

The Role of Game Elements in Improving *Jawi* Skills through a Mobile Game 'G-*Jawi*'

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Abstract—The existence of a game-based mobile application in the field of education has largely helped students to be more interested and motivated to learn due to the presence of game elements in the apps which makes learning more interesting. The *Jawi* script is one of the subjects that is difficult to learn by younger generation since they do not apply the use of *Jawi* in their private lives. The inclusion of creative features such as game elements should attract students to explore the *Jawi* script. A pre- experimental one- group pre- test and post- test study was conducted in which a game-based mobile application for learning *Jawi* subject named G-*Jawi* was developed and tested among 20 primary school students in order to observe how the elements of the game in the mobile app impacted their *Jawi* spelling skills. The apps were also evaluated by 5 teachers and the findings shows that the game-based mobile application was able to improve the students' performance. This finding was supported by positive results amongst the students which revealed a mean value for the post- test was higher than the pre- test of 89.00. In conclusion, the mobile games app has successfully enhanced student's understanding of *Jawi* subjects compared to the traditional learning methods.

Keywords—game-based mobile application, game elements, *Jawi* understanding, and students' performance

1 Introduction

The diversity of methodologies in teaching and learning process is very helpful in the education system throughout the world. One of it is the game based learning, as stated by [16], which has helped students to be more focused, enthusiastic and successful in learning because play activity is something natural that is inherent in every individual's interest of doing things. Hence, the usage of mobile game application for teaching and learning has recently increased worldwide whether in schools, kindergartens, universities, and other educational institute.

Generally, mobile game-based learning can be accepted by all students regardless of age since each application and its content is designed and developed according to the user's suitability [1]. The developers should examine the appropriateness of each game

element for each learning app and set a game concept that the users can use to achieve the goal of using educational games based apps. According to [13], not all elements of the game have to be included, but a great game is a game that adopts elements that are appropriate in accordance with the concept of the game developed.

Although there are various downloadable games for education on Google Play Store and Apple Store, there is still one subject that is less attention by the application developer, which is *Jawi* education. As mentioned by [10], the weaknesses in *Jawi* writing skills causes students to be less interested in studying Islamic Education subject because the subject uses the *Jawi* script as the main medium in delivering lessons. Therefore, the purpose of this study is to develop a mobile game application that focuses on *Jawi* spell skills named G- *Jawi* by targeting primary school students in helping to foster their interest in writing the *Jawi* script.

1.1 Relevance of mobile game-based learning

According to [7], the usage of game as a teaching tool can motivate students as well as help students in making effective decisions for themselves. Game-based learning method is able to encourage students to understand the lessons taught by teachers through entertaining play situations [15]. Students can interact with their friends while playing the app and leading to an exchange of opinions and ideas session where the students enhances their cognitive skills. This was supported by [18], which proved that mobile learning games can provide positive impact on students if students understand the facts presented in the application as well as understanding the facts present in the textbook.

Learning through mobile devices is actually a self-directed learning process where learning can take place anywhere and is not limited to the classroom only [7]. Albeit with no guidance from the teachers, students can still use the mobile game learning app as it comes with instructions, guides, and rules that help students to use, play, and learn something from the game learning apps. In addition, the learning game app is also equipped with notes to ensure that students understand the learning outcomes from using the games while encouraging them to engage in higher order thinking skills [16]. According to [14], traditional teaching methods which solely use textbooks are not able to attract students towards learning. However, learning through games can generate a deeper understanding of the subjects learned as they have the opportunity to explore, investigate, think, and solve problems while playing [20]. Generally, mobile game based learning is the ideal medium to use today in line with the development of modern technology and 21st-century class as well as to increase the student's interest to explore subjects through games and to further improved the student achievements at school.

1.2 Characteristic of game elements

According to [13], there are twelve elements which make the games become engaging and each element has its own purpose. The characteristic of each element is shown in Table 1 but the developer of G- *Jawi* mobile app has chosen ten out of twelve game

elements which are namely: fun, play, rules, goals, interactive, adaptive, outcomes and feedback, win states, challenge, and problem solving.

