

## The Effect Of Gamification-Based Qurfuntastic Application On Hijaiyah Letter Learning Concentration In Alpha Generation Deaf Children

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**Abstract:** This study aims to assess the influence of gamification-based Qurfuntastic application on increasing the concentration of learning hijaiyah letters in deaf children of the Alpha Generation. This study uses a positivistic paradigm with a quasi-experimental quantitative approach with a Nonequivalent Posttest-Only Control Group Design design applied to all deaf students in SLB, which is divided into experimental and control groups. The instruments were in the form of learning concentration questionnaires and digital learning media validated by experts, while the data analysis used the Mann-Whitney test because the data distribution was abnormal. The results showed that there was a significant difference between the control group and the experimental group with a significance ( $p = 0.003$ ), which confirms that Qurfuntastic is more effective than conventional learning. This influence is supported by the integration of multimedia elements, sign language representation, and gamification strategies that align with the cognitive traits and visual learning preferences of deaf students. This study concludes that the gamification-based Qurfuntastic application has an effect on increasing the concentration of learning hijaiyah letters in deaf children with Gerenrasi Alpha.

**Keywords:** Deaf Students; Digital Learning Media; Gamification; Hijaiyah Letters; Learning Concentration.

**Abstrak:** Penelitian ini bertujuan untuk menilai pengaruh aplikasi Qurfuntastic berbasis gamifikasi terhadap peningkatan konsentrasi belajar huruf hijaiyah pada anak tunarungu Generasi Alpha. Penelitian ini menggunakan paradigma positivistik dengan pendekatan kuantitatif jenis kuasi-eksperimental dengan desain Nonequivalent Posttest-Only Control Group Design yang diterapkan pada seluruh

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siswa tunarungu di SLB, yang dibagi menjadi kelompok eksperimen dan kontrol. Instrumen berupa kuesioner konsentrasi belajar dan media pembelajaran digital yang divalidasi oleh para ahli, sedangkan analisis data menggunakan uji Mann-Whitney karena distribusi data tidak normal. Hasil penelitian menunjukkan bahwa terdapat perbedaan yang signifikan antara kelompok kontrol dan kelompok eksperimen dengan signifikansi ( $p = 0,003$ ), yang menegaskan bahwa Qurfuntastic lebih efektif daripada pembelajaran konvensional. Pengaruh ini didukung oleh integrasi elemen multimedia, representasi bahasa isyarat, dan strategi gamifikasi yang selaras dengan sifat kognitif dan preferensi pembelajaran visual siswa tunarungu. Penelitian ini menyimpulkan aplikasi Qurfuntastic berbasis gamifikasi berpengaruh terhadap peningkatan konsentrasi belajar huruf hijaiyah pada anak tunarungu Generasi Alpha.

**Kata Kunci:** Anak Tunarungu; Gamifikasi; Huruf Hijaiyah; Konsentrasi Pembelajaran; Media Pembelajaran Digital.

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## A. Introduction

Inclusive education is one of the global agendas emphasized by UNESCO through the principles of Education for All, which affirms that every individual has the right to equal access to education without discrimination (UNESCO National Commission Indonesia, 2023). This commitment is also in line with the Sustainable Development Goals (SDGs), especially the 4th goal (Quality Education), which emphasizes the importance of providing inclusive, equitable, and quality education for all students, including children with special needs (SDGs 4 Indonesia, n.d.). In this context, the development of technology-based adaptive learning is an important strategy to answer educational challenges in the digital era, especially for the Alpha Generation who have characteristics close to technology and interactive media.

One group that needs special attention in the implementation of inclusive education is deaf children. Deaf children experience limitations in hearing access which has an impact on the process of language acquisition and information comprehension (Widiastuti, 2019). This condition has implications for cognitive ability, especially in maintaining attention and concentration in learning. Noor and Panambaian stated that deaf children at the primary education level generally only master about 2,000

vocabulary words, much lower than children with normal hearing who can reach around 5,000 vocabulary (Noor & Panambaian, 2024). In addition, data from the Central Statistics Agency shows that the number of Alpha Generation children with hearing loss reaches 22,013,768 people (Census of the Central Statistics Agency, 2022). In learning Islamic Religious Education, these limitations are a serious challenge, especially in mastering hijaiyah and Qur'an literacy. Data from the Institute of Qur'an Sciences shows that around 65% of Indonesians still have difficulty reading hijaiyah letters, which indicates that religious literacy is still a significant problem, especially for children with special needs.

