International Journal of Innovative Research and Scientific Studies, 8(1) 2025, pages: 126-136

IJIRSS
International Journal of Innovative Research & Scientific Studies

ISSN: 2617-6548

URL: www.ijirss.com

The implications of educational games on the development of children's intellectual abilities

Meruyert Izat[1], Ulbossyn Kyyakbayeva[2], Saniya Nurgaliyeva[3*], Feruzakhon Urinova[4], Maksudakhon Khallokova[5]

[1,2,3]*Abai Kazakh National Pedagogical University, Almaty, Kazakhstan.*
[4,5]*Fergana State University, Fergana, Uzbekistan.*

Corresponding author: Saniya Nurgaliyeva (*Email: sanianur@mail.ru*)

Abstract

Educational games have emerged as powerful tools in contemporary pedagogy, leveraging interactive and engaging platforms to enhance children's intellectual abilities. This research explores the multifaceted implications of educational games on cognitive development focusing on critical thinking, problem-solving skills and knowledge retention among children. This study used a mixed-data collection strategy. The goal of this research was to determine the impact of developed educational game technology on improving children's intellectual abilities. The study included 43 participants. According to the study, children have an average level of intellectual development. In this regard, training preschool-aged children required modifications to the content, procedural and personal aspects of learning for children using educational game technology. The study's findings revealed that incorporating educational game technological advances into the process of training children improved their cognitive abilities. Teachers can improve their teaching strategies using the useful tools and materials provided by the study's findings on the usage of educational games to support children' intellectual development. This research underscores the importance of integrating educational games into curricula to maximize their intellectual benefits and prepare children for future academic and life challenges.

Keywords: Children, Educational games, Exploring, Fostering, Impact, Intellectual abilities.

DOI: 10.53894/ijirss.v8i1.3578
Funding: This study received no specific financial support.
History: Received: 17 April 2024/**Revised:** 10 September 2024/**Accepted:** 25 September 2024/**Published:** 1 January 2025

Competing Interests: The authors declare that they have no competing interests.
Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.
Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.
Institutional Review Board Statement: The Ethical Committee of the Academic Council, Abai Kazakh National Pedagogical University, Kazakhstan has granted approval for this study on 14 October 2022 (Ref. No. 4).
Publisher: Innovative Research Publishing

1. Introduction

Processes associated with the development of children have recently attracted great interest worldwide. International research in education programs has shown a strong relationship between student achievement and pre-primary education

attainment Nilsen et al. [1], AlKaabi et al. [2] and Nonte et al. [3]. Analysis of research works demonstrates the intensity of research on the fundamentals of how preschoolers develop their intelligence as an important means of improving learning Skene et al. [4]. The most recent studies emphasize the following fact: the successful development of a child's abilities is not dependent on external factors such as whether the child's environment is conducive to learning Parker et al. [5] and Bjorklund's [6] studies about the suitability of a child's environment for learning do not determine whether a child will develop their skills effectively. According to recent research by Saracho [7], children's development potential can be negatively impacted by updating educational resources in developing countries especially with the lack of major social shifts. New learning elements for educational games have emerged as an important strategy for promoting cognitive development in our country's preschool children. The curriculum and instructional methods were revised by Kulshayeva et al. [8]. The intelligence of preschool children should be developed through educational games. However, according to Zhakupova et al. [9] it is critical to recognize significant gaps in educational policy, research and practice in preschool education in Kazakhstan. This strategy did not contribute to the intensive development of children's intelligence at preschool age or to the effectiveness of programs used by a preschool educational institution to stimulate preschoolers' intellectual development. Therefore, additional measures are required to improve education for young children particularly the intellectual abilities of preschoolers despite improvements in preschool education in Kazakhstan. This determines the task of finding appropriate diagnostic tools that allow the identification and analysis of a set of educational games that will help children develop their intellectual abilities.

Thus, the intellectual development of children is fraught with difficulties. The research issue represents the conflict between the need to develop preschoolers' intellectual abilities and the insufficient focus on developing intellectual abilities in children through educational game technologies. These challenges can only be overcome through innovative research, the use of educational game technology and the efficacy of these programs in stimulating the intellectual development of preschoolers. However, the main question is whether educational game technology improves children's intellectual abilities. If so, how does this happen? Unfortunately, the existing literature has not sufficiently studied the issue of developing intellectual abilities among children based on modern educational game technology despite the importance of improving children's intellectual abilities. In this research, we focus on investigating the impact of developed educational game technology in Kazakhstani preschool educational institutions in terms of fostering intellectual abilities and the practical application of educational games to support the intellectual education of preschool-aged children. This study attempted to address the following research questions:

1.1. Research Questions

Q1: What are the interpersonal relationships among preschool children?

Q2: What are the main characteristics that influence a child's self-esteem and perceptions of how other children perceive him?

Q3: What characteristics of communication actions between children are critical for the entire communication process and which play a supporting role?

