TIN: Terapan Informatika Nusantara
Vol 4, No 11, April 2024, page 719-726
ISSN 2722-7987 (Media Online)
Website https://ejurnal.seminar-id.com/index.php/tin
DOI 10.47065/tin.v4i11.5059

Implementing Digital Game-Based Learning for Qur'anic Arabic Learning Using Serious Game Development Method to Increase Arabic Vocabulary

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Abstract−The Qur'an is regarded as the source for communication with Allah, while most of Muslims in the world are non-Arabs and could barely speak Arabic, it is becoming a challenge for Muslims to have a deeper understanding of God's words and deeper connection with Him. By implementing digital game-based learning as an effort to gain traction among the Islamic world, especially in the digital era of Society 5.0, developing a serious game that specialized in solidifying *mufradat* (Arabic vocabularies) can retain motivation and interest to keep learning the Qur'an by reducing level of stress and boredom, especially Muslim youth living in an age of liberal, this is found to be a serious challenge for the Islamic community to preserve its purity in daily worship. The research method in use is serious game development method, this method fits the unique aspect of a serious game that is comparably different from pure entertainment game development method such as game development life-cycle. Serious game development model involves educational foundations to be a form of game development that orients educational values whilst retaining the fun and engaging aspect of game. The results of this research shown that Qur'anic Arabic serious game using serious game development method is considered acceptable according to the user acceptance test (UAT) indicated by the ratings of 71.57%, this concludes that users found the game to be effective yet engaging to bolster their daily worship and the method being used is effective in implementing game-based learning compared to the conventional game development life-cylce. This result is reliable as supported by Cronbach's alpha reliability level shown to be reaching 0.954 or is an excellent level of reliability using the IBM SPSS Statistics 26 software.

Keywords: Game-Based Learning; Serious Game Development Method; Qur'anic Arabic; Arabic Vocabulary

1. INTRODUCTION

The Qur'an is regarded as the holy book by the Muslims and is used as guidance on how to live in this world, thus it is known to be the device on which humans communicate with the creator (Safliana, 2020). The Qur'an has an important role for the lives of the human being in this world, among those roles are to give instruction to all of Allah's creation, correcting the previous holy books that came before the Qur'an, and establish law among civilizations (Al & Jaz, 2019). Therefore, it is become urgent to understand the content of the Qur'an in order to preserve the connection between men and God as it meant to be the source of guidance for humans or *hudan li al-nas* as the Qur'an refers to itself (Afwadzi et al., 2023).

The language in which the Qur'an is written is Arabic, but in Arabic there are varieties of dialects and locutions, and the Qur'an text language is identified to be classical Arabic. In that case, the mastery classical Arabic becomes the key to true understanding towards the intent of the creator inside al-Qur'an (Baharun et al., 2020). Based on the statistic from Pew Research Center, majority of Muslims are non-native Arabic speaker – more than 85% Muslims are non-Arab, this becomes a challenge for non-natives to study the Qur'an organically, it is known that God (Allah) sent his revelation of the Qur'an using Arabic as the medium of His message and this shows how important Arabic is to acquire the revelation (Selim & Abdalla, 2022; *The Future of the Global Muslim Population | Pew Research Center*, n.d.).

Qur'anic Arabic refers to the unique use of Arabic language inside the Qur'an, where its *mufradat* (vocabulary) is nuanced from the rest of the Arabic dialects. By mastering the Qur'anic Arabic, including memorizing the mufradat, it will significantly bolster non-natives understanding of the Qur'an and helps every day's application of their worship (Fahri et al., 2023).

Information and communication technology in today's day and age has increasingly been used as an alternative solution in education, games are without exception an option to overcome boredom, anxiety, and stress experienced by students. Besides that, games also transform learning experience to be more fun and engaging. Previous researchers have found that implementing gaming aspects on to be effective in increasing student's motivation and participation in learning (Riwanda MAN et al., 2021).