These problems are increasingly complex with the limitations of inclusive education resources. Basic Education data in 2023 shows that the number of regular teachers who have received inclusive training is only 10,244 people and special teacher assistants are 4,695 people, while the number of Special Schools (SLB) only reaches 2,326 schools that must serve around 152,756 students (Stephanus Aranditio, 2023). This condition shows that inclusive education services in Indonesia are still not optimal. In addition, hijaiyah literacy learning is still dominated by conventional methods with less adaptive media use, minimal technological integration, and have not utilized the visual-interactive approach to the fullest (Mas et al., 2025; Sriwidiastuty et al., 2025). This causes the learning process to be monotonous and less able to maintain the learning concentration of deaf students.

This phenomenon was strengthened by the results of initial observations at SLB, which organizes a learning program to read the Qur'an for deaf students on a regular basis. Although this program shows a commitment to the development of religious literacy, the learning method used still focuses on the book Iqro' with the help of sign language. This approach allows for gradual recognition of hijaiyah letters, but it has not been supported by the use of interactive technology that can increase student engagement. As a result, learning tends to be monotonous and has not been optimal in increasing learning concentration, thus showing a gap between students' learning needs and the methods used.

In line with these problems, various previous studies have examined the development of technology-based hijaiyah literacy learning media through various approaches. The use of sign language in hijaiyah letter learning media for deaf children has been researched by several researchers and shows that visual representation through sign language can help the process of recognizing the form and meaning of hijaiyah letters (Huda, 2019; Mohamad Shafiei Ayub, Nor Adina Abdul Kadir, Hamidah Jalani, Aini Qamariah Mohd Yusof & Fadil, 2025; Setyono et al., 2024). The development of learning media based on Android applications is also able to increase interest in learning hijaiyah letters, although its implementation has not been specifically aimed at deaf students (Gunawan, 2019; Sari, 2020). In addition, the use of augmented reality technology in learning has been able to provide a more interactive learning experience and support the literacy process of students (Fadli & Ishaq, 2019). On the other hand, the application of gamification in learning shows the potential to increase student engagement and focus on learning in various learning contexts (Atawy, 2021; Kurniawan et al., 2022; Majid & Huda, 2020; Sudarmilah, 2020).

Although this study shows positive potential in supporting the learning process, previous research shows that media development is still carried out separately in each component, both in the use of sign language, the use of digital platforms, the application of augmented reality, and the integration of gamification elements. Thus, there have not been many studies that comprehensively combine a visual-kinesthetic approach through sign language with interactive gamification elements in a single learning medium. In addition, the relationship between media development and increased learning concentration of deaf children is also rarely studied empirically, even though limited learning concentration is one of the main challenges often experienced by deaf students. Therefore, this study presents a novelty through the development of hijaiyah letter learning media that integrates sign language as a visual-kinesthetic approach with interactive gamification elements, as well as testing its influence on increasing learning concentration of deaf children.

Based on the problems, urgency, and research gaps that have been described, the main purpose of this study is to find out whether the gamification-based Qurfuntastic

application has an effect on the concentration of hijaiyah letter learning in deaf children of the Alpha Generation. This topic is important because it touches the wedge between inclusive education, learning technology, and Islamic religious education, which until now has been relatively rarely studied empirically. This research departs from the hypothesis that the integration of gamification and sign language not only increases learning interest, but is also able to increase the learning concentration of children with special needs, which is often overlooked in digital learning media research. The main contribution of this research lies in enriching the scientific richness of inclusive educational technologies based on religious values and providing empirical evidence on the effectiveness of adaptive digital media for deaf children.

## **B. Research Methods**

This research is based on the positivistic paradigm as affirmed by Creswell and clarified by Mudjia Rahardjo regarding the importance of objectivity, and strengthened by Denzin through the concept of data verification triangulation (Rahardjo, 2025, Cresswell, 2016). This study uses a quantitative approach with a quasi-experimental design with a Non Equivalent Posttest-Only Control Group Design, which places the research subjects into two classes that are differentiated into experimental class and control class categories (Rusalina, 2020). This design was chosen because in quasi-experimental research, researchers do not randomize to form new groups, but rather use pre-existing learning groups in learning. The research was conducted at SLB by involving the entire population of deaf students. The researchers did not randomly select students to create new classes in the control group and experimental group because of the small sample size and class structure within established schools. Therefore, the division of the research group was carried out while maintaining the composition of students in accordance with the original class, without moving or rearranging students, but following the class structure that has been running in the school.

