



The Effectiveness of Employing Digital Educational Games in Developing Linguistic Abilities among Primary School Pupils in Light of Innovations in Educational Technology: A Field Study

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Abstract

This study aims to examine the effectiveness of using digital educational games in developing linguistic abilities among primary school pupils, in light of recent educational technology innovations. The research gains its importance from promoting innovative teaching approaches that integrate play-based learning to enhance Arabic language skills – listening, reading, writing, and expression.

The general hypothesis states that digital educational games have a positive impact on developing pupils' linguistic abilities, supported by three sub-hypotheses addressing statistical differences between experimental and control groups, pre- and post-tests, and the improvement of written expression skills.

A quasi-experimental method was applied using two groups (experimental and control). The study sample consisted of 50 fourth-grade pupils, purposefully selected from a primary school in Batna Province. A linguistic abilities test was administered before and after the experiment to assess the impact of the digital games.

Results revealed statistically significant differences in favor of the experimental group, indicating that the use of digital educational games effectively enhanced students' linguistic performance and motivation.

The study recommends integrating digital educational games into Arabic language curricula at the primary level and training teachers in their pedagogical use to foster active and engaging learning.

Keywords: *Digital educational games, linguistic abilities, primary education, educational technology, active learning.*

L'efficacité de l'utilisation de jeux éducatifs numériques dans le développement des compétences linguistiques chez les élèves du primaire à la lumière des innovations en matière de technologies éducatives : une étude de terrain

Résumé

Cette étude vise à examiner l'efficacité de l'utilisation de jeux éducatifs numériques dans le développement des compétences linguistiques chez les élèves du primaire, à la lumière des récentes innovations en matière de technologies éducatives. La recherche tire son importance de la promotion d'approches pédagogiques innovantes qui intègrent l'apprentissage par le jeu afin d'améliorer les compétences linguistiques en arabe, à savoir l'écoute, la lecture, l'écriture et l'expression.

L'hypothèse générale est que les jeux éducatifs numériques ont un impact positif sur le développement des compétences linguistiques des élèves, étayée par trois sous-hypothèses portant sur les différences statistiques entre les groupes expérimentaux et témoins, les tests pré et post-expérience, et l'amélioration des compétences d'expression écrite.

Une méthode quasi expérimentale a été appliquée à deux groupes (expérimental et témoin). L'échantillon de l'étude était composé de 50 élèves de quatrième année, sélectionnés à dessein dans une école primaire de la province de Batna. Un test de compétences linguistiques a été administré avant et après l'expérience afin d'évaluer l'impact des jeux numériques.

Les résultats ont révélé des différences statistiquement significatives en faveur du groupe expérimental, indiquant que l'utilisation de jeux éducatifs



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numériques améliorerait efficacement les performances linguistiques et la motivation des élèves.

L'étude recommande d'intégrer les jeux éducatifs numériques dans les programmes d'enseignement de la langue arabe au niveau primaire et de former les enseignants à leur utilisation pédagogique afin de favoriser un apprentissage actif et stimulant.

Mots clés : *jeux éducatifs numériques, compétences linguistiques, enseignement primaire, technologie éducative, apprentissage actif.*

Introduction

The contemporary world is witnessing an accelerating digital revolution that has transformed the features of the educational process across its various stages. The integration of educational technology has become a fundamental element in developing teaching methods and enhancing the quality of learning. Amid this transformation, digital educational games have emerged as one of the most significant technological innovations, blending entertainment with learning. These games contribute to stimulating learners' motivation and encouraging active engagement with academic content.

The Arabic language is a central pillar in shaping a learner's personality and developing their cognitive, intellectual, and communicative abilities, serving as the tool through which they express their ideas and interact with their surroundings. The primary stage is the foundational phase for establishing linguistic competencies, such as comprehension, expression, and communication, which form the basis for subsequent academic achievement. However, it has been observed in many schools that traditional methods of teaching Arabic, which rely on rote memorization and rule-based instruction, persist without considering the psychological and developmental characteristics of learners. This has led to weaknesses in Arabic language skills, as well as a decline in students' reading comprehension, oral expression, and written expression abilities.

