



Gamification of Cognitive Diagnostic Assessment: Transforming Arabic Language Learning Motivation in the Era of the Independent Curriculum

Linura Tuada ^{1*}, M. Baihaqi ², Hisbullah Huda ³, Umi Hanifah ⁴, Zheefa Billqisth Al-Hafi ⁵

^{1,2,3,4} Universitas Islam Negeri Sunan Ampel Surabaya, Indonesia

⁵ Universitas Al Azhar Cairo, Mesir

Abstract

Low motivation to learn Arabic at the madrasa level often stems from conventional and stressful initial assessment processes for students. This study aims to analyze the effectiveness of implementing cognitively diagnostic assessments based on the gamification media Quizalize in transforming the Arabic learning motivation of tenth-grade students at MAN Sidoarjo. Amid the implementation of the Merdeka Curriculum, this study emerges as an effort to digitalize initial assessments to create more inclusive and enjoyable differentiated learning. The research method used was quantitative with a pre-experimental design: One-Group Pretest-Posttest. The research subjects consisted of 37 students of class X-9 selected through purposive sampling. Data collection instruments included cognitive diagnostic tests via the Quizalize platform and a validated learning motivation questionnaire. Data analysis techniques employed the Shapiro-Wilk normality test and the Paired Sample T-Test hypothesis test using SPSS software. The research results indicate a significant increase in students' learning motivation. This is evidenced by the rise in the average motivation score from 38.27 in the pre-test phase to 42.35 in the post-test phase. The Paired Sample T-Test statistical analysis yielded a significance value (2-tailed) of 0.028, which is less than the significance level of 0.05 ($p < 0.05$), thus supporting the acceptance of the working hypothesis (H1). Further analysis shows that the gamification elements in Quizalize, particularly the Team vs Team and Leaderboard features, play a crucial role in reducing language anxiety and fostering students' emotional engagement. This study concludes that the integration of gamification into cognitive diagnostic assessments not only assists teachers in accurately mapping students' initial cognitive abilities but is also effective in enhancing students' enthusiasm for learning in the context of the Independent Curriculum era. The practical implications of this research encourage educators to utilize interactive media during the assessment phase to support the effectiveness of student-centered foreign language teaching.

Keywords: Cognitive Diagnostic Assessment, Quizalize, Learning Motivation, Arabic, Independent Curriculum.

* Correspondence Address:		linuratuada@gmail.com		
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INTRODUCTION

مقدمة

Arabic occupies a central position in the Islamic education curriculum in Indonesia, particularly in madrasah institutions. As the lingua franca of Islam, mastery of Arabic is not merely a fulfillment of linguistic aspects, but a key to understanding the authentic sources of Islamic teachings, namely the Qur'an and Hadith, as well as classical literature (kitab turats). In the context of the Merdeka Curriculum, Arabic learning is aimed at shaping the profile of Pancasila students who have a global perspective while remaining rooted in religious values. As emphasized (Aulia & Anggraeni, 2023), Arabic in madrasah functions as an instrument for

cognitive and spiritual development that must be taught with an approach adaptive to the times. The importance of mastering Arabic in Islamic education at madrasah also aligns with research showing that competence in Arabic plays a role in deepening students' understanding of Islam (M. Hadi Sutiyo, 2024).

However, in reality, the teaching of Arabic at the Madrasah Aliyah level often faces significant challenges in the form of low student motivation to learn. Motivation is an internal driving force that determines the success of foreign language acquisition. Observations in the field indicate that many students perceive Arabic as a difficult, boring subject that is overly focused on rigid grammar rules (qawaid). This low motivation impacts students' apathy in class, low participation, and learning outcomes that fail to meet the minimum competency criteria (Pratama, 2023). Therefore, it is essential to implement innovative and engaging teaching methods to enhance students' motivation in learning Arabic. A more interactive and relevant approach can help address this challenge and encourage students to be more active in the teaching and learning process. One solution that can be implemented is the use of interactive learning media, such as videos and applications, which can enhance student engagement in Arabic language learning (halimah & Ali Alfatani, 2024).