The determination of the experimental group and the control group was carried out by involving teachers who teach BTQ subjects who understood the characteristics and level of students' ability. The division of groups also considers the level of

education in SLB, namely SDLB, SMPLB, and SMALB, so that students in both groups have a relatively comparable level of understanding. Thus, group division maintains natural class conditions while maintaining equality of ability between groups. In this study, the experimental group obtained learning using the Qurfuntastic application, while the control group followed learning with the methods commonly used in the classroom, to test the effect of using the Qurfuntastic application on learning concentration in hijaiyah letter learning in deaf students.

The research instrument in this study is in the form of a questionnaire used to measure two main variables, namely the perception of the use of digital learning media in the form of the Qurfuntastic application and the concentration of student learning in hijaiyah letter learning. The preparation of the instrument is based on the theoretical indicators of each variable. Indicators of digital learning media include the principles of multimedia, coherence, redundancy, spatial proximity, temporal proximity, segmentation, personalization, and interactivity (Mayer, 2009). Meanwhile, indicators of learning concentration include attention to the material, ability to respond to learning, limb movements according to the teacher's instructions, ability to apply and analyze knowledge, readiness to resurface knowledge that has been learned, interest in subjects, and not feeling bored during the learning process (Slameto, 2010).

Based on these indicators, the instrument was formulated into 16 questions consisting of 8 items for the digital learning media variable and 8 items for the learning concentration variable. The researcher used the validity of the content through expert assessment as the primary basis for determining the feasibility of the instrument, as it was judged more appropriate to ensure the suitability of the indicators with the measured construction and characteristics of deaf students. This process involves five validators, namely material experts, media experts, information technology development experts, learning experts, and student instrument experts. The experts evaluated the appropriateness of the indicators, editorial clarity, relevance of the learning context, and the capacity of deaf students to understand the question items. The results of the assessment are then used as a basis for revision and improvement of the instrument until it is declared feasible to be used in research. Thus, the research

instrument has gone through an assessment and revision process based on the input of experts so that it is declared suitable for use in data collection. The results of the content validity test through expert validation can be seen in Table 1.

Formula:  $P = \frac{n}{F} \times 100\%$  (Arikunto, 2021)

**Table 1. Results of Content Validity Test Through Expert Review**

Number	Expert Validation	F (Frequency of Answer)	n (Total Number of Respondents)	Results	Percentage	Remarks
1.	Material Expert	28	25	$\frac{25}{28} \times 100\%$	89%	Worthy
2.	Media Expert	32	29	$\frac{29}{32} \times 100\%$	91%	Worthy
3.	IT Development Expert	28	26	$\frac{26}{28} \times 100\%$	93%	Worthy
4.	Learning Expert	28	24	$\frac{24}{28} \times 100\%$	88%	Worthy
5.	Experimental Group Student Instrument Expert	64	48	$\frac{48}{64} \times 100\%$	75%	Worthy
6.	Instrument Expert Student Control Group	64	52	$\frac{52}{64} \times 100\%$	81%	Worthy

**Table 2. Score Assessment Criteria**

Number	Percentage	Qualification	Remarks
1.	1% – 24%	Invalid / Not eligible	Revision
2.	25% - 49%	A small part is valid / A small part is feasible	Revision
3.	50%	Less valid / Less worthy	Revision
4.	51% - 74%	Quite valid / quite feasible	Minor revisions
5.	75% - 99%	Valid / eligible	No revision required
6.	100%	Very valid / very worthy	No revision required

The results of expert validation showed a feasibility percentage of 75%–93%, which shows that the instrument is classified as suitable for use (Azahrah et al., 2021). The data collection techniques in this study include questionnaires and documentation. Questionnaires were used to measure the level of concentration of research after

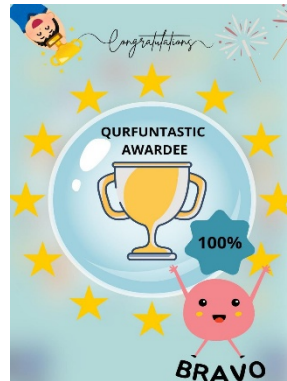
treatment by using a Likert scale to capture variations in student responses. Meanwhile, documentation is used as supporting data in the form of student lists, photos of learning activities, curriculum, study schedules, and relevant administrative records. Both techniques are used to ensure that the data obtained is valid, objective, and scientifically accountable. The questionnaire instrument is compiled through grid preparation, indicator determination, and testing to experts to ensure its eligibility.