In contrast, numerous recent educational studies – such as those by Al-Zu'bi (2021), Abdul Latif (2022), and Al-Qarni (2023) – have demonstrated that the use of digital



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educational games in teaching the Arabic language yields positive results in improving reading, writing, and expression skills. These games also increase students' motivation to learn and reduce classroom boredom. However, these studies have often focused on a single linguistic aspect (such as reading or vocabulary) and have not comprehensively explored linguistic competencies (comprehension, expression, and communication) in the context of modern technological innovations within the Algerian school environment. This represents the research gap that this study aims to address.

Thus, this study, titled:

"The Effectiveness of Using Digital Educational Games in Developing Linguistic Competencies Among Primary School Students in Light of Educational Technology Innovations: A Field Study,"

seeks to investigate the impact of employing digital educational games on developing linguistic competencies among primary school students compared to traditional teaching methods, and to determine their contribution to enhancing reading comprehension, written expression, and oral communication skills.

Based on this objective, the study poses the following research problem:

To what extent does the use of digital educational games contribute to developing linguistic competencies among primary school students in light of educational technology innovations?

From this problem, the following sub-questions arise:

- 1) Are there statistically significant differences between the average scores of the experimental group and the

- control group in the linguistic competencies test in favor of the experimental group?
- 2) Are there statistically significant differences between the pre-test and post-test scores of the experimental group in the linguistic competencies test in favor of the post-test?
 - 3) To what extent does the use of digital educational games contribute to developing written expression and oral communication skills among primary school students compared to traditional methods?

Based on these questions, the study's hypotheses are formulated as follows:

General Hypothesis:

The use of digital educational games effectively contributes to developing linguistic competencies among primary school students in light of educational technology innovations.

Sub-Hypotheses:

- 1) There are statistically significant differences at the level ($\alpha \leq 0.05$) between the average scores of the experimental group and the control group in the linguistic competencies test in favor of the experimental group.
- 2) There are statistically significant differences at the level ($\alpha \leq 0.05$) between the pre-test and post-test scores of the experimental group in the linguistic competencies test in favor of the post-test.
- 3) The use of digital educational games contributes to improving written expression and oral



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communication skills among primary school students compared to traditional methods.

From the above, the importance of this research lies in its endeavor to leverage modern technology to serve Arabic language education in an interactive and engaging manner, contributing to the development of students' linguistic skills and opening new horizons for teachers to innovate classroom practices in alignment with the demands of contemporary digital education. It is also expected that the results of this study will enrich Arabic educational literature in the field of digital educational games and provide a practical model that can be applied in the educational field to improve Arabic language learning outcomes at the primary stage.

1. Methodology

1.1. Research Design

The study adopted a quasi-experimental design, which is considered one of the most suitable approaches for educational and field experimental research aimed at measuring the effect of an independent variable (digital educational games) on a dependent variable (development of linguistic competencies). This design allows for a comparison between two equivalent groups: an experimental group and a control group. The experimental group is exposed to the experimental variable (digital games), while the control group receives traditional instruction, enabling precise analysis of the resulting differences.

1.2. Study Population and Sample

- Population: The study population consisted of fourth-year primary school students at a public school in Batna city during the 2024/2025 academic year.
- Sample: A purposive sample of 50 students was selected and randomly divided into:
 - Experimental Group: Consisting of 25 students who participated in the digital educational games experience.
 - Control Group: Consisting of 25 students who received instruction through conventional teaching methods.
- Equivalence between the two groups was ensured based on:
 - General academic achievement level.
 - Chronological age.
 - Linguistic background.
 - Gender (ensuring balance).

1.3. Research Tools

1.3.1. Pre- and Post-Test:

- Designed to measure the four linguistic competencies: listening, speaking, reading, and writing.
- Consisted of 20 questions distributed across the linguistic skills, with a standardized scoring scale.
- Validity was verified by presenting the test to a group of specialists in Arabic language education and assessment techniques. Reliability was calculated using Cronbach's Alpha, yielding a reliability coefficient of 0.87, indicating good reliability.