Research (Wulandari et al., 2023) indicates that this stagnation in motivation is often caused by the use of conventional and monotonous learning media and evaluation methods. Generation Z students, who have grown up in a digital ecosystem, tend to lose interest when faced with assessment processes that rely solely on paper and pencil without any elements of interactivity. Furthermore, the presence of foreign language anxiety exacerbates students' motivation issues, as they fear making mistakes before even attempting (Margaretta et al., 2024). Therefore, it is important for educators to integrate digital technology into teaching and evaluation methods to enhance motivation and reduce students' foreign language anxiety.

This situation demands a radical transformation in the way teachers approach the initial stages in the classroom. Cognitive diagnostic assessments, which are central to the Merdeka Curriculum for mapping students' initial abilities, must be designed innovatively so as not to add to students' mental burden. Without strong motivational support, any effort by teachers to convey complex material will be difficult for students to internalize. Therefore, integrating technology with game elements (gamification) into the assessment stage becomes urgent to reignite interest in learning Arabic from the very first minute of instruction. The use of gamification-based learning applications such as Duolingo can serve as an effective solution to enhance students' motivation in learning Arabic (Yunus et al., 2025). This aligns with the preferences of Generation Z, who favor interactive and enjoyable learning methods.

In the implementation of the Independent Curriculum, cognitive diagnostic assessments are essentially designed as instruments to map students' learning achievements at the beginning of a period. However, in practice, these assessments often get caught in the stigma of boring administrative formality. The use of static formats (paper-based tests) tends to create a rigid exam atmosphere, turning assessments that are meant to assist students into an additional mental burden. Students often feel stressed and anxious before learning begins, which psychologically can lower their self-efficacy regarding the Arabic subject, which is already considered complex. The gap between the ideal objectives of diagnostic assessments and the reality in the field has become a significant obstacle to creating effective differentiated learning. According to (Pratama, 2023), monotonous assessment procedures without instant feedback fail to trigger students' emotional engagement. As a result, the data obtained by teachers through conventional assessments often do not reflect the true cognitive potential of students because

they complete them under pressure or boredom. Therefore, a radical innovation is needed in the way teachers gather initial data, namely by shifting the paradigm from "exams" to an interactive "learning experience." Digitizing assessments through gamified media like Quizalize offers a strategic solution to deconstruct that mental burden (Zainuddin et al., 2020).

This innovation allows initial assessments to take place in a fluid, participatory, and healthily competitive manner. The transformation from manual to digital methods is not merely about following technological trends, but a pedagogical necessity to ensure that the mapping of students' abilities is conducted under optimal psychological conditions, so that the resulting data is accurate and can serve as a strong foundation for teachers in designing precise learning strategies.

Gamification in learning is defined as the use of game design elements and mechanics in non-game contexts to enhance participant engagement and motivation. The main principle of gamification is not to create a full-fledged game, but rather to adopt the competitive structure and recognition found in games into classroom activities (Nurningtias et al., 2022). Gamification is considered effective because it can appeal to the psychological aspects of humans who enjoy challenges, recognition, and achievement. In teaching Arabic, these elements help shift students' focus from the difficulties of the material to the enjoyment of completing cognitive missions.

METHOD

منهج

Research Design This study uses a quantitative approach with an experimental research type. The applied design is a Pre-Experimental Design using the One-Group Pretest-Posttest model. The selection of this design is based on the researcher's goal to compare students' learning motivation before and after receiving treatment in the form of implementing cognitive diagnostic assessment based on Quizalize. In this design, there is no control group, so the effectiveness of the treatment is measured through the deviation of scores between the pre-test and post-test within a single group. As explained by (Sugiyono, 2020) in methodological literature, this design is highly effective for educational research that focuses on the development of learning media within a specific classroom ecosystem.