The research procedure is carried out through three main stages. In the preparation stage, the researcher conducts pre-observation at SLB to understand the condition of deaf students and learning hijaiyah letters, prepares research proposals and instruments, validates them with supervisors and BTQ teachers, and collaborates with schools to set a research schedule. At the implementation stage, the researcher gave three treatments using the Qurfuntastic application to the experimental group, while the control group followed the learning of hijaiyah letters without using the application. Observations are also carried out during learning to document activities, learning focus, and student responses to media. At the completion stage, the researcher collected data from questionnaires, observations, and documentation, then analyzed it using the Mann-Whitney test as a non-parametric test because the results of the normality test showed that the data was not distributed normally. The analysis was conducted to test the hypothesis regarding the difference in the level of learning concentration between the experimental group and the control group. The entire research process is structured in a systematic, transparent, and replicable manner in the context and characteristics of similar subjects.

### **C. Result and Discussion**

The research procedure begins with the initial observation stage to determine the learning conditions of hijaiyah letters in deaf students and to observe concentration patterns that appear during conventional learning. Based on these initial observations, the research continued with the application of a gradual treatment, as illustrated in figure 1, figure 2, and figure 3. In treatment 1, students were introduced to hijaiyah letter material based on sign language using a basic approach that emphasizes understanding visual forms and pronunciation, without using digital media. In treatment





**Figure 4-10 User Interface Qurfuntastic Application**

In the treatment phase, the researcher applied learning using the Qurfuntastic application as shown in Figure 5-11. This application is designed with an interface (UI/UX) that supports hijaiyah letter learning for deaf students by integrating the principles of multimedia learning proposed by Richard E. Mayer (Mayer, 2009). The learning process starts from the main page as a navigation center, then students log in to ensure user identification and documentation of learning activities. After that, students access the Ta'aruf feature which presents the recognition of hijaiyah letters through a combination of letter text, visual animation, and sign language. The design reflects the principles of multimedia and *spatial proximity*, i.e. the presentation of visual information placed close together on a single screen to facilitate the integration between letter symbols and their meanings. In addition, this approach also favors the characteristics of visual-kinesthetic learning, in which students not only visually observe letter symbols but also relate them to sign language movements as kinesthetic representations. According to Howard Gardner in the theory of compound intelligence, individuals with visual and kinesthetic intelligence tendencies are more likely to perceive information through a combination of visual observation and movement activity (Gardner, 2011). Integrated visual presentations help students focus on the material and respond to learning more actively, which is in line with the learning concentration indicator according to Slameto which emphasizes the importance of attention to the material and response to learning stimuli (Slameto, 2010).

Furthermore, students use the Lock n Lock feature which consists of three levels (Sin, Mim, and Shod) with ten questions in each level. The presentation of the material

gradually reflects Mayer's principle of segmentation which aims to reduce cognitive load so that students can process information in a more focused way. After completing each level, students proceed to the Exam feature which contains thirty random questions as an evaluation of comprehension. These quizzes and challenge activities also represent the application of gamification concepts in digital learning, as students are actively engaged through the points, levels, challenges, and feedback systems directly from the app. This gamification approach is in line with Karl M. Kapp's view that game elements such as levels, rewards, and challenges can increase students' motivation, engagement, and focus during the learning process (Karl M. Kapp, 2012). Additionally, the app's interface is designed to be simple and displays only those elements that are relevant to the material so that it reflects the principles of coherence and redundancy that help minimize visual distractions. The success of each student is also rewarded in the form of a star badge as a form of gamification that serves to increase learning motivation and keep students' interests from getting bored easily during the learning process, which is related to concentration indicators in the form of interest in the material and the sustainability of learning focus.

Analytically, the application of interface design based on multimedia principles, visual-kinesthetic approaches, and gamification elements in Qurfuntastic shows that the integration of visual elements, sign language, and interactive activities is able to increase the engagement of deaf students during learning. This is reflected in the increased attention of students to the material, active response in answering questions, and the ability to apply the knowledge gained through the evaluation feature during the treatment process. This condition strengthens Slameto's view that learning concentration is characterized by a focus on attention, response to learning stimuli, and active involvement in the learning process. Thus, the integration of interface design based on Mayer's multimedia principles, the visual-kinesthetic approach according to Gardner, and the gamification mechanism in the Qurfuntastic application not only facilitates the visual understanding of hijaiyah letters, but also contributes to increasing the learning concentration of deaf students during the learning process.

