, but not all teachers know how to use it effectively. Consequently, the media has the potential to hinder rather than facilitate pupils' learning [6]. Games are one type of multimedia application where users can obtain several types of information and rewards.

Games are interactive activities governed by predefined rules, explicitly designed to enhance engagement and determine a victor or vanquished outcome. Beyond their recreational nature, games also serve as potent tools for facilitating learning, offering a multitude of advantages, such as heightened motivation and cognitive prowess. Within the realm of gaming, diverse categories cater to the preferences of users [7]. Action games demand rapid cognitive processing and physical reflexes from players, with First-Person Shooter (FPS) games standing out as a particularly favoured sub-genre [8]. These games empower players to employ finite resources to construct diverse projects of their choosing. Strategy games necessitate astute critical thinking skills and astute resource management [9]. Notably, in games like Valorant, triumph hinges upon adept communication and judicious resource allocation. Role-playing games (RPGs) allow players to inhabit distinct characters and progressively unlock additional features, including skill enhancements, new resources, and character evolutions [10]. Word games, primarily crafted to explore the intricacies of language and evaluate linguistic aptitude, amalgamate entertainment with educational value [11]. Quiz games, characterized by their straightforward gameplay involving the posing of diverse questions, challenge players to exhibit swift thinking abilities to achieve victory. By incorporating games into educational contexts, educators can harness the potential of an interactive and captivating approach that effectively fosters motivation and facilitates cognitive development.

Game development relies on a set of foundational components that play a crucial role in the design and creation of video games. These components serve as the basis for mathematical modelling and include the following: (1) Game rules are, the decisions made by the game's author regarding the roles and operations of objects and characters within the game. (2) Plot: the sequence of actions that players will undertake in the game, along with specific commands or goals that must be accomplished. (3) Theme: the moral lesson or underlying concept conveyed by the game, such as leadership in a deserted setting. (4) Characters, both players and non-playable characters (NPCs), with unique traits and characteristics, like skills, facial features, and past experiences [12]. (5) Objects or items, are essential elements that contribute to the game's progression, particularly in games with a specific plot. (6) Text, graphics, and audio are elements that enhance the game's atmosphere and overall experience. (7) Animations, moving objects, including characters, and interactive elements are typically found in adventure genre games. (8) The user interface is the graphical display that enables interaction and communication between the game and the user [13]. These fundamental components form the building blocks of successful game development, allowing for the creation of immersive and captivating interactive experiences.

Several studies regarding the use of game-based learning in education have focused on Arabic language education and other subjects. One study implementing Quizzes in Arabic language education found positive effects on student engagement and motivation [14]. The incorporation of game elements, such as leaderboards and instant feedback, contributed to increased participation and a sense of competition [15]. This is also beneficial regarding the effectiveness of learning vocabulary for diverse learning participants.

The investigation into Digital Game-Based Learning (DGBL) for Arabic language education emphasizes its potential benefits and implications for instructional methods. Additionally, the exploration of the Game Development Life Cycle (GDLC), as depicted in Fig. 1, model in mobile-based game platforms underscores the importance of a systematic and well-structured development process[16]–[18]. The collective findings underscore the potential of game-based learning to enhance student motivation and improve educational outcomes across various subjects and platforms. Importantly, these studies emphasize the crucial role of considering user needs