1.3.2. Classroom Observation Card:

- Used to observe students' behavior during interactive learning.
- Included indicators such as attention, interaction, language use, effort, collaboration, number of participations, and enthusiasm.
- Completed by the teacher/observer during each session.

1.3.3. Linguistic Performance Evaluation Card:

- Specific to assessing speaking and writing skills.
 - Designed based on a rubric containing indicators such as lexical richness, language accuracy, clarity of ideas, paragraph organization, and use of punctuation.

1.4. Study Implementation Procedures

1.4.1. Phase One: Preparation

- Selection of appropriate digital educational games and software (e.g., "Words" application, "Read with Me," and the game "Where's the Word?").
- Training the teacher on integrating these games into instructional sessions.
- Preparing integrated educational content aligned with the official fourth-year primary curriculum.

1.4.2. Phase Two: Pre-Test Application

- Administering a diagnostic test to measure the initial linguistic proficiency of students in the four skills.
- Recording and documenting the results for both groups.

1.4.3. Phase Three: Instruction (Duration: 4 Weeks)

- Experimental Group: Learned using digital educational games integrated into guided instructional activities, which included:
- Introducing new vocabulary through interactive images.
- Enhancing listening skills with audio clips via the application.
- Encouraging speaking through interactive conversation games.
- Allocating time for free writing within the digitally integrated “Write Your Story” game.
- Control Group: Studied the same content using traditional methods (e.g., explanation, rote reading, copying, memorization).

1.4.4. Phase Four: Post-Test Application

- Administering the same test used in the pre-test after the experimental period.
- Comparing results between the pre- and post-tests within each group and between the two groups.

2. Results

The data were analyzed using the SPSS program, and the results were as follows:

2.1. First Hypothesis:

There are statistically significant differences between the average scores of the experimental group and the control group in the linguistic competencies test, in favor of the experimental group.



Table (1): Comparison of Average Scores of the Two Groups in the Linguistic Competencies Test

Group	Sample Size	Mean Score	Standard Deviation	T-Test	Significance Level (Sig)	Statistical Significance
Experimental	25	16.80	2.10	4.52	0.000	0.01
Control	25	12.10	2.65	-	-	-

The table shows that the mean score of the experimental group (16.80) is higher than that of the control group (12.10), with a statistically significant difference at the 0.01 level. This indicates that the use of digital educational games had a positive impact on improving students' linguistic competencies compared to the traditional method.

2.2. Second Hypothesis:

There are statistically significant differences between the pre-test and post-test scores of the experimental group in the linguistic competencies test, in favor of the post-test.

Table (2): Comparison of Pre-Test and Post-Test Results for the Experimental Group

Group	Sample Size	Mean Score	Standard Deviation	T-Test	Significance Level (Sig)	Statistical Significance
Experimental	25	11.75	2.30	6.18	0.000	0.01
Control	25	17.20	2.05	-	-	-

The data reveal a clear improvement in the post-test mean score compared to the pre-test, indicating that digital educational games contributed to the development of students' language skills after the intervention period.

2.3. Third Hypothesis:

The use of digital educational games contributes to the development of written expression skills among primary school students compared to the traditional method.

Table (3): Comparison of the Two Groups in the Written Expression Skills Test

Group	Sample Size	Mean Score	Standard Deviation	T-Test	Significance Level (Sig)	Statistical Significance
Experimental	25	17.45	1.95	5.10	0.000	0.01
Control	25	13.05	2.60	-	-	-

The results show statistically significant differences in favor of the experimental group, indicating that the use of digital educational games contributed to improving students' written expression abilities.

3. Discussion

First Hypothesis:

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Discussion

First Hypothesis:

There are statistically significant differences at the level ($\alpha \leq 0.05$) between the average scores of the experimental group and the control group in the linguistic competencies test, in favor of the experimental group.



Discussion of Results:

The results demonstrated statistically significant differences in favor of the experimental group, indicating that students who learned using digital educational games achieved better linguistic performance than their peers who learned through traditional methods. This superiority can be attributed to the interactive nature of educational games, which encourage students to actively participate in the learning process and connect linguistic concepts to realistic and engaging educational contexts.