The studies related to implementing game-based learning into learning activity are categorized into three contexts. First, non-game context known as gamification, this does not refer to a game, but a method of implementing game-like experience towards user interfaces. Second, non-digital game context which by definition is a game, but does not revolve around current novel technologies, classic examples of it are traditional game and board game. Third, digital game context which currently keep being researched actively, there are two ways of implementing digital game-based learning and those of which are educational game and serious game (Roedavan et al., 2021).

Previous attempts to implement game-based learning to Arabic language mastery has been done through research. Game-based learning desktop-based application by Jannat (2022) found to have positive impact on Arabic language learning (Jannat & Obaidellah, 2022). Another research by Riwanda (2021) have also implemented gamification to learn Arabic using Kahoot! platform, the research concluded that by implementing this method, it increases the average score of students learning mufradat (Riwanda MAN et al., 2021). Azizah (2020) conducted a

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software development research paper in attempt to develop educational game for learning Arabic language, the conclusion resulted from the research was that software application found to be acceptable as efficient, and fun by modern Islamic boarding schools (Hasna Azizah & Fatah Yasin Irsyadi, 2020). Other similar method to game-based learning is technology-based educational game, it features technology such as virtual reality (VR) for educational purposes and implementing the Qur'an to the game platform resulted in decreasing online game addiction (Siste et al., 2021).

Based on the observations of the previous researchers that the author has made, developing digital game that is focused on teaching rather pure entertainment supposed to be able to provide optimum result of student's engagement (Zainuddin et al., 2023). Therefore, this paper ought to implement game-based learning concept to be a form of integration between Islam, science, technology, and art. Game-based learning (GBL) is a design framework that consists of four main pillars, namely affective, behavioral, cognitive, and social/cultural engagement to create high engagement towards Muslim students. Serious game (SG) is one attempt to implement GBL, it is implemented by developing digital game that is refocused from pure entertainment towards educational game with assessment component included in the game (Dewi & Listiowarni, 2019). Hence, this paper will use SG development model for the methodology.

2. RESEARCH METHODS

The methodology used in developing is the serious game development method proposed by Roedavan et al. (2021) which is adopted from the GDLC (game development life cycle) iterative activity, a development life cycle that suits game development style of art and creativity (Ramadan & Widyani, 2013). This model is dividing the phase of development into four phases namely analysis, production, testing, and release.