1.2. The Study's Objectives

The goal of this research was to determine the impact of developed educational game technology on improving children's intellectual abilities.

The hypothesis is that the developed educational game technology which contributes to the structure of the game process will improve the intellectual education of preschool-aged children.

1.3. Significance of the Study

This study is significant because it addresses the current issue of not only promoting child development but also intellectually educating the younger generation. The general and specific facets of preschoolers' intellectual development have been the subject of numerous studies in developed countries but Kazakhstani preschool pedagogy has not given this enough consideration. Another fact that confirms the relevance of the study is that practicing teachers use outdated forms and methods of teaching educational games. The current study was conducted to contribute to the body of knowledge by filling a gap. The inadequate development of the problems associated with the use of educational games for preschool children requires the modification of educational programs that use the potential of educational games. The outcomes of this study provide teachers with some useful resources and materials to help them update their instructional methods based on the numerous benefits of using educational games for preschool children's intellectual development.

2. Review of the Literature

2.1. Development of Intellectual Abilities in the Preschool Age

The impact on the child's abilities must be very specific. Training must be carried out by the program, purposefully and consciously. Researchers' views on the feasibility and effectiveness of planned training for preschoolers differ. Some argue that not all reserves, both physical and mental are fully used. Others argue that children's abilities at this age are still limited and that their psyches should not be overburdened with training Swider-Cios, et al. [10].

Binet and Simon [11] considered that the development of intelligence occurs when one masters all three forms of information representation: actions, visual images and linguistic signs. The presentation of information should be carried out in different ways (visual-spatial, sensory-sensory and verbal-symbolic). The preference for one way of presenting information leads to the formation of a superficial understanding of the world.

The attention of a 6-7-year-old child is characterized by involuntariness. He cannot yet control his attention and often finds himself at the mercy of external impressions. This manifests itself in rapid distraction, inability to concentrate on one thing and frequent changes in activities. This involves carefully completing any task. According to Puranik and Li [12] and Burchinal's [13], preschools develop interesting knowledge. There are two contradictory trends here. First, in the mental activity process, there is an expansion of volume and a deepening of knowledge about the world around us. This stable knowledge forms the core of the child's cognitive sphere. The second is that in the process of mental activity, assumptions and questions appear.

It's important to pay attention to information regarding the "distribution" of roles across the hemispheres when working with six-year-olds. According to Darling-Hammond et al. [14], teachers should develop all types of memory in children and strive to learn memorization based on mental activity and understanding. Raffington et al. [15] argue that emotional memory reaches a high degree of development in a six-year-old child. According to Ke, et al. [16] and Kim, et al. [17] a child's emotional memory is inseparable from the figurative and visual ones. Memory development is manifested not only by a significant expansion and deepening of the range of ideas but also by the transition from individual and specific images to generalized ideas.

As involuntary imagination develops further, a qualitatively new type of imagination emerges from the voluntary imagination Kushnir [18]. At this age, images of imagination have different brightness, clarity, mobility and variability. According to Zhao et al. [19] and Nyhout and Ganea [20], a six-year-old child creates images by combining previously obtained ideas with their transformation which is achieved by analyzing and synthesizing existing ideas.

In preschool, the main activity is play. In the process of playing out situations and roles, mastery of the functions and forms of speech becomes very important for him. Feldman [21] and Brodin and Renblad [22] describe that speech is closely related to thinking. At the same time, the physical aspect of speech activity fades into the background, overshadowed by the task of mastering the various functions of speech and the forms in which they are expressed. The semantic (meaning) aspect of language becomes more significant. A significant expansion of a child's social circle by the age of six leads to the development of his free speech. Mastering concepts and their meanings allows a six-year-old child to use generalization in speech and develop his thinking. According to Panjeti-Madan and Ranganathan [23], Rayhan [24] and Rauf and Bakar [25] forms of mental activity also help preschoolers improve their concepts, judgement and inferences.

Researchers classify intellectual abilities as external manifestations of intelligence in various ways Gubbels et al. [26] and Bucaille et al. [27]. The ability to assimilate new knowledge and activity methods is a manifestation of the ability to learn. Learning ability is defined by the child's level of independence when performing tasks as well as the use of knowledge and methods of activity to complete a similar task. Active creative activity on the subject is the highest degree of learning ability [28]. However, at preschool age, this type of ability is not sufficiently organized. It only begins to emerge under the condition of a high level of intellectual development. Intellectual abilities manifest themselves in the ability to analyze, compare, generalize, compare and synthesize. The development of intellectual ability and mental experience is closely related to the cultivation of certain personal qualities in children.

2.2. Using Educational Games to Develop Preschoolers' Intelligence

One of the most important intellectual abilities that develops in preschool is visual-spatial modeling. Children's activities are of a modeling nature and play predominates in them, so their capacity for visual modeling is precise. Therefore, the simulation of reality in games is of particular value for the intellectual development of a child Dag et al. [29] and Garaigordobil et al. [30].