### Student Response Results

**Table 3. Results of the Control Group Student Response**

Number	Name	Questions															F (Frequency of Answers)	n (Total Number of Respondent)	Percentage	Category	
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					16
1	HM	3	2	4	4	3	3	4	3	4	2	2	2	4	4	2	48	64	75%	Valid	
2	GD	4	2	4	4	4	4	4	4	4	4	4	4	4	4	3	61	64	95%	Valid	
3	TT	4	2	4	4	4	1	4	4	4	4	4	4	4	4	3	58	64	91%	Valid	
4	RS	3	2	3	4	3	2	3	3	3	3	4	3	4	3	4	2	49	64	77%	Valid
5	WN	3	1	2	1	1	1	3	3	1	1	3	1	3	3	3	1	31	64	48%	a Small Part is Valid
6	RZ	4	3	4	4	4	3	4	3	3	3	4	4	4	4	3	58	64	91%	Valid	
7	LC	3	2	2	1	4	3	1	3	4	4	3	3	4	2	3	45	64	70%	Quite Valid	
8	VR	4	3	2	4	3	1	3	4	3	4	3	3	4	4	2	1	48	64	75%	Valid
9	AH	4	3	4	4	2	4	4	4	4	3	4	4	3	4	4	3	58	64	91%	Valid
10	GF	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	63	64	98%	Valid
11	FJ	4	2	3	4	4	3	4	1	4	4	4	1	4	4	4	1	51	64	80%	Valid
12	FD	4	3	4	4	3	3	2	4	4	4	1	4	4	4	4	1	53	64	83%	Valid
<b>Quantity</b>																	<b>623</b>	<b>768</b>	<b>86%</b>	<b>Valid</b>	

Formula:  $P = \frac{n}{F} \times 100\%$  (Arikunto, 2021)

**Table 4. Score Assessment Criteria**

Number	Percentage	Qualification	Remarks
1.	1% – 24%	Invalid / Not eligible	Revision
2.	25% - 49%	A small part is valid / A small part is feasible	Revision
3.	50%	Less valid / Less worthy	Revision
4.	51% - 74%	Quite valid / quite feasible	Minor revisions
5.	75% - 99%	Valid / eligible	No revision required
6.	100%	Very valid / very worthy	No revision required

Based on the data in Table 3, it shows that the response from the control group of students undergoing conventional learning assessed the learning process to be in the category of a small number of valid to valid, so that the overall validity percentage was 86%. The results of this study show that conventional learning is still well received by deaf students, especially because they are already familiar with the teaching patterns commonly used in special classrooms. Nonetheless, some students showed responses in

fairly valid categories indicating that conventional learning did not fully meet their visual learning needs. These varied scores show that the effectiveness of conventional learning is uneven, so it is necessary to use media that is more adaptive and responsive to the learning characteristics of students with special needs.

**Table 5. Experimental Group Response Results**

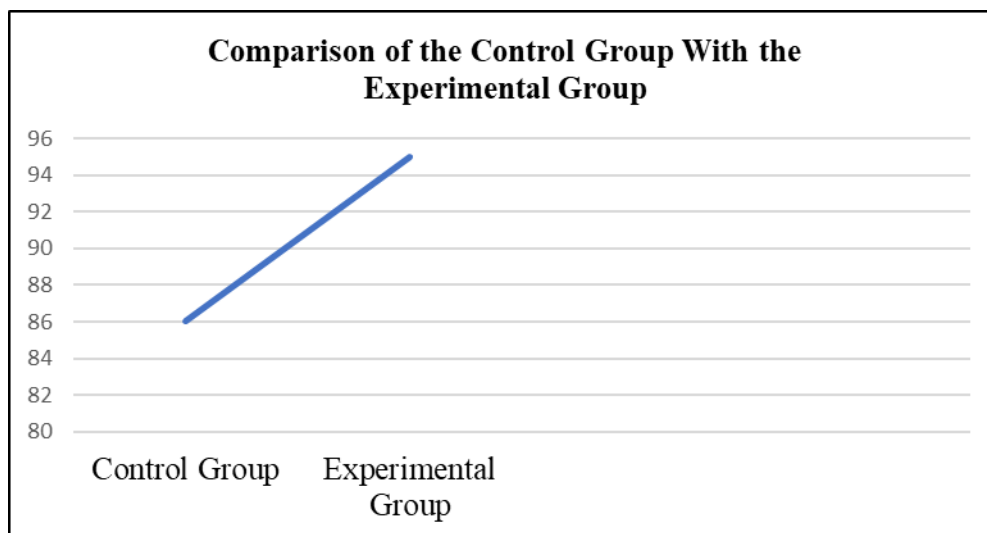
Number	Name	Questions																F (Frequency of Answers)	n (Total Number of Respondent)	Percentage	Category
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16				
1	DK	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
2	NF	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
3	SL	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
4	NS	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
5	RS	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	56	64	87,5%	Valid
6	AV	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	62	64	97%	Valid
7	NN	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
8	NR	3	3	3	3	3	3	3	3	4	4	4	4	4	4	4	4	56	64	87,5%	Valid
9	RR	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	64	64	100%	Very valid
10	SV	3	3	3	3	3	3	3	3	3	3	4	4	4	4	4	4	54	64	84%	Valid
11	AZ	4	4	4	4	3	4	3	3	4	4	4	4	4	4	3	3	59	64	92%	Valid
12	CL	4	4	4	4	4	4	3	3	4	4	4	4	4	4	3	4	61	64	95%	Valid
<b>Quantity</b>																		<b>732</b>	<b>768</b>	<b>95%</b>	<b>Valid</b>