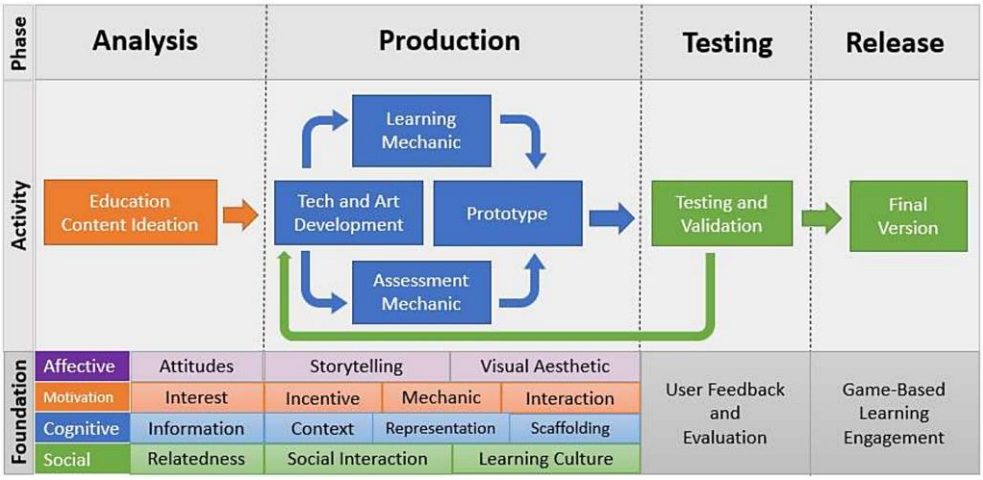

Figure 1. Serious game development model

1. Analysis
   The analysis phase initiates the whole software process of serious game development by ideation of education content. Analyzing the educational point inside the game and ensuring the fun aspect of the game to retain interest of learning. Thus, it is decided for the game content are split into two levels, the first level start with the story of Maryam and then proceeded by the story of Ibrahim. Each story is taken from the Qur'an in verse 12 of At-Tahrim and verse 120 to 122 of An-Nahl respectively, this will fulfill the affective and cognitive aspect based on the Qur'anic teaching. Meanwhile, in order to fulfill the motivation and also social aspect foundation to the game, vocal musical composition of nasheed is added when not reciting the Qur'an.
2. Production
   a. Tech and Art Development
      First step in production phase is to focus at tech and art development, author as developer chose Scratch as the tech development tool and Figma as the art development tool. Scratch is a free web-based visual programming environment by MIT to create media projects, such as games, animations, etc. and is chosen because of its simplicity and easy to learn (Fagerlund et al., 2021). Figma on the other hand is a design tool (Technology, 2020). The game will be represented in 2D visualization, the choice for the visual representation is based on the reading aspect in the learning mechanic. The incentive system implemented in the game is the score system for the rewarding system to the users.
   b. Learning Mechanic
      The learning mechanic is designed for the players to read passages from the Qur'an combined with visual aesthetic and user interaction to make the learning process less boring and ended with the Qur'an recitation at the end of each lesson.

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c. Assessment Mechanic
The game provides the users simultaneous experience of learning while being assessed through the scoring system of quiz, the players had to achieve a certain threshold of score points in order to proceed to the next lesson. This mechanic ensures the users to understand prerequisites vocabularies to continue to the next lesson.

d. Prototype
The final step in the production phase is the prototype of serious game has to be ready to be deployed and tested by all users for the necessary feedback on the prototype, then the game is ready to be evaluated. The game protoype is deployed in itch.io platform and can be accessed through the following link: https://billdan.itch.io/qurani.

3. Testing
There are two activities in testing phase, namely game mechanic testing and educational content validation. This phase will not only include testing the game prototype to test its functionalities, but also includes Likert questionnaire using scales from 1 to 5 to indicate respondents' scale of acceptance such as strongly disagree (SD), disagree (D), neutral (N), agree (A), and strongly agree (SA). The following table 1 shows which interval each Likert scale belongs to alongside its label.

Table 1. Likert scale interpretation

Likert scale	Interval	Label
1	0%-19.99%	Strongly Disagree
2	20%-39.99%	Disagree
3	40%-59.99%	Neutral
4	60%-79.99%	Agree
5	80%-100%	Strongly Agree

The questionnaire instrument is based on evaluation construct in the USE usability evaluation to get the Usefulness, Satisfaction, and Ease of Use, also Ease of Learning dimension of the serious game to be evaluated (Fernanda et al., 2022; Gao et al., 2018; Purwinarko et al., 2020). The ideal score of each item is $9 \times 5 = 45$ and the value percentage is calculated as follows.

$$Value\ percentage = \frac{Score}{Ideal\ score} \times 100\% \quad (1)$$

After each items' value percentage is calculated, value percentage's average is acquired through the following formula.

$$Average\ Value\ Percentage = \sum_{i=1}^{n} \frac{xi}{n} = \frac{2075.6}{29} = 71.57 \quad (2)$$

Notation:
xi = total value percentage
n = number of items

Areliability test is conducted as measurement of the level of trust towards the result of this research so that consistency is achieved. The reliability test is measuring the consistency level using Cronbach's alpha reliability level and is shown in table 2 (Azizah & Irsyadi, 2020; Purwinarko et al., 2020).