Table 1. Characteristic of game elements [13]

Game Element	Purpose
Fun	Make players feel entertained and amused.
Play	Help players engage with passion.
Rules	Provides instructions to players.
Goals	Encourage and motivate players.
Interactive	Simplify the games.
Adaptive	Ensure that the games suitable to the players.
Outcomes and Feedback	Ensure the players learn and gain knowledge from the games.
Win States	Make the players proud.
Challenge	Give players spirit and adrenaline.
Problem Solving	Encourage players' creativity.
Interaction	Help players becoming socialize.
Story Line	Make the game alive and give emotion to players.

With reference to Table 1, mobile learning app developers can implement the elements of the game by assisting them in the development of mobile learning app that meets the needs of their intended users. All elements of the game need to be adjusted according to the player's target age, game concept, learning content and local culture. Sensitivity should be taken into care of and the elements of violence in the game should be avoided in the game to ensure that players did not act aggressively when playing the game [13].

There are six key elements in the game which are: rules, goals, results and feedback, challenges, interactions, and storylines that differentiate mobile games or video games with other types of games [13]. The rules and goals element suggests that a good and purposeful game should have instructions and guideline to help players play properly and structured to achieve their objective at the end of the game [3]. In addition, the outcome and feedback element are to measure the player progress while ensuring players learn something from the game. Besides that, the challenge elements are components that the players need to solve in order to continue the game. This element has its own distinctive stages from the easiest to the hardest. The next element is the interaction that fosters the spirit of socialism during the game in which the players can play and solve challenges together. The last element is the storyline that brings meaning to the game where the players can understand the requirements as well as making them imagine and fantasize while playing. As mentioned by [8], a good educational game need to have a balance in terms of playing satisfaction and enhancing knowledge in which players uses their cognitive skills when solving a game challenge and improved their creativity and high order thinking skills [12].

1.3 Significance of *Jawi* in Mobile Game App

The *Jawi* script has been the official script for people in Malaya and is being used in various affairs such as in administrative, diplomatic relations, trade, Malay affairs, and education system [4]. However, due to the emergence and adoption of Roman script in Malaya after the formation of Malaysia, the *Jawi* script were less used causing the marginalization of the *Jawi* script by the current generation [19]. As a result, the level of writing skills and spelling in *Jawi* amongst students is at a poor level where 65.4% of primary school students were not able to write *Jawi* [5]. Based on that result, this proves that all parties need to take actions to uplift the *Jawi* script for the younger generation.

Hence, the appropriate approach to enhance the interest of the younger generation towards *Jawi* writing is to get adapted to modern technology and absorb the teaching and learning process [11] since the present generation who grew up in the digital world are familiar using modern technology [2]. Amongst today's trending technologies are mobile game apps which help students to improve their knowledge and skills in virtual environments [18] which can also be combined with *Jawi* education because it is one of the educations that require thinking skills and writing skills with the advantage of increasing the interest of students with attractive video game elements [2].

According to [17], students are more likely to learn *Jawi* writing through the use of game applications than using only books and pens as multimedia elements such as graphics, animation, and video which are helpful in giving understanding and mastery of writing, reading, and spelling *Jawi* among students as well as promoting active teaching and learning processes between teachers and students. Additionally, the use of mobile game learning applications offers self-directed learning which allows students to easily learn *Jawi* and carry out various activities such as training learning *Jawi* as expressed by [9], the use of mobile applications in language learning helps in enhancing motivation and autonomy among students because it is easy and fast accessible to learn the language anytime and anywhere.

2 Methodology

The effectiveness of the developed G-*Jawi* application was tested using quantitative research designs and pre- experimental one group pre- test and post- test methods upon the respondents. The purposive sampling method has been used in the process of selecting the samples. A total of twenty students from Year Two and Five teachers from one of the primary schools in Johor Bahru, Malaysia were chosen as the respondents for the study. The students who were selected as the respondents comprised of students who have obtain the Grade A in the Islamic Education subject during their final exam for the year 2016. This selection is to ensure that all respondents were able to answer the questions presented in the app. Meanwhile, the five respondents selected are teachers that are teaching Islamic Education at the school. Two set of questionnaires comparing both pre- test and post- test were distributed to the respondents in order to evaluate the developed app.