Formula:  $P = \frac{n}{F} \times 100\%$  (Arikunto, 2021)

**Table 6. Score Assessment Criteria**

Number	Percentage	Qualification	Remarks
1.	1% – 24%	Invalid / Not eligible	Revision
2.	25% - 49%	A small part is valid / A small part is feasible	Revision
3.	50%	Less valid / Less worthy	Revision
4.	51% - 74%	Quite valid / quite feasible	Minor revisions
5.	75% - 99%	Valid / eligible	No revision required
6.	100%	Very valid / very worthy	No revision required

In contrast to the control group, the results shown by the experimental group in Table 5 showed that all students in the experimental group gave a very valid assessment of the use of the Qurfuntastic application with a validity percentage of 95%. Most students obtained scores close to the maximum score, which indicates a high level of acceptance and comfort to the use of interactive digital media in learning hijaiyah letters. This condition shows that visual features in the form of hijaiyah letter animation, sign language visualization, and gamification elements in the Qurfuntastic application are able to attract attention and facilitate the understanding of material for deaf students. Thus, the integration of these elements supports the visual-kinesthetic learning style, which is a learning process that combines visual observation with the representation of body movements so that information can be understood more concretely.



**Figure 11. Comparison of the Control Group with the Experimental Group**

A comparison of the results of the two groups is visualized in Figure 12 which shows the difference in score distribution between the control group and the experimental group. The experimental group consistently scored higher than the control group, with an average response percentage of 95.25%, while the control group had an average of 81.17%. In addition to the difference in mean scores, the score distribution in the experimental group was also more concentrated in the highest category with smaller variation ( $SD = 5.99$ ) than in the control group ( $SD = 13.78$ ), suggesting that the learning experience in the experimental group was more consistent. The standard

deviation in this study was calculated using a statistical formula according to Douglas C. Montgomery and George C. Runger as follows (Runger, 2014):

$$SD = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n - 1}}$$

Description:

SD : Standard deviation

$x_i$  : Score of each respondent  $x$

$\bar{x}$  : Average value

$n$  : Number of samples

Based on the research data, the calculation of standard deviation in the experimental group resulted in  $SD = 5.99$ , while the control group produced  $SD = 13.78$ . Smaller standard deviation values in the experimental group indicated that students' scores were more homogeneous and concentrated on high scores than control groups that had greater score variations. To find out the magnitude of the practical impact of these differences, an effect size analysis was carried out using Cohen's formula  $d$  proposed by Jacob Cohen, namely (Cohen, 1988):

$$d = \frac{M1 - M2}{SD_{pooled}}$$

With the combined standard deviation calculated using the formula:

$$SD_{pooled} = \frac{SD1^2 + SD2^2}{2}$$

Description:

$M1$  : Average experimental group

$M2$  : Average control group

$SD1$  : Standard deviation of experimental groups

$SD2$  : Standard deviation of the control group

Based on the research data, it was obtained:  $M1: 95.25$ ;  $M2: 81.17$ ;  $SD1: 5.99$ ;  $SD2: 13.78$ . Calculation of combined deviation standard ( $SD_{pooled}$ ):

$$SD_{pooled} = \sqrt{\frac{(5,99)^2 + (13,78)^2}{2}}$$

$$SD_{pooled} = \sqrt{\frac{(35,88)^2 + (189,81)^2}{2}}$$

$$SD_{pooled} = \sqrt{112,85} = 10,62$$

Cohen's next calculation d:

$$d = \frac{95,25 - 81,17}{10,62}$$

$$d = \frac{14,08}{10,62} = 1,33$$

The Cohen value d of 1.33 belongs to the category of large effects according to the Cohen classification (0.2 = small, 0.5 = medium, 0.8 = large). This shows that the use of the Qurfuntastic app not only makes a descriptive difference, but also has a strong practical impact on students' responses and engagement in learning. The visualization of the score distribution also showed that the performance improvement in the experimental group was experienced by almost all students, so the use of Qurfuntastic was able to provide a more consistent learning experience through clear visualizations, direct feedback, and a structured digital learning environment.