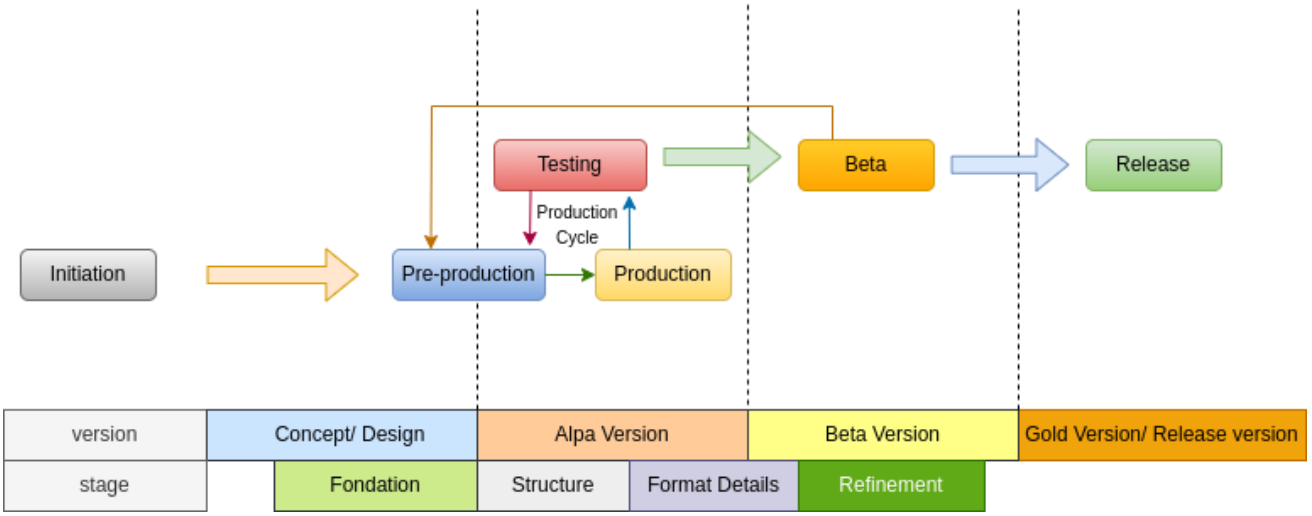


Figure 1. GDLC

and employing structured development methodologies, such as GDLC, to ensure the effectiveness and quality of educational games[19]–[21].

Based on the background above, the author developed foreign language reading learning materials, especially in education based on Arabic language learning, which refers to the Al-Munawir Arabic dictionary [22], entitled "Design and Development of an Edugame Arabic for Learning Media." This Edugame Arabic-based learning media is one way for users to better understand Arabic, thus triggering their interest in learning Arabic. It is hoped that the development of Edugame Arabic-based learning materials can be a solution to help users improve their understanding of knowledge, learning increases their interest in learning Arabic.

The limitation of Edugame Arabic learning media application development lies in the scope of learning materials, where this application will focus on understanding Arabic vocabulary, which refers to the Al-Munawir dictionary consisting of animals, limbs, numbers, transportation, school, and home. The learning materials will be designed for beginner or early-level Arabic learners. The app will present the materials interactively with the use of gamification elements to increase user engagement and motivation. This application can be accessed through the Android platform.

2 METHOD

2.1 Methodology

Edugame Arabic using the Game Development Life Cycle (GDLC) is a methodology used for developing and planning a game, consisting of six iterative stages: initialization, pre-production, production, testing, and release [17], [18]. These 5 phases can be grouped into 3 main processes [18], [21]:

a. Initialization process, which consists of concept and design.

b. Production process consisting of Pre-Production, Production, and Testing (Alpha and Beta).

c. Release is when the game has gone through testing, namely, the release of the game to the public.

The following is an explanation of the GDLC stages in Fig. 1:

1. Initiation

   Initiation is a new process that involves creating a clear game concept, identifying the game, identifying trending topics, identifying the target user game, and understanding the game genre, scenario, and platform.

2. Pre-production

   Pre-production is the beginning of the production cycle as it relates to game design. Pre-production is an important phase before the production process begins, as the game design and game production plan are executed. Pre-production will involve creating, refining, and prototyping the game. Pre-production ends when modifications or changes to the game design have been approved and documented in the GDLC. In the pre-production stage, researchers will collect data by looking for references related to the game to be created, such as:

   a. Genre: A game genre that will be created by researchers. In this research, the game genre chosen was educational.

   b. Target: The researcher determines the target players of the Edugame Arabic. This game is targeted at elementary and junior high school students.

   c. Collecting data: The researcher used the Al-Munawir Arabic dictionary. There are 6 categories of data used: limbs, numbers, transportation, school and home, of which each category has 20 vocabulary words.

   d. Scenario: A game scenario in the form of a flowchart showing who plays, players can do any

game, implementation of mockup design, and color selection for the game background.

e. Scenario game player: The player can play the Edugame Arabic, learn Arabic, set the music, read the game instructions, and get a score from the results of playing the game. Users can play 3 categories on the play menu: guess the object, guess the number and guess the animal. At the game instruction menu, the player chooses the category to be played and guesses the name of the picture by choosing the answer that the player thinks is the right answer. There are four answer choices to guess the picture. If the player fails to guess the picture at the level being played, then the player is declared Game over and out of the game. If the player succeeds, then it will continue to the next level.