Games have several educational advantages. Through play, a child develops relationships with peers, self-esteem, self-awareness and learning about himself and the world around him. According to this perspective, the most important are the ideas of children about the world of adults that are formed there and the mental abilities that develop under the influence of Şen and Yazıcı [31], Yang et al. [32] and Flogie et al. [33]. Studies by Bonilla-Sánchez et al. [34] and Iordanou et al. [35] show that children use substitutes for real items instead of the real ones during play which helps them develop a symbolic (sign) function of consciousness.

These are characteristics of imagination and creativity. Imagination is further developed when one compares the model made in the game with the simulated world itself. The child begins to see a second imaginary plan behind his play actions and the actions of his partners. Of course, the statement mentioned above regarding the game's developmental value is only valid if preschoolers' understanding of the game reaches a sufficient level. This requires systematic and skillful guidance from adults. According to Laranjeiro [36] educational games aimed at the mental development of preschoolers are similar to educational activities. The teacher intentionally shapes the students' responses, considers methodological approaches and ensures every student accepts didactic tasks when playing games with them. Consequently, the ability for visual modeling and developed imagination are necessary for various types of work and if they are not formed in preschool childhood, it is extremely difficult to catch up with this later.

3. Methods

3.1. Research Methods

This study used a mixed data collection strategy Şahin and Ozturk [37] and Dawadi et al. [38]. Thus, the main argument for mixed methods research is that the results obtained by combining methods will be superior to those obtained by using a single method.

3.2. Research Sample Formation

The experimental study was carried out in 2022–2023 based on Almaty Kindergarten No. 144 (Kazakhstan) in the senior kindergarten group (experimental group: n = 21). As a control group, we considered children from the older group attending Kindergarten No. 105 in Almaty (Kazakhstan) (n = 22). Educational activities in EG and CG are conducted according to the basic educational program of preschool education. The developed technology games were used in the experimental group.

3.3. Experimental Process

The study was conducted in 'Kindergarten No. 144' and 'Kindergarten No. 105' in Almaty, Kazakhstan from 2022 to 2023. The ethical principles of the study procedure were followed: consent was obtained from the parents of the respondents and the administration of kindergartens for the children to participate in this study.

Each method is created in a specific country and is intended to study sociocultural and psychological phenomena specific to a given ethnic group. The question arises about the validity of the methods and the comparability of the results obtained. Therefore, our objective was to use valid and reliable diagnostic tools.

The characteristics of a specific diagnostic situation were then considered which undoubtedly influenced the technique success, the subjects' motivation, their mental state and ultimately the diagnostic results. In this sense, the conditions for group and individual tests were structured according to the type of training session, so the subjects did not have to adapt to the testing procedure. Diagnostic techniques were used for scientific purposes. The anonymity of the results ensured that they remained confidential.

The experimental group was trained using the developed model and gaming technologies but the main curriculum was not changed or the children's load increased. The development activities were organized into classes, role-playing, didactic and creative games and artistic and creative activities. Specially organized activities were organized into subgroups identified during the diagnostic stage of the technology's implementation (children who had similar difficulties developing certain intelligence criteria). During the classes, children were allowed to first form or understand their own experience and conditions were created to motivate and stimulate their intellectual manifestation in addition to the formation of knowledge contained in the content sections. Children of 4-5 years engage in artistic and creative activities such as fiction, music, theater and visual arts. In this regard, the content of the child's artistic and creative activities has been developed which aids in the development of his intellect. Original and folklore works were among the fiction submitted for review. A technique known as asking questions about the characters' intentions and feelings about future events (in older preschoolers) was used in addition to direct perception of literary works. The use of this important technique helped the child accurately acquire the information that was relevant to him at the time after all, what had become the subject of his creative activity had personal meaning and acquisition. A characteristic of musical works is that their pedagogical potential lies in their influence on the emotional world of the child. Listening to music and conveying its emotional content through plastic movements, visual activity and creative stories contributed to perceiving the content of another person’s inner life on an emotional and affective level and enriching one’s own experience. Theatrical activities that involve playing a specific character have significant potential for intelligence development. The child learns to recognize such intentions in interpersonal interactions through specific intonations, facial and gestural expressions and internal emotional sensations. The educational space during the holidays provides numerous opportunities for this knowledge. Preparing for the holidays, learning roles and dramatization games allow the child to practice in front of a mirror, visually controlling his expression, correlating it with specific internal sensations and standards and depicting genuine emotions and expressive movements. As a result, the children's creative products became part of the group's developmental environment as well as game aids and attributes. The control group followed the traditional model curriculum.

3.4. Data Collection

Step 1: Ascertain the stage. This stage of the experiment which was partially diagnostic was associated with the preliminary determination of the most important components of interpersonal relationships between preschoolers and the characteristics of communication actions between children that are critical to the entire communication process. After conducting the study, we received results that indicated a low level of intelligence in preschoolers, weak ideas about themselves and their capabilities and difficulty in resolving the situation. In this regard, active work has begun to find optimal training options with corrections to the training content for EG participants.