The development of G-*Jawi* game application is based on several elements of the game as suggested by [13] so as to ensure that G-*Jawi* achieved its' objectives. Ten out

of the twelve proposed game elements have been implemented into the G-*Jawi* app which are fun, play, rules, goals, interactive, adaptive, outcomes and feedback, win states, challenge, and problem solving. All the elements of the game included in G-*Jawi* app were adjusted according to age, level of learning, and the ability of the respondents. The selection of colours, icons, graphics, video, visuals, and button design emphasizes interactive and adaptive elements where it facilitates players and attract players' attention to keep playing without being bored [13]. Table 2 explains the usage of the game elements in G-*Jawi* app while Figure 1 shows some of the interfaces available on the G-*Jawi* mobile app.

Table 2. Use of game elements in G-*Jawi*

No.	Game Element	Description
1	Fun	<i>Jawi</i> videos sing along to help the players in improving their cognitive skills in memorizing the <i>Jawi</i> letters.
2	Play	There are three types of games available in the G- <i>Jawi</i> app: 1. Spelling 2. Reading 3. Guessing
3	Rules	The G- <i>Jawi</i> App provides the rules towards the players.
4	Goals	The players must complete each level of the game in the G- <i>Jawi</i> App.
5	Interactive	G- <i>Jawi</i> App was created with Interactive and friendly user buttons and links.
6	Adaptive	Design, colour, animation, audio, and graphics used in the G- <i>Jawi</i> App are also in line with the level education of the players.
7	Outcomes and Feedback	Each game comes with a description of the playing outcomes.
8	Win States	The player will be informing whether they are winning or losing the game.
9	Challenge	G- <i>Jawi</i> App has 4 levels. Higher level can only be unlocked if the player win the lower level.
10	Problem Solving	The game is a problem-solving game where players need to complete each task by thinking and using their creativity.



Fig. 1. Screens of the G-*Jawi* app with some game element based on [13]

3 Findings

A total of 20 students were selected to undergo the pre- experimental process to test the effectiveness of the game elements on G-*Jawi* game applications. The effectiveness of the app was evaluated using the pre-test and post-test questionnaires. Table 3 and 4 shows the differences and the increment in post-test scores obtained after using the G-*Jawi* game app. Overall, the post-test scores increased after using the G-*Jawi* application with the mean value of post-test (89.00) which is higher than the pre- test mean value (72.25).

Table 3. Differences Pre- Test and Test- Post Score

Student	Pre-Test (%)	Post-Test (%)	Differences (Post-Test) – (Pre-Test) (%)
1	80	100	20
2	95	100	5
3	80	90	10
4	80	95	15
5	75	100	25
6	60	90	30
7	75	80	5
8	55	75	20
9	50	90	40
10	95	100	5
11	65	75	10
12	75	90	15
13	75	95	10
14	75	90	5
15	50	55	5
16	75	85	10
17	70	95	25
18	75	80	5
19	70	95	25
20	70	100	30

Table 4. Increased scores by number of students

Score Increase (%)	Number of Students
5	6
10	4
15	2
20	2
25	3
30	2
40	1

In order to strengthened the results of the study, students were also required to answer a set of questionnaires so as to ascertain the views of students on the content of the G-*Jawi* app. Based on Table 5, the percentage of students who answered 'Yes' is higher than 'No' for all of the questions where they have agreed that elements of the game used in the applications is effective in attracting their attention.

Table 5. Student's view on G-*Jawi* game application content

No.	Item	Yes (%)	No (%)
1	This game application caught my attention.	95.00	5.00
2	The game instructions are easy to understand.	90.00	10.00
3	Graphics or images used are appropriate, clear, and interesting.	95.00	5.00
4	The questions given are easy to understand.	80.00	20.00
5	This game application is easy to use.	85.00	15.00
6	Text or writing is easy to read.	95.00	5.00
7	The sounds present in the game are clearly heard.	85.00	15.00
8	The activity in this game is challenging my mind	70.00	30.00
9	The video can be watched perfectly.	85.00	15.00
10	The game is very fun.	100.00	0.00

Besides the students, teachers were also required to answer a set of questionnaires so as to obtain their views on the content of G-*Jawi* game applications. Based on Table 6, the highest mean value is 4.80 which is related to the clear audio- based questions in the app and followed by questions related to graphic elements, suitability of questions, and videos which help students memorize *Jawi* letters obtain the same mean value of 4.60. On average, the mean value is 4.28 indicating that teachers are satisfied with the content of the G-*Jawi* application where the mean value exceeding 3.68 indicated that the scores given by the respondents are high.