3. Production

Production is the implementation of game design, and prototyping in pre-production is refined in this production stage. This means that this phase focuses on translating the game design, concept art, and other aspects into game elements, such as the creation of game assets, the creation of game source code, and the integration between game and source code. This process aims to perfect the prototype that was created in the pre-production stage. The output of this stage is a game that is ready to be tested. At this stage, researchers also determine the tools needed to make this game, namely using adobe-flash Professional CS6, Corel Draw X5, Adobe Photoshop CS3, Action Script 3.0 for the coding process, and the AIR SDK Compiler to convert it into .apk format.

4. Testing

Testing means that both internal and external tests are conducted to test the usability of the game. Specific testing methods for each stage of the prototype. Testing has two (2) stages: Alpha Testing and Beta Testing.

a. Alpha testing is to check if there are still bugs and the possibility to reduce or add features. If there are bugs/errors or additional features, they will be fixed by the researcher. Beta testing is also known as external testing.

b. Beta testing is to test the game and detect various bugs and complaints from end-user testers. Beta testing is outside the production cycle, so if the results of this testing still have errors, the researcher repeats the production cycle at this stage is divided into two (2) stages, namely Alpha Testing and Beta Testing.

5. Release

Release is the stage where the game has gone through beta testing, namely, the release of the game to the public. This is the stage when game development has reached the final stage and is ready to be released to the public. The release includes product launch, project documentation, knowledge sharing, post-testing analysis, as well as game maintenance and expansion planning.

2.2 Software Tool

2.2.1 *Adobe Flash:* Adobe Flash, once a stalwart in the realm of game development, played a pivotal role in shaping the interactive and visually appealing landscape of online games. Flash, part of the Adobe Creative Suite, provides a versatile platform for creating engaging multimedia content, including games, animations, and interactive websites. One of the key elements that made Adobe Flash a go-to choose for game developers was its powerful and intuitive development environment. The Flash IDE (Integrated Development Environment) allowed developers to create intricate animations and complex game logic with relative ease. The timeline-based animation system made it simple to synchronize different elements, enhancing the visual appeal of games [23]. Flash games became synonymous with browser-based gaming, offering a convenient way for users to access a diverse range of games without the need for extensive installations. This accessibility contributed to the widespread popularity of Flash games, making them a staple in casual gaming circles. Furthermore, the ActionScript programming language, specifically designed for Flash, facilitated the creation of dynamic and interactive elements within games. Game developers could harness the potential of ActionScript to build robust game mechanics, handle user inputs, and implement complex algorithms [24]. However, the rise of HTML5, WebGL, and the gradual phasing out of Adobe Flash Player by major web browsers marked a significant shift in the industry. Security concerns, performance issues, and the advent of more modern technologies led to the decline of Flash in favour of more efficient and secure alternatives. Despite its eventual decline, the legacy of Adobe Flash in game development remains noteworthy. It played a crucial role in democratizing game creation, allowing developers to bring their visions to life with relative ease. The evolution of the industry, driven by technological advancements, has seen Flash pave the way for newer, more capable platforms while leaving behind a rich history of innovative and entertaining games [25].

2.2.2 CorelDraw X5: CorelDRAW is a powerful vector graphic editor developed by Corel, a software company based in Ottawa, Canada. It was first introduced in January 1989 and has since become a leading graphic design software. With features like precise image manipulation, a wide variety of drawing tools, and advanced effects, CorelDRAW empowers designers to create stunning vector graphics with ease [26]. One of the key advantages of CorelDRAW is its compatibility with various Windows operating

systems. Originally developed for Windows, the software has expanded its compatibility over time. This allows users to seamlessly work with CorelDRAW on different versions of Windows and ensures a smooth design experience. CorelDRAW utilizes the CDR file format for saving vector graphics. This file format is specifically designed to preserve the scalability and quality of vector images. Understanding the structure and compatibility of CDR files is essential for designers working with CorelDRAW. Additionally, CorelDRAW supports other file formats like CorelDraw Compressed (CDX) and CorelDraw Template (CDT) files, providing flexibility in file handling. Finally, CorelDRAW is a popular vector graphic editor with a variety of features and capabilities for designers. Its interoperability with Windows operating systems and support for many file formats make it a powerful tool in the field of graphic design. Designers may efficiently use CorelDRAW for creative expression and professional design projects by knowing its history, capabilities, compatibility, and file formats [27].

