

Enhancing Pre-Schoolers' Learning Motivation in *Jawi* Subject Through Game-Based Learning Application

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Abstract: Game-based learning applications are becoming increasingly popular as an effective means of enhancing student motivation to learn. *Jawi*, a subject often viewed as uninteresting by students, has decreased motivation to learn due to a lack of technology resources. To address this issue, the "*Dunia Jawi*" mobile application was developed as a game-based platform to improve preschoolers' motivation to learn *Jawi*. In this study, student motivation was measured based on the ARCS model, which consists of four components: attention, relevance, confidence, and satisfaction. The study involved a pre-experimental group of 32 preschoolers evaluated using the pretest-posttest design. The results found an increment in preschoolers' motivation, where the mean for the posttest (43.50) was higher than the mean for the pretest (31.47). The increment was statistically significant, indicating that the use of the "*Dunia Jawi*" mobile application led to a significant increase in motivation to learn *Jawi* among preschoolers. Moreover, each ARCS component showed an increment in attention, confidence, and satisfaction. The attention component refers to capturing students' interest and encouraging them to focus on the learning material. The confidence component refers to the student's belief in their ability to learn the material. The satisfaction component refers to the student's enjoyment of the learning experience. The results indicate that game-based learning applications, such as "*Dunia Jawi*," can enhance each component, thereby increasing student learning motivation. The relevance component, which deals with how the students view the value of the learning content, did not, however, experience any appreciable shift. The "*Dunia Jawi*" mobile application may not have had as much of an influence on this component as it could have because the preschoolers may not have seen the content as being applicable to their everyday lives. In conclusion, this study proves that game-based learning applications, coupled with the ARCS model, can enhance preschoolers' motivation to learn *Jawi*. The results demonstrate that the "*Dunia Jawi*" mobile application effectively increased preschoolers' motivation to learn *Jawi*, particularly in the attention, confidence, and satisfaction components. Future studies could explore ways to increase the learning material's relevance to further enhance preschoolers' motivation to learn.

Keywords: Mobile- game application, Learning motivation, ARCS Model, *Jawi* learning

1. Introduction

Jawi is a writing system used to write the Malay language using Arabic script. It is named after the Arabic word for "Java", as it is believed to have originated on the island of Java in Indonesia. The *Jawi* script was widely used in the Malay Archipelago before the introduction of the Latin alphabet by European colonizers. It is still used today in some parts of Southeast Asia, particularly in Malaysia, Brunei, and some parts of Indonesia. *Jawi* is a subject in the primary school curriculum in Malaysia. However, there has been an issue of the decline in student achievement in *Jawi* subjects, it was found that the factor in the occurrence of the situation is that students need to be provided with more reference resources to empower *Jawi* education. Unlike other subjects, the dumping of printed and digital reference resources has helped improve student performance.

Besides that, the teacher's delivery method during the teaching process is also a constraint for students in achieving understanding and satisfaction in the learning process. Thus, the decrease in student motivation in education is not a small matter. The need for reference sources is one of the main factors in this issue. The use of innovative teaching aids based on student needs is seen as an effective initiative in re-increasing student motivation in learning *Jawi* subjects. According to Keller (2010), learning motivation needs to be instilled in students as early as the introductory session and needs to be maintained to ensure that students can develop their own skills. To solve this issue, a game-based learning application is the best approach as a *Jawi* learning resource suitable for all ages, especially preschoolers. The applied game concept can make students have more fun when learning *Jawi*. In addition, the use of game applications can foster the concept of student-centered learning that can build confidence (Reynolds, Roberts, and Hauck, 2017) and foster a positive perception of *Jawi* education (Adly and Mardzelah, 2016).

2. Research Background

2.1 Student Motivation Problems in Jawi Learning

The decline of the *Jawi* learning skills is the beginning of the *Jawi* writing marginalization in the future and needs to be curbed as early as the preschool level (Yusoff, 2005). According to Wahab et al., (2017), the decline in *Jawi* mastery is linked to the problem of *Jawi* learning materials that do not attract students' interest. In addition, the results of a study by Mardhiyyah (2012) showed that most respondents often showed a bored reaction when the teacher used traditional method during *Jawi* learning session.