Step 2: Control stage. The task of this stage was to introduce educational game technology into the educational process through (i) determining the goals of the game identifying criteria for its effectiveness, determining its spatio-temporal limitations, selecting materials for its content component, setting direct game goals and objectives, selecting participants, diagnosing their gaming qualities, explaining the algorithm of game actions and distributing roles among children (in a role-playing game) for the teacher to develop the child’s readiness to play. (ii) Direct the organization of the game process ensuring control over its implementation for the teacher and activities for the child. (iii) For the teacher, recording the consequences of game actions (counting points, determining the nature of decisions made), analyzing the achievement of the game goals and objectives according to its effectiveness criteria, organizing other activities after the game has finished and for the child, reflection of intellectual activity and acceptance of the game results.

After the intervention, evaluation procedures were conducted to determine the nature of the impact of educational game technology on EG participants. A specifically designed set of criteria and indicators is used to assess the effectiveness of influence.

3.5. Instruments for the Collection

The following four collections were used: (1) a technique called 'Captain of the Ship', (2) a technique called 'Staircase', and (3) the bales observation technique.

3.6. Data Analysis

Quantitative analysis determined differences using mathematical statistical methods such as the Mann-Whitney U test. Primary data were analyzed using descriptive statistics. All statistical analyzes were performed using the SPSS Statistics 19 program.

4. Results

The results of the study of interpersonal relationships among preschool children are shown in Table 1.

Table 1.
EG and CG results before the experiment.

Status	% (EG)	% (CG)
Stars	25 % (5 children)	18 % (4 children)
Preferred	50 % (11 children)	57 % (15 children)
Neglected	17 % (4 children)	17 % (2 children)
Isolated	0	8 % (1 child)
Rejected	8 % (1 child)	0

The percentage of the status of the children in the EG and CG results before the experiment is shown in Figure 1.

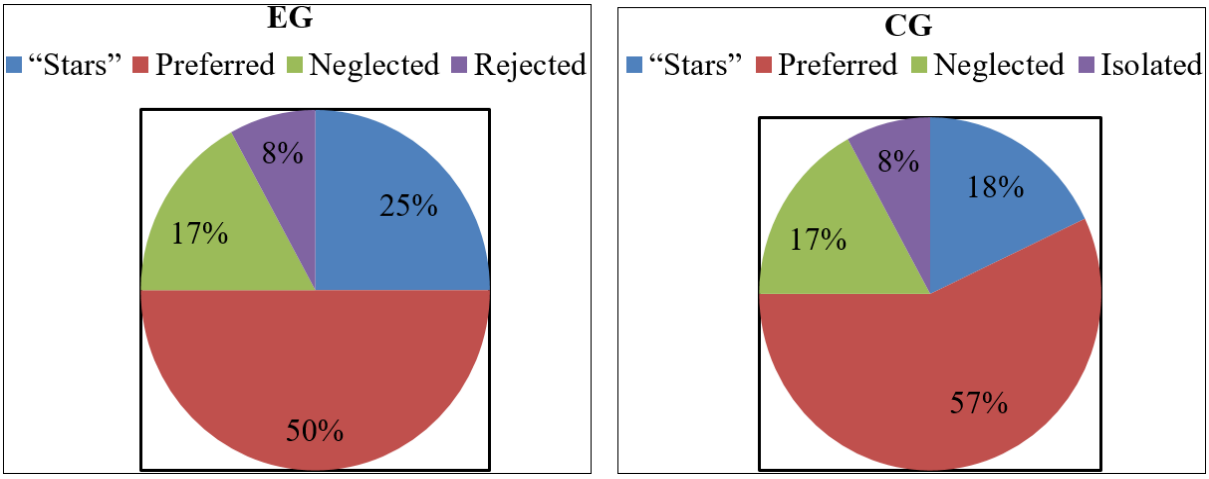

Figure 1.
Percentage of the status of children in EG and CG (Before the experiment).

Based on the data obtained, all children in the EG interact with each other. The children did not choose the 'rejected' person due to his behavior although in everyday life they accept him in the game. In the CG, most children in the group are 'preferred'. There is no choice of 'rejected' children which means that all children in the group are in contact with each other.

The results of the main characteristics that influence a child's self-esteem and perceptions of how other children perceive him are shown in Table 2.

Table 2.
EG and CG results after the experiment.

Status	% (EG)	% (CG)
Stars	33 % (5 children)	18 % (4 children)
Preferred	67 % (16 children)	57 % (14 children)
Neglected	0	17 % (3 children)
Isolated	0	8 % (1 child)
Rejected	0	0

The percentage of children's statuses in EG and CG results after the experiment is shown in Figure 2.