Table 2. Cronbach's alpha reliability level

Cronbach's alpha	Internal consistency
$\alpha > 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

The measurement of the reliability test of Cronbach's alpha is in the formula.

$$r_{11} = \left[\frac{n}{(n-1)}\right]\left[1 - \frac{\sum a_{i^2}}{a_{t^2}}\right] \quad (3)$$

Notation:
r_{11} $= instrument\ reliability$
$\sum a_{i^2}$ $= score\ of\ each\ item$
n $= number\ of\ items$
a_{t^2} $= total\ variant$

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4. Release
   Once feedback is received and game is evaluated, the end result is that the game is ready to be released to the targeted market, which is the public domain. The domain chosen is itch.io platform for it is indie game developers friendly and increases the discoverability of the game with no publishing cost (Vu, 2020).

3. RESULTS AND DISCUSSION

3.1 User Interface Design

The main menu interface is designed to be minimalist and family-friendly; the button design is specifically chosen to fit the metaphor of an actual button that is meant to be pressed so as to preserve the affordance of a button. Meanwhile, the choice of blue and orange color palette is to invoke the sense of emotion that accords with colors effect on emotion, where blue is associated with comfortable so that users can feel relaxed while exercising their practice of memorizing and understanding the Qur'anic Arabic vocabularies, while the orange color that is mostly used as emphasis since it is associated with disturbing or upsetting to get the users attention.

Figure 2. Main menu

In figure 2, the title is colored orange to attract user attention on what this game is all about, the color is also found in the highscore box for the user as a player to keep track of their score whilst playing the game, this feature can be used as a measurement of the player's achievement in memorizing Qur'anic Arabic vocabularies.

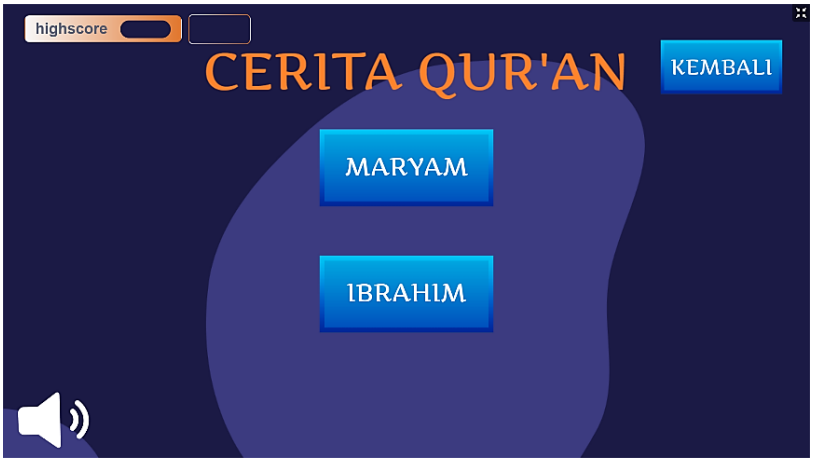

Figure 3. CERITA QUR'AN menu

The *CERITA QUR'AN* menu in figure 3 has two levels of lesson, the first part is the story of Maryam is recited from Q.s. 66:12, the passage tells the story about Maryam the daughter of 'Imran.

ءِ الْقٰنِتِيْنَ مِنَ وَكَانَتْ وَكُتُبِهٖ رَبِّهَا بِكَلِمٰتِ وَصَدَّقَتْ رُوْحِنَا مِنْ فِيْهِ فَنَفَخْنَا فَرْجَهَا اَحْصَنَتْ الَّتِيْ عِمْرٰنَ ابْنَتَ وَمَرْيَمَ ۚ

"And [the example of] Mary, the daughter of ʿImrān, who guarded her chastity, so We blew into [her garment] through Our angel [i.e., Gabriel], and she believed in the words of her Lord and His scriptures and was of the devoutly obedient."

The second and last section of the game prototype's level of lesson tells the story of Ibrahim inside the Q.s. 16:120-122.