2.2.3 *Adobe Photoshop CS3:* Adobe Photoshop, commonly referred to as Photoshop, is a powerful image editing software developed by Adobe Systems. Its primary purpose is to manipulate and enhance photographs, as well as digital photographers and advertising firms, Photoshop has established itself as the leading software in the market for image processing. Alongside Adobe Acrobat, it is regarded as one of the best products ever produced by Adobe Systems [28]–[30]. The software has undergone several iterations, with the eighth edition known as Photoshop CS (Creative Suite), followed by subsequent versions named Adobe Photoshop CS2, CS3, CS4, and the latest being create various visual effects. Widely utilized by the versatility of Adobe Photoshop makes it an essential tool for professionals in the fields of photography and advertising. Its wide array of features allows users to modify images, adjust colours, apply filters, and create visually stunning effects. The software's reputation as the industry leader can be attributed to its comprehensive capabilities and the continuous updates and improvements made with each new version. By catering to the needs of photographers and graphic designers, Photoshop has become an indispensable part of their workflow. Adobe Photoshop has maintained its popularity due to its constant evolution and adaptation to the changing demands of the industry. As technologies advance, Photoshop continues to incorporate new features and functionalities to meet the evolving needs of its users. With its rich history and ongoing development, Adobe Photoshop remains the go-to software for professionals seeking to enhance and transform images in the digital realm.

2.2.4 *Air SDK Compiler:* Adobe Systems has developed a cross-platform runtime system called Adobe AIR, which was formerly referred to as Adobe Integrated Runtime. Its primary purpose is to facilitate the creation of desktop applications and mobile applications. To achieve this, developers can utilize various programming languages, such as Adobe Flash and ActionScript, and optionally Apache Flex. One of the key advantages of Adobe AIR is its ability to support installable applications on a wide range of operating systems including Windows, and OS X, as well as mobile platforms like Android, iOS, and BlackBerry Tablet OS. It is worth noting that while Adobe AIR originally had support for Linux, this support was discontinued after the release of version 2.6 in 2011. Adobe AIR offers a unique runtime environment that enables the construction of applications and video games outside the confines of a web browser. By utilizing Adobe Flash content and ActionScript 3.0 code, developers can create applications that behave as if they were native applications on the supported platforms, providing users with a seamless and immersive user experience. In terms of deployment, there is a distinction between applications developed for Flash Player or HTML5 and those developed for Adobe AIR. Applications designed for Flash Player or HTML5 can be accessed and used directly within a browser without the need for installation. On the other hand, Adobe AIR applications require installation from an installer file on Windows and OS X, or through the appropriate App Store on iOS and Android, ensuring proper integration into the user's device. Another advantage of Adobe AIR applications is their ability to have unrestricted access to local storage and file systems, enabling tasks such as file management and data storage. In comparison, browser-based applications typically have limited access to individual files specifically selected by the users, providing a more controlled and secure environment. In summary, Adobe AIR offers developers a powerful runtime system for creating cross-platform desktop and mobile applications, providing the flexibility to utilize various programming languages, supporting a wide range of operating systems, and enabling the development of applications that behave like native applications. With their installation requirements and unrestricted access to local storage, Adobe AIR applications offer users a more immersive and integrated experience compared to browser-based applications [31]. Developed by Adobe Systems, Adobe AIR is a flexible runtime system for creating rich internet

applications (RIAs) for desktop and mobile platforms. It supports multiple screens and operating systems, allowing developers with web development skills to create applications using technologies like HTML, JavaScript, and Ajax. Developers can choose to use technologies such as Flash, Flex, ActionScript, HTML, JavaScript, CSS, or Ajax, depending on their experience and requirements. Adobe AIR provides a seamless user experience similar to native applications, and it enables the extension of web-based applications to the desktop without the need for extensive knowledge of traditional desktop development technologies or native code complexity. In summary, Adobe AIR is a powerful tool that bridges web and desktop application development, giving developers flexibility and allowing for the creation of immersive RIAs.