### Normality Test

**Table 7. Normality Test Results**  
**Saphiro-WILK**

Remarks	Statistic	df	Sig.
<b>Control Group</b>	.908	12	.201
<b>Experimental Group</b>	.786	12	.007

The researchers conducted a data normality test using Shapiro-Wilk, as shown in Table 7, before conducting further analysis through hypothesis testing. According to the test results, the data from the experimental group were not normally distributed (p = 0.007), while the control group showed a normal distribution (p = 0.201). This difference suggests that the response patterns of students in the experimental group did not follow a symmetrical distribution, likely due to the high consistency of scores so that almost all of them were in the highest category. This condition makes the use of parametric tests not meet basic statistical assumptions. Therefore, the researcher uses

non-parametric tests to ensure that the analysis can be performed appropriately without violating statistical rules. The selection of this method is important so that the interpretation of the research results is valid and can be scientifically accounted for, because errors in the selection of statistical tests can lead to bias in drawing conclusions about the effectiveness of the learning media being tested.

**Hypothesis Test**

**Table 8. Mann-Whitney Test Results**

	Score
Mann-Whitney U	16.000
Wilcoxon W	94.000
Z	-2.935
Asymp. Sig. (2-tailed)	.003
Exact Sig. [2*(1-tailed Sig.)]	.003 <sup>b</sup>

The findings of the study show that the application of Qurfuntastic has a significant effect on increasing the concentration of learning hijaiyah letters in deaf students of the Alpha Generation. This was proven through the Mann-Whitney hypothesis test which produced a value of  $U = 16.00$ ,  $Z = -2.935$ , and a significance of  $p = 0.003 (< 0.05)$ , thus showing a significant difference between the experimental group and the control group. These findings confirm the research hypothesis that the use of gamification-based Qurfuntastic applications has an effect on increasing the concentration of hijaiyah letter learning in deaf students. Conceptually, these findings show that the integration of visual and verbal elements in a single learning display is able to improve the quality of students' information processing. This is in line with the multimedia theory of Richard E. Mayer, who states that learning is more effective when information is presented through a simultaneous visual and verbal combination (Mayer, 2002).

In the context of Qurfuntastic, hijaiyah letters, sign language animation, and dynamic visualization are presented in an integrated manner, allowing for a dual coding process without the need for attention transfer between information sources. These findings indicate that integrated information presentation can reduce cognitive burden and improve learning focus, especially in deaf students who rely on visual modalities as

the main channel in receiving information. In addition, the findings of this study also show that gamification plays a role as an effective pedagogical mechanism in increasing learning concentration. Elements such as level systems, rewards, interactive challenges, and live feedback not only serve as motivators, but also as attention boosters. Scientifically, this shows that gamification is able to create learning conditions that encourage the formation of sustained attention, namely the ability to maintain focus in a sustainable manner in completing learning tasks.

These findings also explain why the experimental group showed a higher level of engagement than the control group using the conventional approach using Iqro'. When compared to previous research, the results of this study reinforce the findings of Kurniawan and Rahma who stated that the visualization of sign language can improve the understanding of hijaiyah letters in deaf students (Kurniawan et al., 2022; Rahma, 2020). However, this research offers novelty by integrating the visualization of such sign language into a structured gamification system. In contrast to the research conducted by Ayub Mohamad Shafiei which focuses on the use of mobile applications as a medium for delivering materials, Qurfuntastic presents a more interactive learning experience through a combination of gamification, sign language visualization, and visual-motor interaction (Mohamad Shafiei Ayub, Nor Adina Abdul Kadir, Hamidah Jalani, Aini Qamariah Mohd Yusof & Fadil, 2025). Thus, the findings of this study show that the integration of various learning elements in one integrated system is more effective than a partial approach.

Furthermore, these findings also show that the effectiveness of Qurfuntastic is influenced by the suitability of the learning design with the characteristics of the Alpha Generation. This generation has a high tendency towards the use of interactive digital media, so a dynamic application interface is able to significantly increase engagement (Fadlurrohman et al., 2020). This is reflected in the high response of students to the experimental group which shows a high level of acceptance and comfort with the use of the application. Thus, these findings confirm that the compatibility between learning media and student characteristics is a key factor in increasing learning concentration. In the perspective of Qur'anic learning theory, this finding is in line with Abuddin Nata's

view that Qur'an learning must integrate cognitive, affective, and psychomotor aspects (Abuddin Nata, 2016). Qurfuntastic has been proven to be able to accommodate these three aspects simultaneously, namely understanding hijaiyah letters as a cognitive aspect, increasing concentration and learning involvement as an affective aspect, and interactive activities in the use of applications as a psychomotor aspect.