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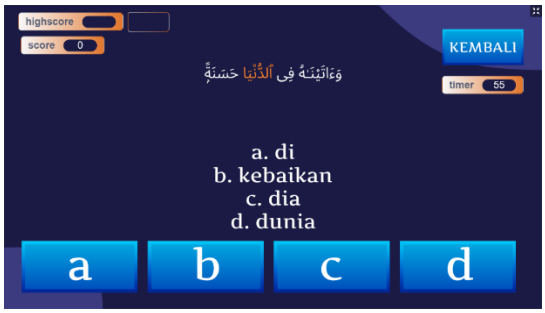
لَمِنَ الْاٰخِرَةِ فِى ۖوَاِنَّهٗ حَسَنَةً الدُّنْيَا فِى وَاٰتَيْنٰهُ مُّسْتَقِيْمٍ صِرَاطٍ اِلٰى وَهَدٰىهُ ۖاجْتَبٰىهُ لِّاَنْعُمِهٖ اكِرًاشَ الْمُشْرِكِيْنَۙ مِنَ يَكُ وَلَمْ حَنِيْفًاۗ لِلّٰهِ قَانِتًا اُمَّةً كَانَ اِبْرٰهِيْمَ اِنَّ ۗالصّٰلِحِيْنَ

"[He was] grateful for His favors. He [i.e., Allāh] chose him and guided him to a straight path. Indeed, Abraham was a [comprehensive] leader, devoutly obedient to Allāh, inclining toward truth, and he was not of those who associate others with Allāh. And We gave him good in this world, and indeed, in the Hereafter he will be among the righteous."

3.2 Level Design

Table 3. Game level design

Levels	Description
	MARYAM level introduces seven new *mudrafat*: 1. مَرْيَمَ 2. عِمْرٰنَ 3. ٱلَّتِىٓ 4. مِن 5. وَ 6. رَبِّهَا 7. كَانَتْ The vocabularies chosen are among the most frequent word found in the Qur'an. IBRAHIM level introduces sixteen new *mufradat*: 1. إِنَّ 2. إِبْرٰهِيمَ 3. كَانَ 4. لِلَّهِ 5. لَمْ 6. ٱلْمُشْرِكِينَ 7. شَاكِرًا 8. لِّ 9. هُ / هِ 10. إِلَىٰ 11. صِرٰطٍ 12. مُّسْتَقِيمٍ 13. فِى 14. ٱلدُّنْيَا 15. حَسَنَةً 16. ٱلْـَٔاخِرَةِ The vocabularies in this level are among of the mostly occurred in *al-Qur'an*.
	

The game level design shown in table 3 listed all of the *mufradat* that the user as a player to be mastered along the game. The choice of the Qur'anic passages is considered based on how frequent those vocabularies are used throughout the whole Qur'an and the chosen words are amongst the common ones.

3.3 User Acceptance Testing

The questionnaire for the user acceptance testing (UAT) is in the form of online questionnaire accessed through https://forms.gle/8nRh4ADZVsD8JzhV6 and is responded by students from Universitas Pendidikan Indonesia with 9 voluntaries that are willing to participate in the UAT to test out Qurani, serious game for learning Qur'anic Arabic.

Table 4. USE questionnaire result

Variable	Instrument Code	Items	Likert Scale					Score	Value percentage
			SD	D	N	A	SA		
Usefulness	U1	It helps me learn Qur'anic Arabic effectively	1	1	0	4	3	34	75.6%
	U2	It enhances my productivity in learning Qur'anic Arabic	1	1	0	6	1	32	71.1%
	U3	The game is useful for acquiring Qur'anic Arabic vocabulary mastery	0	1	1	5	2	35	77.8%
	U4	It gives me more control over my Qur'anic Arabic learning activities	2	1	2	3	1	27	60%