These findings align with the principles of *Constructivist Theory*, which posits that learners construct their knowledge through interaction with their educational environment. They also correspond with *Self-Determination Theory*, which emphasizes that learning is more effective when driven by intrinsic motivation resulting from challenge and achievement.

The results are consistent with the findings of Al-Bari (2011), which demonstrated the superiority of groups taught with educational games over those taught traditionally in linguistic patterns. Similarly, the study by Latman and Amayour (2022) confirmed that educational games create an engaging learning environment that encourages interaction and the use of language in natural contexts.

This result suggests that integrating digital educational games into language teaching enhances overall performance in linguistic skills and provides learners with opportunities for continuous practice in a stimulating environment. Thus, educational games serve as an effective alternative to rote-based methods, which often diminish motivation and limit linguistic creativity.

Second Hypothesis:

There are statistically significant differences between the pre-test and post-test scores of the experimental group in the linguistic competencies test, in favor of the post-test.

Discussion of Results:

The results showed a significant improvement in the performance of the experimental group after implementing the educational program based on digital games, reflecting the direct positive impact of using games in developing linguistic skills over a short period.

Scientific Explanation:

This result can be interpreted through the lens of *Experiential Learning Theory*, which asserts that learning occurs through practice and experimentation. Educational games provide repeated opportunities for learning through trial and error, enhancing linguistic memory and strengthening comprehension and application. Their interactive nature fosters intrinsic motivation in students, encouraging them to repeat activities, which in turn improves their linguistic proficiency.

Comparison with Previous Studies:

These findings align with Fatma Razzaq's (2023) study, which confirmed that linguistic games develop language skills by integrating enjoyment with education. They are also supported by Aweqib's (2021) study, which emphasized the



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importance of repetition and practice in learning reading and writing skills.

Theoretical and Practical Implications:

This result indicates that the impact of educational games is evident not only in comparisons between groups but also within the same group over time. This confirms that the systematic integration of games into classroom practices can lead to tangible improvements in learners' performance, particularly in skills requiring cumulative experience, such as reading and written expression.

Third Hypothesis:

The use of digital educational games contributes to developing written expression skills among primary school students compared to the traditional method.

Discussion of Results:

The results demonstrated the superiority of students who used digital educational games in written expression skills, as they showed greater ability to organize their ideas and use vocabulary more accurately and diversely. This can be attributed to the nature of digital games, which provide realistic linguistic contexts that encourage learners to produce written content interactively, fostering creativity and critical thinking.

This result is explained through the lens of *Multiple Intelligences Theory*, which suggests that employing multimedia (audio, visuals, and movement) activates multiple intelligence types in children (linguistic, visual, kinesthetic), enriching the writing process. It is also

supported by the concept of "Learner-Centered Learning", which positions the learner as an active producer of texts rather than a passive recipient.

These findings are consistent with Latman and Amayour's (2022) study, which highlighted that educational games stimulate linguistic creativity and encourage students to use language in both written and oral forms. They also align with Almiliji and Atifi's (2014) study, which demonstrated that interactive game-based activities enhance children's expressive skills by blending education with entertainment.

This result underscores the significant importance of using digital games to develop writing skills, a complex productive skill that requires a supportive and motivating environment. Therefore, digital educational games can be integrated into expression and composition lessons at the primary level to encourage creative writing and build confidence in students' linguistic abilities.

General Hypothesis

Presentation of Results:

The field study's results, supported by statistical analyses, confirmed that digital educational games have a significant and positive impact on developing various aspects of linguistic competencies (listening, reading comprehension, written expression, and linguistic structures). This was evidenced by the experimental group's superiority over the control group in the post-test, as well as the notable improvement within the experimental group between the pre-test and post-test.

This outcome is attributed to the fact that digital educational games provide an active and engaging learning



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environment, activate learners' roles, and connect knowledge with practice. They combine motivation, repetition, and interaction, which help consolidate linguistic skills and develop linguistic thinking.