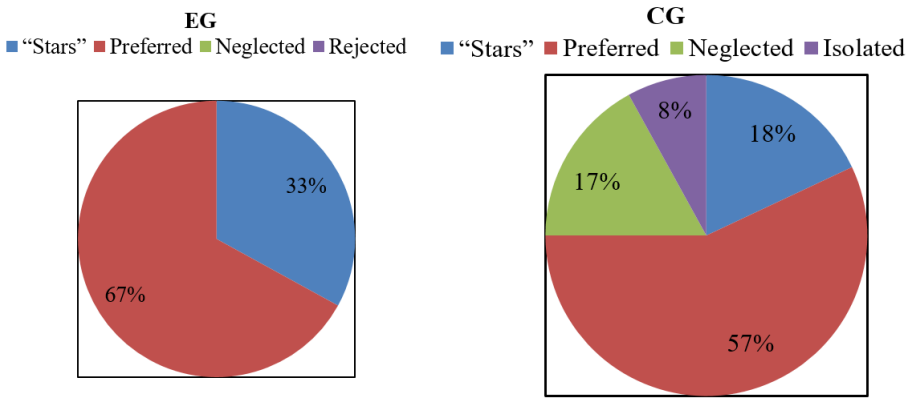

Figure 2.
Percentage of the status of children in EG and CG (After the experiment).

After testing the gaming technology, no children were left with a negative option in the EG. The children began inviting peers who had previously made negative choices to the game. Results in the control group (after), indicators and results remained unchanged.

The results of the study of the main characteristics that influence a child's self-esteem and perceptions of how other children perceive him are shown in Table 3.

Table 3.
EG and CG results before the experiment.

Stage no.	EG		CG	
1.	-	-	-	-
2.	-	-	-	-
3.	-	-	-	-
4.	-	-	-	-
5.	-	-	-	-
6.	-	-	-	-
7.	8 % (1 child)	8 % (1 parents)	-	-
8.	8 % (1 child)	-	-	-
9.	17 % (4 children)	17 % (2 parents)	33 % (5 parents)	-
10.	67 % (15 children)	75 % (18 parents)	67 % (17 parents)	100% (22 parents)

The responses of the EG and CG responses before the experiment are shown in Figure 3.

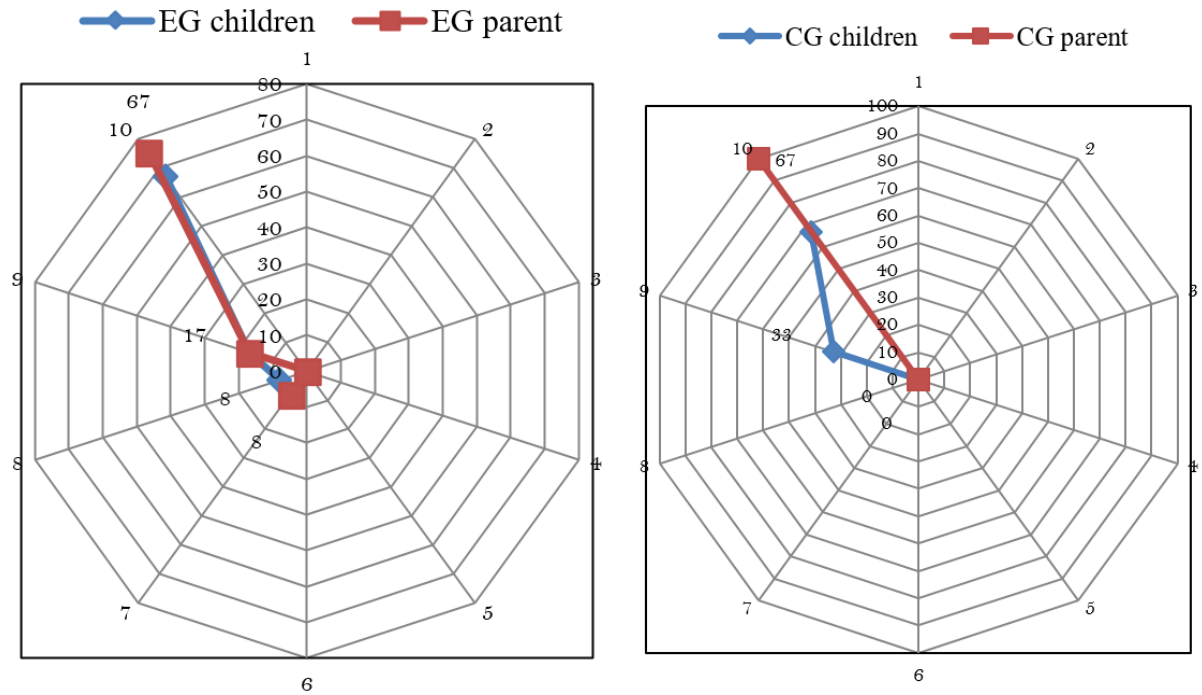

Figure 3.
EG and CG (Before the experiment).

It is considered normal for children of this age to rate themselves as very good or even very good children. This means that we can conclude that the self-esteem of a preschooler is directly dependent on the parent.