Various efforts can be made to generate student motivation, such as diversifying teaching strategies and resources that are more innovative and creative in line with the wishes and needs of students (Jaafar et al., 2017; Nahar and Safar, 2016; Azli and Azan, 2013). Like the results of a study conducted by Adly and Mardzelah (2016), 100% of respondents admitted that game-based learning could increase their motivation towards learning *Jawi* compared to traditional and formal learning. Therefore, initiatives to restore students' motivation towards *Jawi* learning need to be taken immediately to curb the problem of decline in *Jawi* learning proficiency in the future.

2.2 The Potential of Digital Game Application in Increasing Jawi Learning Motivation

Efforts to foster the motivation of the young generation towards learning *Jawi* should start at the preschool level, but the method of exposure should be appropriate to the natural needs of students (Azli and Azan, 2013). The learning strategies and resources used should be game-based and have a relaxed concept because children's nature is to play (Ashari et al., 2013). A study by Ahmad, Aurani, and Mazlan (2018) shows that preschool students well receive the use of *Jawi* learning resources with an informal concept. In addition, most respondents showed increased motivation and were certified by the teacher that the tool is user-friendly, fun, and supports *Jawi* learning by preschool students (Ahmad et al., 2018). Interactive learning content designed in a digital game-based platform is important to catch attention and stimulate children's minds' development (Mokhtar, Mohamed, and Sunar, 2019). The active involvement of preschool students can also be fostered using digital game-based learning applications through a combination of game elements adapted to learning, such as challenge elements, rewards, problem-solving, and many more (Behnamnia, Kamsin, and Ismail, 2020). Accordingly, digital game-based learning applications are seen as a *Jawi* learning medium that has the potential to help preschoolers become more motivated.

3. Literature Review

3.1 Mobile Game-Based Learning

Mobile game-based learning is a learning platform that uses games to enhance the learning experience while maintaining a balance between learning content and games (Tan, 2019) applied in the real world (Cózar-gutiérrez and Sáez-lópez, 2016). This strategy requires systematic and consistent planning and organization of each content to achieve each set learning goal (Pho and Dinscore, 2015). According to Perrotta, Featherstone, Aston, and Houghton (2013), the game-based learning approach has several main principles, among which this strategy is implemented voluntarily, a fun learning environment, goal-based learning, the concept of independent learning, and learning through experience. In addition, this game-based learning strategy is an innovation in the education system suitable for all levels of education (Becker, 2016). Three factors of the effectiveness of mobile game learning are the type of games, platform, and technical characteristics (Tan, 2019). These three factors need to be considered and adapted to the student's level to maintain students' active involvement during the class session. In addition, combining learning goals, game design, learning theory, and game elements can produce a game that could improve students' mastery and skill development [21].

3.2 Game Elements for Learning Strategies Based on Digital Games

Improving students' ability, skills, and achievement in doing something is easier through playing experience (Achraf and Youngkyun, 2018). The element of fun found in a game can provide satisfaction without coercion or insistence in learning something without feeling bored (Prensky, 2001). A total of twelve digital game elements proposed by Prensky (2001) are intended as a guide to the developers of digital game application systems in producing game applications that are effective for learning. The elements are fun, play, rules, objective, interactive, adaptive, feedback, win, challenge, problem solving, interactive, and storytelling.

The role of fun elements is to create comfort and increase motivation in a learning process (Prensky, 2001). Next, according to J. Huizenga, W. Admiraal, S. Akkerman (2009), game activities in learning sessions clearly affect engagement, motivation, and mastery. The excitement of playing makes students concentrate and master the lesson (Barzilai and Blau, 2014). According to Prensky (2001), the rule element is to ensure play activities are more organized and purposeful. Accordingly, the objectives of the game and learning need to be clearly stated at the beginning of the game process to inject students with enthusiasm and motivation (Prensky, 2001). The interactive element of a game is intended to make the game seem 'alive' and able to communicate even if the game is used individually without guidance from the teacher or any other party. Therefore, the language used in the game system must be simple, easy, and suitable for the student's level (Prensky, 2001). In addition, elements of representation or storytelling are used to create students' emotions for more fun and passion for completing the game (Prensky, 2001). Furthermore, the element of challenge is to stimulate adrenaline to ensure that the playing process is not boring. Besides that, according to Prensky (2001), each activity or task should start with the easiest level and then move to more difficult levels.