The population subjects in this study were all tenth-grade students at MAN Sidoarjo. The research subjects or the selected sample were the students of class X-9, totaling 37 respondents. The sampling technique was conducted using purposive sampling, in which this class was chosen based on considerations of student characteristics that exhibit a variety of cognitive abilities but show signs of motivational stagnation in conventional Arabic language learning. The determination of these subjects is relevant to the principles of the Independent Curriculum, which emphasize the importance of intervention in learning groups that require an in-depth mapping of the Zone of Proximal Development (ZPD).

Data Analysis Techniques To test the validity of the hypothesis, the researcher used two main stages of statistical analysis processed using SPSS software. The first stage is to conduct a prerequisite analysis test using the Shapiro-Wilk test. This is done to ensure that the obtained learning motivation data are normally distributed. Considering that the sample size is less than 50, the Shapiro-Wilk test is considered more accurate than the Kolmogorov-Smirnov test. According to the normal distribution assumption, it is an absolute requirement before proceeding to parametric statistical testing. The next stage is to perform a Paired Sample T-Test. This technique is used to analyze whether there is a significant difference in the average scores of motivations before and after using Quizalize. If the significance value (2-tailed) is less than 0.05,

it can be stated that the gamification of diagnostic assessments has a real effect on the transformation of students' learning motivation.

RESULT | نتائج

Motivation Category	Score Range	Frequency (pre-test)	Presentase (pre-test)	Frequency (post-test)	Persentase (post-test)
High	39 – 45	5	13,51%	23	62%
Medium	37 – 38	9	24,32%	9	24%
Low	31 – 36	23	62,16%	5	15%
Total		37	100%	37	100%

This study measures the transformation of students' learning motivation through two main evaluation stages, namely the pre-test (before the intervention) and the post-test (after the intervention using Quizalize media). Based on data analysis of 37 respondents in class X-9 at MAN Sidoarjo, a significant change was found in the students' learning motivation profiles.

Initial data indicated that the average score of students' motivation to learn Arabic before the use of media was 38.27. Although the frequency of high category scores appeared to be dominant, qualitatively, students tended to feel bored and insufficiently challenged by conventional assessment models. This aligns with (Salim, 2024) findings in modern educational literature that motivation to learn foreign languages, particularly Arabic, is often hindered by students' perceptions of grammatical complexity and monotonous teaching methods. After the implementation of cognitive diagnostic assessments based on Quizalize, there was a shift in students' perceptions of the learning process. The integration of gamification in diagnostic assessments does not merely provide tests but creates an ecosystem of healthy competition. Based on the results of the Shapiro-Wilk test, students' motivation data showed a normal distribution with pre-test significance values of 0.659 and post-test of 0.097 ($p > 0.05$).

Statistically, this effectiveness was tested using the Paired Sample T-Test. Before testing the hypothesis, the data were confirmed to be normally distributed through the Shapiro-Wilk test with a significance value of $p\text{-value} > 0.05$. The T-test results showed a calculated t-value of 2.286 with a significance (2-tailed) of 0.028. Referring to the statistical decision-making criteria, since the Sig. value (0.028) is less than alpha (0.05), it can be concluded that there is a significant difference in students' learning motivation before and after the implementation of the Quizalize media. This increase demonstrates that technological intervention in the diagnostic stage has a strong positive psychological impact on students. These findings indicate that the implementation of innovative teaching methods can help students overcome their anxiety and enhance their confidence in speaking Arabic (Kholifia et al., 2025).