In addition, these achievements can also be analyzed through the perspective of humanism learning theory which emphasizes the importance of developing students' potential as a whole, both from cognitive, emotional, and experiential learning aspects. According to Abraham Maslow, an effective learning process occurs when the psychological needs of students are met so as to encourage self-actualization (Maslow, 1943). In this context, the interactive and gamification features in Qurfuntastic provide a fun learning experience, boost confidence, and meet the need for rewards through a level system and feedback. Meanwhile, according to Carl Rogers, meaningful learning occurs when students are actively involved and have direct experience in the learning process (Carl Rogers, 1994; Sartika et al., 2025). This is reflected in the use of Qurfuntastic which allows students to not only receive information, but also interact directly through visual-motor activities.

Thus, the integration of cognitive, affective, and psychomotor aspects in Qurfuntastic shows that the app is in line with humanistic principles that place learners at the center of learning and encourage active involvement in building knowledge. These findings show that the increase in learning concentration that occurs is the result of a holistic and contextual learning process, not just the result of the use of technology. Overall, the scientific findings in this study show that the success of Qurfuntastic lies in the synergistic integration between multimedia design, gamification, and an inclusive approach based on student needs. These findings not only answer the research hypothesis, but also contribute to the development of adaptive digital learning models for students with special needs, especially in hijaiyah letter learning.

**Qurfuntastic (Digital Learning Media)** Mayer's Theory of Multimedia Learning (2002) which contains several indicators, namely:

1. Multimedia Principles
2. The Principle of Coherence
3. Principle of Reduction
4. The Principle of Spatial Proximity
5. The Principle of Temporal Proximity
6. Segmentation Principle
7. Personalization Principle
8. Principle of Interactivity

It was affected by using the Mann-Whitney test which produced a significance value of 0.03

**The Slameto Theory Learning Concentration** contains several indicators, namely:

1. There is acceptance or attention to the subject matter.
2. Respond to the material taught.
3. The existence of proper limb movements in accordance with the teacher's instructions.
4. Able to apply the knowledge obtained.
5. Able to analyze the knowledge gained.
6. The readiness of the knowledge gained quickly appeared.
7. Be interested in the subjects studied.
8. Don't get bored of the learning process that you go through.

**Figure 12. Research Findings**

#### **D. Conclusion**

The findings of this study show that the application of gamification-based Qurfuntastic has a positive effect on increasing the concentration of hijaiyah letter learning in deaf students of Generation Alpha. The integration of multimedia elements, sign language visualization, and gamification mechanisms has been proven to be able to create a more directed, engaging, and responsive learning experience compared to conventional learning. These findings show that the success of learning for deaf students is not only determined by the material taught, but also by the suitability of the design of the learning media with the visual-cognitive characteristics and digital culture of the students. Theoretically, this research contributes to the development of the study of inclusive educational technology in the context of Islamic education, especially the learning of hijaiyah letters for students with special needs. The results of this study reinforce the view that the integration of multimedia learning principles, gamification

approaches, and sign language representation can be an effective conceptual framework in designing digital learning media that is responsive to the learning needs of deaf students. In addition, these findings also expand the academic discourse on the use of digital technology in learning the Qur'an by showing that gamification not only functions as a motivational strategy, but also as a pedagogical mechanism that is able to increase learning concentration through structured visual interactions.

Practically, the findings of this study provide recommendations for educators, especially Islamic Religious Education teachers and special education teachers, to utilize gamification-based digital learning media as a more inclusive and adaptive learning strategy for deaf students. For curriculum developers, the results of this research can be the basis for integrating interactive learning technology into religious education curricula that are more responsive to the needs of students with special needs. Meanwhile, for researchers and developers of learning media, Qurfuntastic can be an early model for digital media development that combines elements of gamification, sign language visualization, and visual-motor interaction. However, this study has limitations on the relatively small sample size and the scope of the research is only conducted at one educational institution, so the generalization of the findings is still limited. The research instrument also focuses more on measuring short-term learning concentration and has not evaluated material retention and consistency of learning behavior in the long term. Therefore, further research is recommended to involve a wider number of participants, expand the research context on a range of inclusive educational institutions, and integrate additional variables such as learning motivation and long-term retention. The development of artificial intelligence-based adaptive features and cross-platform trials can also be carried out to increase the effectiveness and external validity of the development of digital learning media in the context of inclusive education.

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