3 RESULT AND DISCUSSION

Edugame Arabic is a learning medium that aims to enable effective and efficient social processes and social interactions in the context of educational communication. Educational games are games used in the learning process. Arabic language education contains educational elements and educational values.

3.1 Initiation

The genre of this game is Digital Game-Based Learning, which is a student-centred learning method that uses digital games as a learning medium with an emphasis on thinking and learning skills. There are several criteria for developing educational games, including overall value, usefulness, accuracy, suitability, relevance, objectivity, and feedback. The target of this game application is targeting children.

Arabic dictionary (Al-Munawwir) [22], accompanied by pictures. The learning menu has six categories: animals, body parts, numbers, vehicles, school, and home. Each category has 20 Mufflodates. The game menu is used for the game arena. There are three categories in the game menu: Guess Objects, Guess Numbers, and Guess Animals. The Arabic Edugame game menu has 20 levels that you can play.

3.2 Pre-Production

3.2.1. Flowchart: The workflow of the system can be seen in Figure 2. In the Arabic Edugame workflow, players are directed to the home page with several. Edugame Arabic has two menu options: the Learning Menu and the Game Menu. The study menu contains Mufrodat Arabic words listed in the menu options, such as Learn, Play, Settings, and Exit. If a player wants to learn or play, they are given the option to select a category and start learning and playing. When the player selects the exit menu, the game ends. When the player selects the settings menu, they can enable or disable the music and view information, namely the game. Use Case Diagram Use Case diagrams in Fig. 3 explain that players can carry out several activities in Edugame Arabic: selecting the learning menu, selecting the game menu, selecting the settings menu, and exiting the game. Once in the learning menu, players can select the desired category and start learning Arabic. Players who select the game menu can also select a category to start the game. When the player selects the settings menu, they can turn on/off the music. When a player logs out, they leave the application. For more details, see the following use case. When the game starts, the players guess the picture provided. Four answers are provided. The players then choose the answer they think is most appropriate. In addition, players get points in the form of stars.

3.2.2. Storyboard: Storyboards are sketch images arranged sequentially based on a script. Storyboards are used to easily communicate story ideas to other people. Because storyboards can stimulate the imagination of people who follow the images presented and produce the same perception of the story idea, below is an example of a storyboard from Edugame Arab. When the game starts, the players guess the picture provided. Four answers are provided. The players then choose the answer they think is most appropriate. In addition, players get points in the form of stars. Table 1 shows the storyboard.

3.3 Production

The application development stage includes device preparation, which includes. The software specifications used by the author to build Edugame Arabic are as informed in Table 2.

3.4 Testing

The testing will be conducted in two parts, which are alpha and beta testing. Alpha testing will be conducted in the development phase. This testing aims to find defects or failures in the game. Beta testing will be conducted by collecting responses from end users on whether the game satisfies their needs.

3.4.1 Alpha Testing: The alpha testing was carried out using the Android operating system with the specification, of system version, Android 11 with 3 GB RAM, Android 9 with 4 GB of RAM, and Android 9 with 6 GB of RAM. By installing and running the game, the results are based on Table 3. Based on the result in Table 3, the game application menus and feature requirements are all satisfied by developers and users. Hence, the application is ready to use and release. In the next stage, the researcher used beta testing for user feedback agreements.