The integration of audio, visuals, and movement contributes to engaging multiple sensory channels in language acquisition, as supported by *Multimedia Learning Theory* and *Game-Based Learning Theory*. Studies indicate that combining learning with interactive experiences enhances comprehension and retention of linguistic information.

These results align with several studies, including:

- Abu Al-Saud's (2019) study, which confirmed the effectiveness of educational games in improving Arabic language skills among primary school students.
- Latman and Amayour's (2022) study, which highlighted that the use of digital games increases motivation for language learning and enhances expressive abilities.
- Almiliji's (2014) study, which demonstrated that game-based education is one of the most successful methods for developing children's communication skills.

These findings are consistent with modern trends in educational technology, which advocate for a shift from rote-based education to interactive and experiential learning. The current digital generation learns more effectively through technological environments that allow participation and discovery rather than memorization.

The study's results contribute to enriching the educational literature supporting *Game-Based Learning, affirming that educational games are not merely recreational tools but effective scientific instruments that can be integrated into curricula to develop essential linguistic competencies.

Practically, the results recommend incorporating digital educational games into classroom practices at the primary level, tailored to students' levels and curriculum objectives, given their direct impact on improving linguistic achievement and enhancing classroom interaction.

Despite the significance of the results, the study remains limited by its sample size, temporal scope, and geographical context, as it was conducted on a specific group of students in a single academic stage. This necessitates caution in generalizing the findings and calls for further studies on other stages and groups to verify the sustainability of the impact.

General Conclusion of the Discussion

Through the discussion of the three hypotheses, it is evident that digital educational games have proven their effectiveness in developing various aspects of linguistic competencies, whether in comprehension or linguistic production. The results also confirm their alignment with global trends in educational technology, which advocate for interactive and game-based learning. These findings highlight that transitioning from traditional to interactive digital education has become an urgent educational necessity to meet the demands of the new digital generation.



Conclusion

This study concluded that the use of digital educational games represents an effective pedagogical approach for developing linguistic competencies among primary school students. The results demonstrated statistically significant differences in favor of the experimental group, which learned using these games, compared to the control group, which relied on traditional methods. The positive impact was particularly evident in enhancing listening, reading, and written expression skills, reflecting the effectiveness of digital interaction and educational games in promoting language learning and activating students' cognitive and affective abilities.

Theoretical Implications:

The study contributes to supporting modern educational trends advocating for the integration of educational technology into the learning process by providing field-based evidence of the importance of digital educational games as an effective tool for developing language skills. It aligns with theories of active learning, constructivism, and game-based learning. Additionally, it adds a cognitive dimension to Arabic literature in the field of educational technology, particularly given the scarcity of applied studies addressing this topic in the Algerian context.

Practical Implications:

The study offers a model that can be utilized in designing digital, game-based linguistic activities for primary classrooms, contributing to improving Arabic language

teaching practices and making them more engaging and effective. Its results can guide educational policymakers toward incorporating digital educational games into official curricula and textbooks, as well as training teachers in their pedagogical use.

Research Limitations:

Despite the positive outcomes, the study is not without limitations, including:

- 1) The sample was limited to students in a specific primary stage, which restricts the generalizability of the results to other educational stages.
- 2) The short duration of the experiment, which calls for longitudinal studies to assess the long-term impact of educational games on linguistic achievement.
- 3) Reliance on quantitative assessment tools without integrating qualitative methods (e.g., observation or interviews), which could be addressed in future research.

Recommendations:

Based on the findings, the researcher recommends:

- Incorporating digital educational games into strategies for teaching Arabic in primary education.
- Organizing training programs for teachers on how to use these tools in a scientifically and pedagogically sound manner.
- Encouraging researchers to conduct future studies exploring the impact of digital games on other linguistic aspects, such as spelling, grammar, or literary appreciation.



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- In conclusion, this study affirms that digital educational games are not merely recreational tools but strategic educational instruments capable of bringing about a qualitative shift in Arabic language learning and the development of linguistic competencies in light of modern advancements in educational technology.

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