DISCUSSION | مناقشة

The Significance of Motivation Transformation through Gamification

After the implementation of cognitive diagnostic assessments based on Quizalize, there was a shift in students' perceptions of the learning process. The implementation of gamification in diagnostic assessments is not merely about administering tests, but rather about creating a healthy competitive ecosystem. Based on the results of the Shapiro-Wilk test, student motivation data showed a normal distribution with pre-test significance value of 0.659 and post-test of 0.097 ($p > 0.05$). This indicates that students felt more motivated and engaged in learning Arabic following the application of gamification methods, which contributed to overall learning improvement. The application of gamification in education, particularly in Arabic language

learning, has proven effective in enhancing students' motivation and learning outcomes, in line with previous research indicating the positive impact of gamification (Laiya, 2025)

The pinnacle of the statistical findings lies in the hypothesis test using the Paired Sample T-Test, which yielded a significance value (2-tailed) of 0.028. Since the value $0.028 < 0.05$, the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted. This empirically demonstrates that the integration of gamification in cognitive diagnostic assessments is effective in transforming students' learning motivation (Alsadoon, 2023). The main attraction of Quizalize lies in its instant feedback feature and leaderboard, which psychologically trigger students' extrinsic motivation to perform their best. However, beyond that, the ease of understanding the material through a digital game format gradually fosters intrinsic motivation, where students enjoy learning Arabic because of the enjoyable process, rather than solely due to curriculum compulsion.

Furthermore, an analysis was conducted on the effectiveness of using Quizalize as a cognitive diagnostic assessment tool to enhance motivation in learning Arabic. The effectiveness test was carried out using a quantitative approach by comparing pre-test and post-test data from 37 respondents in class X-9 at MAN Sidoarjo. Based on the primary data obtained, the average student learning motivation score before the implementation of assessment gamification was 38.27, which then increased significantly to 42.35 after receiving treatment in the form of a Quizalize-based diagnostic assessment. These results indicate that the application of gamification in assessments not only improves motivation scores but also creates a more interactive and enjoyable learning environment for students. (Hellín et al., 2023).

This transformation of motivation is also evident from changes in students' discipline and learning perseverance indicators. Before the intervention, most students felt bored with the complex structure of the Arabic language. However, with the 'game' format in cognitive assessments, students felt more relaxed while remaining focused. This phenomenon is referred to as the Flow state, where the challenges presented by the media are proportional to the students' abilities, allowing them to be fully immersed in the learning process without compulsion. Research (Kartini et al., 2024) confirms that gamification-based media such as Quizalize or Quizizz have a high effect size in transforming students' learning behavior from passive to active. The results indicate that the implementation of gamification methods in education, particularly in Arabic language learning (Atisyah & Ilmiani, 2024), can create a dynamic and interactive classroom environment, significantly increase student motivation, and strengthen their engagement in the learning process. Thus, gamification becomes an effective alternative in addressing the challenges of Arabic language learning, which is often considered monotonous and difficult.

In conclusion, the effectiveness reflected by the statistical figures above is a testament to the successful integration of appropriate technology. The significance of 0.028 is not merely a number, but empirical evidence that the modernization of cognitive diagnostic assessment tools is key to addressing the low interest in learning Arabic in the digital era. Teachers no longer serve merely as examiners (Nasikha et al., 2025), but as facilitators who provide a competitive, transparent, and enjoyable learning ecosystem through gamification.

Identification of Determinant Features in Quizalize

The implementation of Quizalize in cognitive diagnostic assessments at MAN Sidoarjo provides a clear picture of how gamification elements work psychologically on students. Based on observations and motivation survey results, two main features of Quizalize were identified as

the most influential determinants in enhancing students' motivation to learn Arabic: the Team vs Team feature and the Leaderboard (Damawiyah et al., 2025). These features not only create an enjoyable competitive atmosphere but also promote collaboration among students, thereby increasing their overall engagement in learning Arabic.

The Team vs Team feature on Quizalize transforms the assessment experience, which is typically individual and stressful, into a competitive, collaborative activity. In this feature, students are automatically divided into groups, and their individual scores contribute to the team's progress on the main classroom screen. Data narratives indicate that students feel more responsible for providing correct answers due to the "shared fate" within the team. Theoretically, this aligns with the concept of Social Interdependence Theory (Erev & Bornstein, 1994), where individual success contributes to group success. Thus, the implementation of gamification features in Arabic language learning not only increases student motivation but also strengthens social interaction and collaboration among them. This aligns with research (Winata et al., 2025) indicating that gamification elements can reduce student anxiety and enhance their engagement in the learning process.