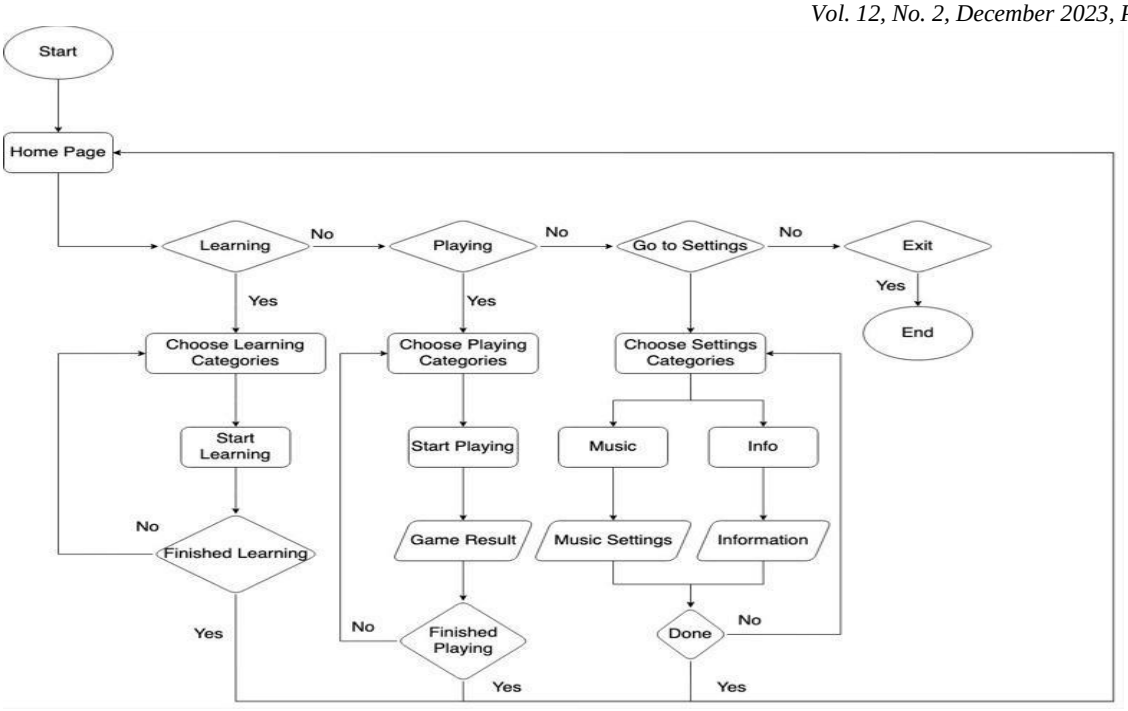


Figure 2. Edugame Arabic Flowchart

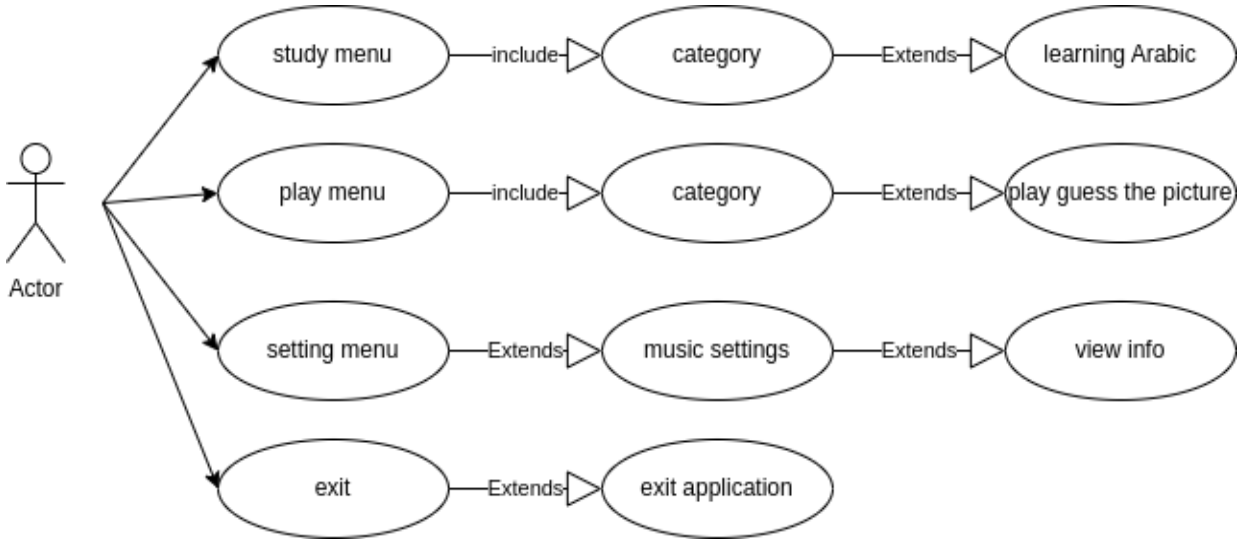
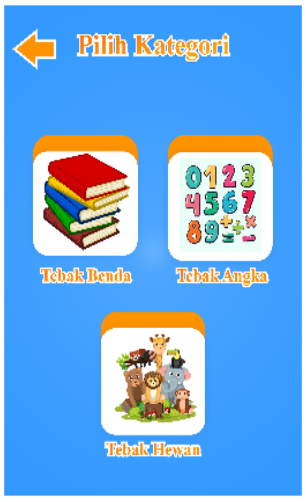