Table 4 shows the results of the study of the main characteristics that influence a child's self-esteem and perceptions of how other children perceive him.

Table 4.
EG and CG results after the experiment.

Stage no.	EG		CG	
1.	-	-	-	-
2.	-	-	-	-
3.	-	-	-	-
4.	-	-	-	-
5.	-	-	-	-
6.	-	-	-	-
7.	-	-	-	-
8.	58 % (17 children)	33 (7 parents)	-	-
9.	42 % (4 children)	50 % (10 parents)	33 % (5 children)	-
10.	-	17 % (4 parents)	67 % (17 children)	100% (22 parents)

The responses of the EG and CG responses after the experiment are shown in Figure 4.

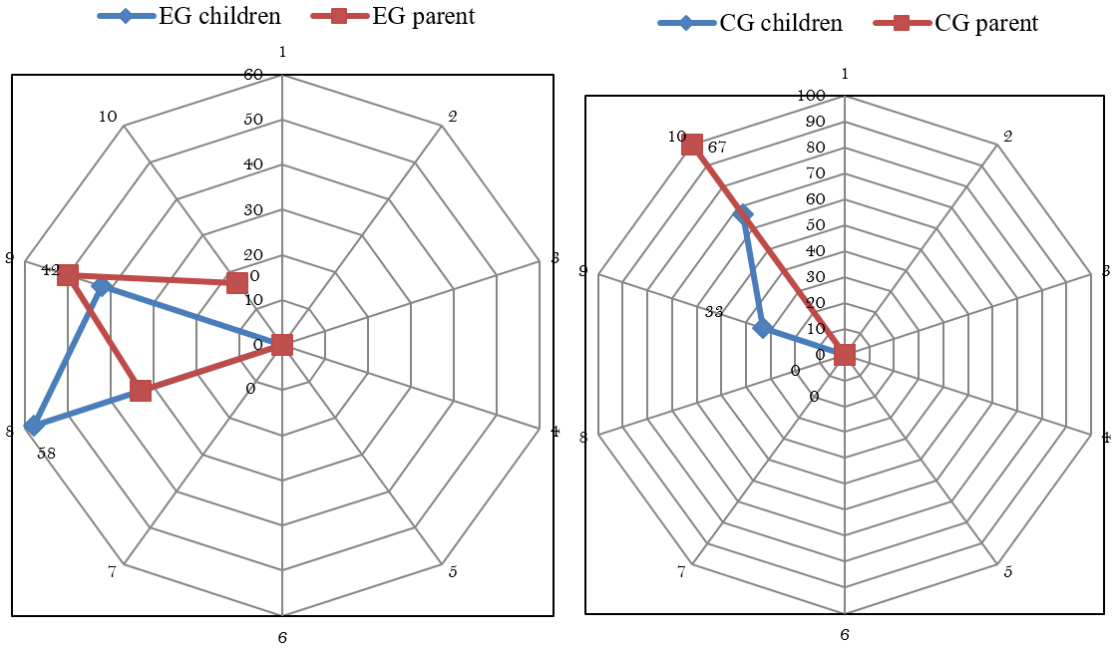

Figure 4.
EG and CG (After the experiment).

After testing the gaming technology, the indicators changed and the children began to choose one step lower. Data results from the control group (after) indicators have not changed.

Based on these indicators, we can conclude that children began to have an idea of themselves and their abilities with the least dependence on the opinion of parents.

Table 5 shows the results of the study on communication actions between children.

Table 5.
EG and CG results before the experiment.

Profile	% (EG)	Profile	% (CG)
Dominant	17% (2 children)	Dominant	17% (2 children)
Dependent	25% (3 children)	Dependent	25% (3 children)
Positive	33% (13 children)	Positive	50% (16 children)
Negative	8% (1 child)	Instrumental	8% (1 child)
Expressive	17% (2 children)	-	-

The percentage of children's statuses in the EG and CG results before the experiment is shown in Figure 5.

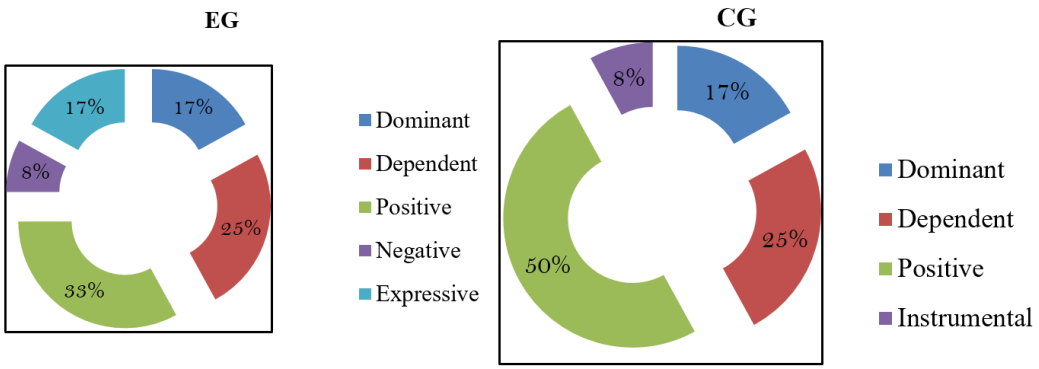

Figure 5.
Percentage of the status of children in the EG and CG (Before the experiment).