3.3 Digital Mobile Game Based Jawi Learning and the ARCS Motivation Model

A combination of game elements adapted to *Jawi* learning can help increase student learning motivation since it is not direct learning (Prensky, 2003). This method is suitable for preschoolers who are still unable to get involved in formal learning (Ashari et al., 2013). According to Ashari and Baharuddin (2017), teaching subjects related to language and writing through playing methods can support student-centered learning methods. The selection of the ARCS motivational model by John M. Keller for this study is because this model clearly explains the teaching system design by using technology equipment, whether online learning or blended learning, that prioritizes the self-learning method (Keller, 2010).

In addition, the ARCS motivation model also provides a measurement tool that shows the change in student motivation after going through the learning process. Two instruments for measuring changes in student motivation that can be used through the ARCS model are Course Interest Survey (CIS) and Instructional Materials Motivation Survey (IMMS). CIS is used to measure the effectiveness of motivation through teaching methods delivered through face-to-face methods, either directly or online. Meanwhile, IMMS is used to measure changes in student motivation based on the ARCS through student-centered learning using ICT or printed equipment (Keller, 2010).

4. Methodology

The research design for this study is quantitative and one group pre-experimental approach to examine the effectiveness of the *Dunia Jawi* apps. The respondent for this study is preschoolers from one preschool located in one of the cities on the east coast of Peninsular Malaysia. The researcher used purposive sampling techniques and set several criteria for selecting respondents, including being six years old and not having speech difficulties. The study involved 32 respondents from two classes. The development of *Dunia Jawi* Apps was based on the Malaysia Standard Preschool *Jawi* Education syllabus.

4.1 Instrumentation

To assess the effectiveness of the *Dunia Jawi* application, the researcher utilised the Reduced Instructional Material Motivation Survey (RIMMS), which is a revised version of the Instructional Material Motivation Survey (IMMS) initially developed by Keller (2010). The RIMMS questionnaire was chosen for this study as it had been used by other researchers, including Tongco (2007), in previous studies that focused on the use of ICT in preschool education. However, the questionnaire was modified to suit the requirements of this study, with two versions created to evaluate the traditional (*Jawi* education textbook) and game-based learning (*Dunia Jawi* application) methods. The questionnaire items were developed based on the expectancy-value theory and evaluated using a four-point scale and facial reaction symbols to facilitate ease of use for the respondents. Four university lecturers reviewed the questionnaire to ensure its validity by assessing its difficulty level, language, item objectives, and rating scale. An internal consistency test was then conducted, resulting in an overall alpha coefficient value of 0.898.

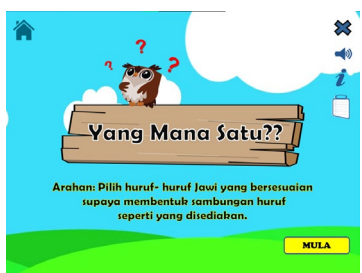
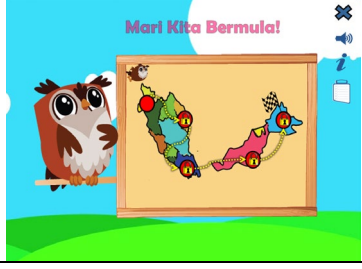
4.2 Development of Dunia Jawi Game-Based Learning Application

The *Dunia Jawi* application offers its content in a game format that is tailored to the respondent's level to prevent boredom during the experiment. To create this content and select the game type, the researcher first needs to assess the student's ability to interact with a touch screen based on their age level, as recommended by Aziz (2013), which suggests that pre-schoolers aged five to six are suitable for using smartphone-based

learning applications as they can operate touch screens by pressing buttons and performing drag and drop movements. The study by Gossen et al., (2015), highlights the importance of designing a specific character to represent the player in the virtual world, using simple language to ensure easy comprehension of instructions, prioritizing the use of pictures over text, and choosing bright colours to keep players engaged. Additionally, the researcher designed large menu buttons for ease of use.

Prensky's twelve digital game elements were prioritized in the creation of content to increase respondent motivation in terms of attention, relevance, confidence, and satisfaction. These game elements not only encourage learning but also boost self-confidence through self-directed learning. Virtual interaction is utilized to help respondents understand all game rules and learning guidelines, with an audio system available for those who cannot read.

Table 1: Prensky digital game elements in *Dunia Jawi* application

Elements	Details	Interfaces
Rules	Guidelines on proper handling methods.	
Objectives/ Goals	Learning outcomes are explained before the game starts.	
Interactive	Every button, character, audio, and animation are designed and developed according to the student's level.	
Adaptive	The game's plot is built on topic difficulty levels, starting from easy topics to difficult topics.	