Figure 3. Use Case

Table 1. Storyboard

No	Menu	Description
1	View Home 	*The home screen is the screen that appears when you first open an application. The initial menu screen has two main menus: the learning menu and the game menu. Apart from that, there is a settings menu and an exit button to exit the application.*
2	*View page learning* 	*The learning menu has several categories such as animals, body parts, numbers, transportation, school and home. Additionally, there is also a back button to return to the home screen.*
3	*View Learning Arena* 	*In the learning arena, players will learn Arabic/Muhrodat vocabulary accompanied by pictures and Indonesian translations.*
4	*View Play menu* 	*The game menu has several category menus: Guess the Object, Guess the Number, and Guess the Animal.' There is also a back button to return to the home menu display.*
5	*View Play Detail* 	*Game Arena View: In the game arena view, players guess the picture by choosing the answer that matches the picture displayed. When a player completes a level, he receives 10 points and advances to the next level.*
6	*View Popup Score*	*When a player declares the game over, a pop-up scoreboard will appear. If the score is between 0 and 60, the player receives a star. If the score is between 70 and 130, the player*

No	Menu	Description
		*receives 2 stars. If the score is between 140 and 190, the player receives 3 stars. Then there is a home button to return to the start menu, a retry button to start the game again, and a close button to exit the score popup.*

Table 2. Software Specification

Software	Description
Adobe Flash Professional	Software for creating animations, visualisations, vector designs and games.
Corel Draw X5	Application for editing images/vectors
Adobe Photoshop CS3	Application for editing images/vectors
Google Chrome	As a reference medium in game design.
Windows 10	The operating system used to create the product

Table 3. Alpha Testing

Alpha Testing Result			
Component	***Scenario***	***Expected Output***	***Result***
Home Page	Learning Menu	Go to the Learning page	Satisfied
	Play Menu	Go to play page	Satisfied
	Exit	Exit the application	Satisfied
	Settings	Show settings in the pop-up	Satisfied
Learning Category	Animals Category	Goes to the learning menu with the animal category	Satisfied
	Body Parts Category	Go to the learning menu with the body parts category	Satisfied
	Numbers Category	Go to the number's menu learning category	Satisfied
	Transportation Category	Go to the transportation menu learning category	Satisfied
	School Category	Go to the school learning menu category	Satisfied
	House Category	Go to house learning menu category	Satisfied
Play Category	Guess the object	Go to guess the object game menu	Satisfied
	Guess the number	Go to guess the number game menu	Satisfied
	Guess the animals	Go to the Guess the Animals game menu	Satisfied

3.4.2 *Beta Testing:* The beta testing was carried out with a survey using a questionnaire with a Likert scale. Inside the questionnaire, there are some user feedback agreements, which are very agreed, agree, disagree, and very disagree. Subjects can choose whether the game application can fulfil the user's needs or not. After the subjects answer the questionnaire, the feedback is then calculated in percentages. The results are in Table 4.