On the basis of the results obtained, in the experimental group, positive and dependent behavior profiles predominate. We can assume that the predominance of a positive profile is for the better, since children with a dependent profile are followers and can follow the example of someone, they consider an authority. According to the results, positive and dependent profiles predominate in the control group.

Table 6 shows the results of EG and CG after the experiment.

Table 6.
EG and CG results after the experiment.

Profile	% (EG)	Profile	% (CG)
Dominant	18% (2 children)	Dominant	17% (2 children)
Dependent	9% (1 child)	Dependent	25% (3 children)
Positive	64% (17 children)	Positive	50% (16 children)
Instrumental	9% (1 child)	Instrumental	8% (1 child)

The percentage of children's statuses in the EG and CG results after the experiment is shown in Figure 6.

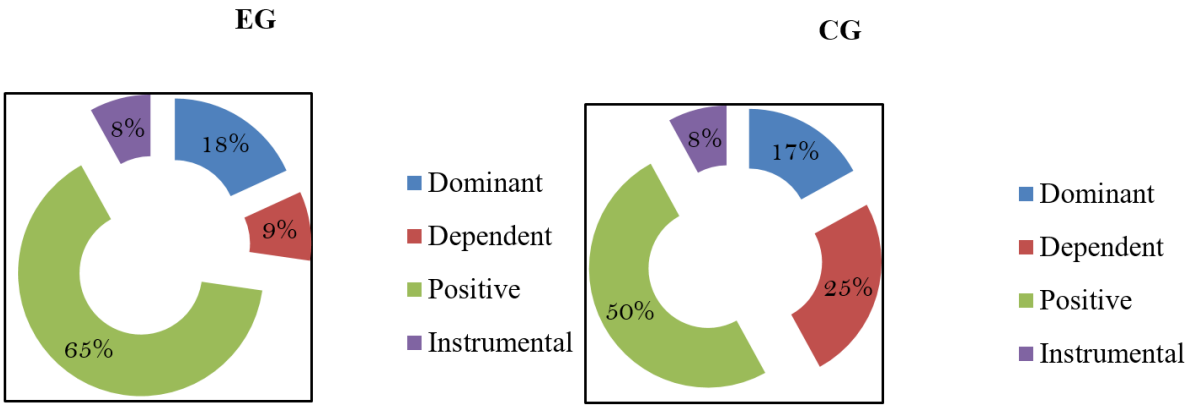

Figure 6.
Percentage of the status of children in EG and CG (After the experiment).

After testing the technology, positive changes occurred in the experimental group, the percentage of children with a dependent behavior profile decreased and the number of children with a positive profile increased. Results in the control group (after), indicators and results did not change.

Given the strength of the findings, we can conclude that preschoolers have become more oriented towards their peer group.

The Mann-Whitney criterion was used to statistically process preschooler intelligence data in CG and EG. In our case, the largest sample size is 22 and the smallest is 21. At $p < 0.05$, the critical value (U_{crit}) is 120.

The empirical value obtained is less than the critical value (107.5<120) and the difference is considered significant.

Conclusion: The mathematical calculation confirmed the significance of the difference in the results obtained between CG and EG at the control stage of the experiment indicating the effectiveness of the work done and supporting the hypothesis of the investigation.

5. Discussion

The study investigated how the technology of educational games contributes to the structure of the game process and improves children's intellectual abilities. EG participants who are learning using the developed educational game technology demonstrated statistically significant intellectual ability compared to CG participants who are not learning using

this technology. According to Atashbahar et al. [39] and Qamar [40] these results are consistent with those of other researchers. As part of the experiment, it was also determined that the effectiveness of educational game technology can vary significantly due to the degree of implementation of a certain set of the following conditions: interaction with children on the principles of humanism taking into account their age and individual, national-cultural, religious and social characteristics (representatives of more than 100 different nationalities live in our country) ensuring constructive interaction between children, creating a comfortable subject-development environment, the subject, the readiness of the teacher to conduct games ensuring the creation of an atmosphere of healthy competition between the participants in the game including through any reward incentives, the organization of role-playing games. This is consistent with the arguments of Cohrssen, Niklas [41] and Jin [42].

The main advantages of the results of our research are that the tasks and techniques of games can increase the sensitivity, diversify their educational activities of children and make them entertaining. Furthermore, our findings about the positive impact of educational games on the development of children's intellectual abilities are consistent with the findings of other researchers by Lozada et al. [43] and Garcia [44].