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Variable	Instrument Code	Items	Likert Scale					Score	Value percentage
			SD	D	N	A	SA		
Ease of Use	U5	It makes learning Qur'anic Arabic easier and more manageable	1	2	0	4	2	31	68.9%
	U6	The game saves me time in my Qur'anic Arabic learning process	1	1	2	2	3	32	71.1%
	U7	It meets my need for learning Qur'anic Arabic	0	2	1	5	1	32	71.1%
	U8	The game fulfills my expectation for learning Qur'anic Arabic	2	1	2	3	1	27	60%
	EU1	Qurani is easy to navigate and use	0	0	4	4	1	33	73.3%
	EU2	Qurani has simple and user-friendly interface	0	3	1	3	2	31	68.9%
	EU3	The game requires minimal steps to accomplish learning tasks	0	1	2	5	1	33	73.3%
	EU4	Qurani offers flexibility in learning Qur'anic Arabic	1	1	1	4	2	32	71.1%
	EU5	Using the game feels effortless for learning Qur'anic Arabic	0	1	3	4	1	32	71.1%
	EU6	I can use the game without relying on written instructions	0	1	1	6	1	34	75.6%
	EU7	I don't encounter any inconsistencies while using the game	0	2	3	4	0	29	64.4%
	EU8	Both occasional and regular users would find it easy to use	2	0	0	3	4	34	75.6%
	EU9	I can recover from mistakes quickly and easily while using the game	1	0	1	4	3	35	77.8%
	EU10	I can successfully use the game every time	1	0	2	6	0	31	68.9%
Ease of Learning	EL1	I learned how to use the game quickly	0	1	2	4	2	34	75.6%
	EL2	I easily remember how to use the game	0	1	0	4	4	38	84.4%
	EL3	It is easy to learn how to use the game	0	1	0	3	5	39	86.7%
	EL4	I quickly become skillful in using the game	0	0	0	6	3	39	86.7%
Satisfaction	S1	I am satisfied with the game	1	3	1	3	1	27	60%
	S2	I would recommend the game to others interested in learning Qur'anic Arabic	2	0	1	5	1	30	66.7%
	S3	It is enjoyable to use the game	1	2	1	5	0	28	62.2%
	S4	The game works the way I want it to	0	1	2	5	1	33	73.3%
	S5	It is a wonderful tool for learning Qur'anic Arabic	1	2	1	3	2	30	66.7%
	S6	I feel the need to use it regularly for learning Qur'anic Arabic	2	1	0	4	2	30	66.7%
	S7	It is pleasant to use the game for learning Qur'anic Arabic	1	1	1	4	2	32	71.1%

The average of value percentage is 71.57% after calculated using formula (2) – each value percentage is calculated according to formula (1) prior calculating the average, this number can be interpreted using table 1. The interval that interprets average value percentage of Likert scales is obtained by division of 100 by the number of scales, five in this case. The level of acceptance by users after testing is in between the interval of 60%-79.99%, which corresponds to users agree to accept the digital game-based learning method for learning Qur'anic Arabic.

The instrument reliability based on SPSS calculation is 0.954 with the formula (3) and has internal consistency classified as excellent according to table 2, this concludes that the USE questionnaire used as the research instrument has a reliable result.

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4. CONCLUSION

The implementation of digital game-based learning to teach Muslim youth can be a good opportunity to occupy their vacant time with the Qur'an and to solidify the mastery of mufradat as daily needs for worship. Qurani as implementation of a digital serious game using the serious game development model has been agreed upon students in Universitas Pendidikan Indonesia to be acceptable, based on the user acceptance result, average acceptance result reached 71.57% of acceptance. Serious game for the purpose of worship is a solution for Muslim in the digital era that are non-natives to Arabic language in general, it reduces level of stress and anxiety, and also a great way to spend their spare time without feeling bored whilst being engaged towards the recitation and understanding of al-Qur'an. The result found in this research is found to be reliable after being tested using IBM SPSS Statistics 26 software.

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TIN: Terapan Informatika Nusantara
Vol 4, No 11, April 2024, page 719-726
ISSN 2722-7987 (Media Online)
Website https://ejurnal.seminar-id.com/index.php/tin
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