Research (Amnouychokanant, 2025) indicates that team-based competition in gamified media is effective in reducing students' language anxiety when dealing with foreign language material perceived as difficult. By working in teams, the cognitive load in answering Arabic diagnostic questions is distributed through collective spirit, allowing students to explore answers more boldly without the fear of individual mistakes. This demonstrates that implementing gamification in Arabic language learning can create a more inclusive and supportive classroom environment, which in turn enhances students' willingness to participate. The application of this method is expected to contribute positively to improving the quality of learning and students' motivation in facing the challenges of learning Arabic.

The real-time Leaderboard feature serves as a powerful stimulus for tenth-grade students. When students see their names or teams rise in the class rankings, their brains release dopamine, triggering feelings of pleasure and pride (Rosida & Wahyuningsih, 2024). However, further analysis shows that the influence of the leaderboard goes beyond mere momentary satisfaction. For students who rank lower, this feature acts as a reminder of areas that need improvement without imparting a stigma of failure, as its format remains that of a game. According to (Helmefalk et al., 2022) in their book on gamification, leaderboards provide instant recognition, which students rarely receive in traditional paper-and-pencil assessments. In the context of the Arabic language, this feature helps students stay focused on the grammatical details (qawaid) or vocabulary (mufrodāt) being tested in order to achieve a top position. The transformation from extrinsic motivation (wanting to win) to intrinsic motivation (feeling competent) occurs when students begin to enjoy the process of mastering the material to improve their scores.

In addition to the two features mentioned above, Quizalize provides instant feedback that immediately informs students of which answers are correct or incorrect along with explanations. In cognitive diagnostic assessments, the speed of this feedback is crucial. Students do not need to wait until the next day to learn about their mistakes. This finding aligns with the principles of the Merdeka Curriculum, which emphasizes constructive and prompt evaluation. As emphasized (Kusmawan, 2024), digitalizing assessments with automatic feedback features is highly beneficial in accurately mapping students' learning profiles while maintaining high levels of engagement.

Integration of the Independent Curriculum: Transforming ZPD Mapping Through Quizalize

Within the framework of the Independent Curriculum, the role of cognitive diagnostic

assessment is no longer merely an administrative formality, but a vital instrument in realizing differentiated learning. Research at MAN Sidoarjo shows that the use of Quizalize significantly changes the way teachers map students' abilities, which in Lev Vygotsky's theory is known as the Zone of Proximal Development (ZPD). The ZPD is the distance between a student's actual level of development, determined by independent problem-solving, and the potential level of development achieved through guidance. The implementation of this diagnostic assessment supports the application of the Scaffolding concept in learning, enabling teachers to provide support that aligns with students' needs and abilities (Swastika & Utami, 2024). Thus, cognitive diagnostic assessment plays an important role in optimizing the learning process, ensuring that each student receives the appropriate support to reach their full potential.

Data from Quizalize provides an instant visualization of each student's ZPD position in Arabic language material. Through its analytics dashboard feature, teachers can see in real-time which questions are most frequently answered incorrectly by students. This enables teachers to carry out targeted interventions (scaffolding) (Gallagher & Scholla, 2025). If the majority of students fail a question on sentence structure (tarkib), the teacher can adjust the lesson module on the same day. The effectiveness of the Merdeka Curriculum heavily depends on the speed at which teachers respond to initial student data. Quizalize reduces the time required for manual grading, which usually takes days, to mere seconds, allowing teachers more time to design more inclusive classroom activities. Thus, the implementation of diagnostic assessments through Quizalize not only enhances efficiency but also strengthens the interaction between teachers and students within the context of learning that is centered on individual needs.