Table 4. Beta Testing

Questions	Very Agree	Agree	Disagree	Very Disagree
Edugame Arabic was designed with an interesting theme	42.9%	57.1%	0%	0%
Edugame Arabic has a good and satisfying visual design	33.3%	66.7%	0%	0%
Edugame Arabic can convey material well	42.9%	57.1%	0%	0%
Edugame Arabic could help in learning the Arabic language	52.4%	47.6%	0%	0%
Edugame Arabic is easy to play	33.3%	66.7%	0%	0%
Learning through Edugame Arabic could help users understand several Arabic vocabulary	52.4%	47.6%	0%	0%
The users are enjoy playing Edugame Arabic	28.6%	71.4%	0%	0%
The users are motivated to learn Arabic through Edugame Arabic	38.1%	61.9%	0%	0%
The users are motivated to learn the Arabic language digitally rather than in conventional ways	38.1%	61.9%	0%	0%
The users agree the game can be played in offline mode	61.9%	38.1%	0%	0%

The questionnaire results indicated that all respondents expressed their agreement and appreciation for the game's design, user-friendliness, and the benefits it provides. The evaluation form consisted of four categories: "Very Agree," "Agree," "Disagree," and "Very Disagree." The findings revealed that 42.39% of the participants selected "Very Agree," while 57.61% chose "Agree." Moreover, no respondents disagreed with the application. This consistent positive feedback aligns with the observation that the application performed exceptionally well in all aspects, meeting the users' expectations and ensuring their satisfaction.

3.5 Release

The release stage is the final stage carried out after the alpha trial stage, namely by issuing a release version of the application [20]. Games that have been made with Adobe Flash Pro CS 6 will be published on Android phones, so it is necessary to use a compiler that supports them when played on Android phones. The supporter that can be used on Android phones is Adobe Air SDK 24. This compiler is often used to create applications on Android. This game was released at version 1.0 and continues to develop a new version. Table 5 is evidence of the release of Edugame Arabic on three Android smartphones.

Table 5. Evidence Release Edugame Arabic

Description	Picture
Android 9; RAM specification 6 GB, internal 256 GB, brand Oppo A31.	
Android 11; specification RAM 3 GB, brand Samsung galaxy A20.	
Android 9; specification RAM 4 GB, internal 128 GB, brand Oppo A31.	

Based on Table 5, Edugame Arabic can run well and smoothly on three Android smartphones.

4 CONCLUSION

Arab Edugame was developed using the Game Development Life Cycle (GDLC) method, which includes stages such as initialization, pre-production, production, testing, and release. The Arabic Edugame design process was built using software including Adobe Flash Professional CS6, and Corel Draw. This game is designed to run on a mobile application platform, so the author uses the AIR SDK Compiler to convert it into .apk format. Developed by Adobe Systems, Adobe AIR is a flexible runtime system for creating rich internet applications (RIAs) for desktop and mobile platforms. Players can select menu features: learn, play, organize, and get out. Edugame Arab testing was successfully carried out on several mobile devices with varying storage capacities, namely on mobile devices with the Android operating system version 11 (3 GB RAM), Android version 9 (4 GB RAM and 128 GB internal), and Android version 9 (6 GB RAM and Internal 256 GB).

The author also surveyed via a questionnaire regarding interest in this Edugame. The target of the questionnaire was students taking Arabic language courses. Based on the questionnaire, it was found that 100% of respondents agreed and appreciated the application design, ease of use and benefits of the game. The assessment form includes four assessment categories, namely "Strongly Agree", "Agree", "Disagree", and "Strongly Disagree". The responses obtained showed that 42.39% of participants answered "Strongly Agree" and 57.61% answered "Agree". Apart from that, no respondents stated that they did not agree with the request. The consistently positive feedback is in line with the observation that the app performs extremely well across all the features provided, thereby effectively meeting user expectations and ensuring their satisfaction. Users are motivated to learn Arabic through digital games rather than learning Arabic manually; this Arabic language Edugame can be played offline without the internet. In the future, this Edugame application can be developed further by adding other features, such as speaking, and creating more levels so that the application can become a place to learn Arabic in more depth.

AUTHOR'S CONTRIBUTION

Inggrid Yanuar Risca Pratiwi, as a contributing author, conducted the research with supervision from the third author, Asri Wulan Septiana. Yudha Riwanto, Fauzia Anis Sekar Ningrum, and Ajie Kusuma Wardhana, as concept managers, researched content and provided supervision on theory and writing methods.

COMPETING INTERESTS

Following the publication ethics of this journal, Yudha Riwanto, Inggrid Yanuar Risca Pratiwi, Asri Wulan Septiana, Fauzia Anis Sekar Ningrum, and Ajie Kusuma Wardhana, as the authors of this article, declare that this article is free from conflict of interest (COI) and competing interest (CI).

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