Elements	Details	Interfaces
Win	The final achievement is displayed to enhance the player's satisfaction.	
Challenges	The challenges are designed according to the student's ability.	

Table 1 contains examples of *Dunia Jawi* application interfaces that use Prensky digital game elements, while Table 2 is an example of interfaces that use ARCS components.

Table 2: The motivational component of ARCS in *Dunia Jawi* application

Components	Details	Interfaces
Attention	The use of game concepts, the combination of colors, the selection of type and size of writing, and the use of animation, characters, graphics, and audio must be adapted to the level of preschoolers to attract attention and focus.	
Relevance	Learning goals are informed to ensure students know the game's benefits.	
Confidence	Each game activity includes direct feedback regarding support and total score so that students do not feel that the game is difficult and boring.	
Satisfaction	Rewards are given directly and cumulatively for each level of the game to ensure that students feel appreciated for every effort made.	

4.3 Research Phases

The period of actual research phase was conducted for seven weeks, during which the researcher set each topic in the game application to be completed within one week. Since the *Dunia Jawi* application has five topics, the time required to implement the intervention process is five weeks, and the pre-and post-testing process takes two weeks. Each respondent was allowed to use the game application for as long as needed until they mastered the whole topic.

5. Results and Findings

The researcher used the Wilcoxon Signed Ranks test to identify the differences between respondents' learning motivation before and after using the *Dunia Jawi* application. The following table is the Wilcoxon Signed Rank test results that were obtained from the SPSS.

Table 3 Results of the Wilcoxon Signed Ranks test (motivational questionnaire)

Pair	Min	Max	Mean	SD	Z	Sig(2- tailed)
Books	24	38	31.47	3.417	-4.942	.000
Apps	33	48	43.50	3.370		
$\alpha = .05, n = 32$						

The study's results in Table 3 indicate that application-based *Jawi* learning has higher motivation compared to book-based *Jawi* learning. The mean value for Apps motivation is higher (43.50) than book motivation (31.47), and there is a significant difference between the two with a p-value of .000, leading to the rejection of the null hypothesis.

5.1 Motivational Questionnaire Analysis of Attention (A) Construct

The first construct analysed is attention (A), where the answers by respondents are summed up according to the book motivation questionnaire and the game application motivation questionnaire. Next, the researcher analysed the following data using the Wilcoxon Signed Ranks test, and the results can be seen in Table 4.

Table 4: Wilcoxon Signed Ranks Test Results (Attention)

Pair	Min	Max	Mean	SD	Z	Sig (2- tailed)
Book	3	8	4.41	1.103	-4.961	.000
Apps	6	12	10.97	1.332		
$\alpha = .05, n = 32$						

Table 4 shows that the game application attention construct has a higher minimum score value of 6, compared to the book attention construct (3). Similarly, the maximum score value for the game application attention construct is higher, with a total of 12 compared to the book attention construct (8). The mean value for the game application attention construct is also higher than the mean value for the book attention construct at 10.97. These findings suggest a significant difference in *Jawi* learning motivation for the attention construct before and after using the *Dunia Jawi* game application, with a p-value of .000, leading to the rejection of the null hypothesis.

5.2 Motivational Questionnaire Analysis of Relevance (R) Construct

The second construct analysed using the Wilcoxon Signed Ranks test is relevant (R). The following table is the Wilcoxon Signed Ranks test results that have been conducted on both questionnaires.

Table 5: Results of the Wilcoxon Signed Ranks test (relevant construct)

Pair	Min	Max	Mean	SD	Z	Sig (2- tailed)
Book	8	12	10.63	1.040	-1.754	.079
Apps	9	12	10.97	.695		
$\alpha = .05. n = 32$						

Based on Table 5 above, it can be observed that the minimum score value for both questionnaires only differ by one mark, and there is no difference between the two maximum score values. Although the mean value for the *Dunia Jawi* game application questionnaire is higher than the mean value for the book questionnaire, the significant value obtained is $p = .079$, where the p-value exceeds the significance level, which is $p < .05$. Thus, it can be concluded that the null hypothesis fails to be rejected because there is no significant difference between the motivation of learning *Jawi* using books and the motivation of learning *Jawi* using *Dunia Jawi* application.

5.3 Motivational Questionnaire Analysis of Confidence (C) Construct

The following table is the result obtained through the Wilcoxon Signed Ranks test for the confidence construct.