Furthermore, mapping the ZPD through Quizalize is conducted in a more enjoyable manner compared to conventional methods. In traditional assessments, students often feel pressured when facing questions that are beyond their actual abilities (the frustration zone). However, with the gamification format, these challenges are transformed into a "level" that must be completed. The researcher observed that students are more persistent in attempting to answer difficult questions due to the relaxed game-like atmosphere. This aligns with research (Ekawati & Baderi, 2024) which states that the digitalization of diagnostic assessments can minimize test anxiety, allowing students' true cognitive potential to emerge without emotional barriers. This study shows that the implementation of diagnostic assessments through digital platforms such as Quizalize not only improves data accuracy but also enhances student motivation and engagement in the learning process (Darma et al., 2025).

This integration also supports the principle of student-centered learning. With accurate data from Quizalize, teachers no longer teach under the assumption of "one size fits all." Students with a high Zone of Proximal Development (ZPD) can be provided with enrichment, while students who are still at a low actual developmental level are given targeted guidance. This transformation demonstrates that technology is not merely an aid but a key catalyst in creating a fair and enjoyable learning ecosystem in the Merdeka Curriculum era. These findings are reinforced by (Lazuardi & Syarif Muhammad Syaheed, 2024), who emphasizes that the use of interactive media during the diagnostic stage is a strategic step to enhance students' self-efficacy in learning Arabic, which is often considered challenging. This integration also supports the principles of student-centered learning. With accurate data from Quizalize, teachers no longer teach based on a 'one size fits all' assumption. Students with a high ZPD can be provided with enrichment, while students who are still at a lower level of actual development are given special guidance. This transformation demonstrates that technology is not merely an aid, but a primary catalyst in creating a fair and enjoyable learning ecosystem in the era of the Independent

Curriculum. This finding is reinforced by Muflihah, who emphasizes that the use of interactive media in the diagnostic phase is a strategic step to enhance students' self-efficacy in learning Arabic, which is often considered difficult. Essentially, Quizalize has bridged the gap between ZPD theory and real classroom practice (Muntasir & Akbar, 2023). Through engaging data, teachers not only teach language but also build the foundation for students' learning success based on each individual's capacity.

CONCLUSSION | خاتمة

Based on the data analysis and discussion presented, this study concludes that the implementation of cognitive diagnostic assessment using the Quizalize media is significantly effective in increasing the Arabic learning motivation of tenth-grade students at MAN Sidoarjo. Empirical findings indicate a positive transformation, statistically confirmed through the Paired Sample T-Test with a significance value (2-tailed) of 0.028 ($p < 0.05$). The average student learning motivation score increased from 38.27 in the pre-test stage to 42.35 in the post-test stage. This success is closely linked to the integration of gamification elements such as the Team vs Team feature and Leaderboard, which have been able to transform students' perceptions of Arabic; from a subject considered rigid and difficult into an enjoyable, interactive challenge.

Quizalize has proven capable of creating a learning ecosystem that is competitive yet collaborative, ultimately stimulating students' intrinsic motivation to engage more deeply in the learning process. Practically, the results of this study provide an important contribution for Arabic language educators in implementing the Merdeka Curriculum. First, teachers can use Quizalize as an efficient "opener" tool to map students' Zones of Proximal Development (ZPD) without causing mental pressure (test anxiety). The real-time data generated by this platform allows teachers to immediately conduct differentiated instruction, providing different interventions for groups of students who have not yet reached basic competencies and enrichment for those who have exceeded them. Second, the use of this media encourages a shift in the teacher's role from a sole source of information to an innovative technology facilitator. By leveraging gamification, teachers can overcome motivational barriers that have long been a classic issue in foreign language teaching.

The Merdeka Curriculum demands creativity in assessment, and this study demonstrates that the digitalization of diagnostic assessments is key to creating student-centered and meaningful learning. Although this study shows positive results, the researchers acknowledge certain limitations. This research was conducted within a limited scope at a single school with a relatively short intervention period, so the generalization of the results in the long term still requires further verification. Additionally, the variables measured focused on general motivation and have not yet explored the specific correlation with the mastery of particular language skills (maharah) in depth.

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