These findings show that the elements of the game proposed by [13] was helped in the development of mobile game applications especially in the G-*Jawi* app. Students agreed that the G-*Jawi* app is able to attract their attention as a fun additional learning tool. Additionally, they can also easily understand the game instructions and rules as well as easy-to-understand questions besides students and teachers also feel that the G-*Jawi* app is interactive and adaptive to them as well as the game challenged the minds of the students. Furthermore, the videos included in the app enhance the student's enjoyment while using the app. To conclude, all of the elements of the game as mentioned in Table 2 have resulted in a game-based *Jawi* learning application that encourages students to learn *Jawi* in a fun and enjoyable atmosphere whilst encouraging them in recognizing *Jawi* letters, memorizing *Jawi* letters, and spelling *Jawi*.

The results of both pre-test and post-test proved that learning by using mobile game apps more helped students to improve reading, spelling, and studying *Jawi* writing skills than traditional learning methods. This suggests that the use of game elements available on G-*Jawi* mobile game applications can make *Jawi* writing lessons more

interesting as well as motivating students to continue studying *Jawi* script from time to time.

Table 6. Teacher's view on G-*Jawi* game application content

No.	Item	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	Mean	SD
1	The design of the app is interesting.	0	0	1	3	1	4.00	0.707
2	The instructions are easily understood by students.	0	0	1	3	1	4.00	0.707
3	Graphical and animation elements were used to attract students.	0	0	0	2	3	4.60	0.548
4	The questions used were in accordance with Year Two student levels.	0	0	0	2	3	4.60	0.548
5	All elements (buttons, icons, and links) in the app work properly.	0	0	0	5	0	4.00	0.00
6	Text or writing can be read clearly.	0	0	0	5	0	4.00	0.00
7	The audio used is heard clearly.	0	0	0	1	4	4.80	0.447
8	The interactivity of this app is in line with the student's level.	0	0	0	3	2	4.40	0.548
9	The video helps the students in memorizing <i>Jawi</i> letters.	0	0	0	2	3	4.60	0.548
10	The game is fun and challenges the students.	0	0	2	2	1	3.80	0.837
	Average						4.28	0.489

4 Discussions and Conclusion

Positive reactions from students and teachers through the evaluative instruments used has provide information that the game elements implemented into learning applications can make the learning process more effective as it is able to attract students' attention in particular to use the app as an additional tool in learning *Jawi*. The findings of this study have supported the study by [20] that learning through playing enhances the students' understanding of learning and enhances the development of the student's cognitive processes. However, the G-*Jawi* game app does not implement the fantasy element because according to [6], a good educational game app should highlight fantasy and game elements more than the content of learning where the students acquires knowledge and skills indirectly when playing the app. Even so, the development of the G-*Jawi* app has improved the understanding of students towards *Jawi* Education. This is supported by [3] that the characteristics of a game for *Jawi* spelling learning are goals, rules, challenges, and interactivity in which the developer also implements those characters in the G-*Jawi* app. Based on the elements of the game recommended by [13], there are twelve elements of the game that should be used to produce a good learning game. However, the developer uses only ten of the game elements and does not use interaction and story line elements in the development of G-*Jawi* which makes the players unable to play their role in the G-*Jawi* app.

Using a game-based learning approach, the G-*Jawi*'s application's development has improved the students' understanding of *Jawi* education especially in the process of recognizing *Jawi* letters, memorizing *Jawi* letters, reading *Jawi*, and spelling *Jawi*. In addition, the use of game elements should be studied before implementing the development of applications to suit the learning objectives of each student. In addition, the development of the application should look at factors such as gender, skills, culture, and relationships with mentors to ensure that the applications is used as an additional learning tool during the teaching and learning process either at school or at home by the students and teachers. In conclusion, it is hoped that the G-*Jawi* game application will further enhance the students' understanding of *Jawi* education and indirectly improve *Jawi* writing in Malaysia.

5 Limitation and Future Studies

The G-*Jawi* game application development does not use two game elements proposed by [13], interaction and story line. Thus, the effectiveness of the interaction element and the story line element cannot be seen in the G-*Jawi* app. For future research and development, the developers will use twelve game elements simultaneously which could be customized according to the chosen target user. In addition, future research will concentrate on how developers can develop game applications for *Jawi* learning for children as early as kindergarten so as to foster and introduce *Jawi* script before they enter school. Thus, these children can recognize and mastered the *Jawi* education as early as from five years old.

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