Table 6: Results of the Wilcoxon Signed Ranks test (confidence construct)

Pair	Min	Max	Mean	SD	Z	Sig (2- tailed)
Book	5	12	8.41	2.092	-4.261	.000
Apps	7	12	10.31	1.378		
$\alpha = .05, n = 32$						

In the table above, the difference between the minimum confidence construct value by the book is lower than the minimum confidence construct value by the *Dunia Jawi* application, which is the value is 2. Although there is no difference between the maximum score value, the mean value of game application confidence is higher than that of book confidence, with a value of 10.31. In addition, the test results show a significant value of $p = .000$, which shows a significant difference in the students' *Jawi* learning motivation in terms of confidence before and after using the *Dunia Jawi* game application. Therefore, the null hypothesis is successfully rejected.

5.4 Motivational Questionnaire Analysis of Satisfaction (S) Construct

The Wilcoxon Signed Ranks test analysis results for the satisfaction construct are shown in Table 7 below.

Table 7: Results of the Wilcoxon Signed Ranks test (satisfaction construct)

Pair	Min	Max	Mean	SD	Z	Sig (2- tailed)
Book	4	12	8.03	1.909	-4.782	.000
Apps	8	12	11.25	1.016		
$\alpha = .05, n = 32$						

Based on the table above, the minimum score value obtained for book satisfaction is lower than game application satisfaction, with a different value of 4. However, there is no difference between the maximum score value for both satisfaction constructs. Nevertheless, the respondent's satisfaction with using game applications for *Jawi* learning can be seen from the mean value obtained for the game application satisfaction construct, with a value of 11.25, compared to the book satisfaction construct, with a value of 8.03. A significant value shows $p = .000$, where there is a significant difference between the construction of *Jawi* learning satisfaction of preschool students using books and game applications. Therefore, the researcher successfully rejects the null hypothesis.

6. Conclusions

The mean value difference shows that using digital game technology based on the ARCS motivation model effectively increases pre-schoolers' *Jawi* learning motivation. Study from Shih-Yeh Chen, Chao-Yueh Hung, Yao-Chung Chang, Yu-Shan Lin (2018) supported this finding, indicating that interactive technology-based learning increases student engagement, concentration, and duration of self-learning. In addition, the findings in terms of constructs show that there is a significant difference between the use of books and *Dunia Jawi* game applications for attention, confidence, and satisfaction. However, for relevant constructs, the findings show no significant differences. This finding shows that the respondents gave a fair view of the benefits of using books and game applications to learn *Jawi*. According to a study by Sharmin et al., (2020), this finding resulted because, both types of teaching content and structure, whether using books or technology-based learning aids, have the same benefits and objectives. However, the mean value comparison suggests that the *Dunia Jawi* game application is more relevant than the book.

Next, the findings for the attention construct prove that different learning approaches that contain technology elements are indeed proven to be able to attract the attention of today's students. This finding is supported by the results of previous studies conducted on preschool students using mobile game applications, where the use of touch screen technology successfully attracted their interest and active involvement in the learning process (Fatimah, Ainol, and Shafitra, 2012). Furthermore, another study found that mobile technology-based learning approaches increased perception and learning skills, likely due to the feeling of fun and excitement during the learning process (El-Sofany and El-Hagggar, 2020).

Lessons involving language or pronunciation that are newly introduced to students are easier to learn by using a game approach where students are in a relaxed situation that allows them to explore and try to speak confidently without feeling shy. This finding is supported by the results of previous studies by Griva et al., (2010), the group of respondents who were taught foreign language subjects using a game approach managed to get high scores and were confident in speaking in a foreign language compared to the group of respondents who were taught traditionally. The respondents in this study were able to achieve satisfaction through a digital technology-based learning approach that offers interactive and fun learning, as demonstrated in the study by Chin et al., (2015). The study found that respondents felt happy and satisfied when completing assignments using an interactive learning system and were excited to continue learning through this approach in the future. Furthermore, the feedback system, rewards, and winning components of interactive learning, as shown in the results of study from Chang, Hwang, Fang, and Lu (2017), help students maintain their self-satisfaction until they successfully complete each learning task.

7. Limitations and Recommendations

Although there is a provision of tablets for use in schools, limitations exist when the amount required is insufficient for individual students to use. Therefore, students can only use this application at home as a reinforcement exercise. The application developed for this study only focuses on the use of preschool students. Therefore, it is hoped that in the future, there will be researchers and application developers who will continue to develop this application for the use of high-level students.

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