6. Conclusion

This study explored the effects of providing educational game technology on the development of children's intellectual abilities. Children's intellectual development happened as a result of multiple interrelated stages during the experimental process, preparatory, deciding on the game's objectives, defining its limits in terms of space and time, choosing resources for its content component, establishing explicit game goals and objectives, choosing players, fostering the child's readiness to play, practical, oversee the game process directly, giving the instructor complete control over its execution, engage the child in play activities and analytical, for the instructor, keeping track of the outcomes of gameplay, evaluating how well the game meets its objectives and goals based on its effectiveness standards, planning follow-up activities once the game is over and for the children, reflecting on their intellectual development and accepting the game's conclusions. Educational games were aimed at developing the child's cognitive processes (initiative, curiosity, independence), self-esteem (self-confidence, sense of intellectual competence), communication skills (goodwill, criticality in assessing "indisputable" truths, and the capacity for intellectual dialogue), emotional (characterizing the attitude towards life phenomena, including reality, art, creativity, knowledge, and intelligence) and intellectual (characterizing the attitude towards life phenomena, including reality, art and creativity). The findings of the study indicate that the hypothesis proposed was proven and that the assigned tasks were completed.

7. The Suggestions and Future Implications

When determining research prospects, it should be noted that additional research on the issue under consideration could be aimed at providing new perspectives and access to scientific knowledge in preschool education. Some issues also require special study, in particular identifying new vectors for the promotion of children's intellectual abilities and the intellectual education of the younger generation which can be indicators of teachers' willingness to exchange knowledge about modern forms and methods of teaching educational games. At the present stage of the development of the preschool education system, there is an urgent need to modify educational programs that use the potential of modern educational games for preschool children. This is especially important in light of the new learning elements for educational games, which have emerged as a key strategy for promoting cognitive development in our country's preschool children. A modern preschool teacher teaches lessons using educational games expands his knowledge and exchanges methodological ideas in professional communities. The insufficient development of educational programs associated with the use of educational games for preschool children requires modification of these programs to capitalize on the potential of educational games. All of these aspects of fostering preschool children's intelligence raise the need for new learning elements, improvements in educational programs, mastery of educational game technology and the effectiveness of the potential of educational games in practice in preschool institutions.

References

[1] T. Nilsen, H. Kaarstein, and A.-C. Lehre, "Trend analyses of TIMSS 2015 and 2019: School factors related to declining performance in mathematics," *Large-Scale Assessments in Education*, vol. 10, no. 1, pp. 1-19, 2022. https://doi.org/10.1186/s40536-022-00134-8

[2] N. A. AlKaabi, N. Al-Maadeed, M. H. Romanowski, and A. Sellami, "Drawing lessons from PISA: Qatar's use of PISA results," *Prospects*, pp. 1-20, 2022. https://doi.org/10.1007/s11125-022-09619-4

[3] S. Nonte, A. Clerkin, and R. Perkins, "An examination of science achievement and school compositional effects in Ireland using TIMSS data," *European Journal of Educational Research*, vol. 11, no. 4, pp. 2523-2536, 2022.

[4] K. Skene, C. M. O'Farrelly, E. M. Byrne, N. Kirby, E. C. Stevens, and P. G. Ramchandani, "Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis," *Child Development*, vol. 93, no. 4, pp. 1162-1180, 2022. https://doi.org/10.1111/cdev.13730

[5] R. Parker, B. Thomsen, and A. Berry, "Learning through play at school–A framework for policy and practice," *Frontiers in Education*, vol. 7, p. 751801, 2022. https://doi.org/10.3389/feduc.2022.751801

[6] D. F. Bjorklund, "Children's evolved learning abilities and their implications for education," *Educational Psychology Review*, vol. 34, no. 4, pp. 2243-2273, 2022. https://doi.org/10.1007/s10648-022-09688-z

[7] O. N. Saracho, "Theories of child development and their impact on early childhood education and care," *Early Childhood Education Journal*, vol. 51, no. 1, pp. 15-30, 2023. https://doi.org/10.1007/s10643-021-01271-5

[8] A. Kulshayeva, A. Amirova, S. Abildina, K. Abdikalykov, and G. Belgibayeva, "Psychological and pedagogical foundations of the development of speech skills of primary school students in English lessons," *International Journal of Early Childhood*, pp. 1-16, 2023. https://doi.org/10.1007/s13158-023-00354-1

[9] A. Zhakupova, U. Kyakbaeva, R. Karimova, and D. Omarova, "Opportunities for the development of ecological competence of the future preschool teachers," *Cypriot Journal of Educational Sciences*, vol. 17, no. 1, pp. 228-239, 2022. https://doi.org/10.18844/cjes.v17i1.6703

[10] E. Swider-Cios, A. Vermeij, and M. M. Sitskoorn, "Young children and screen-based media: The impact on cognitive and socioemotional development and the importance of parental mediation," *Cognitive Development*, vol. 66, p. 101319, 2023. https://doi.org/10.1016/j.cogdev.2023.101319

[11] A. Binet and T. Simon, "The development of intelligence in children," *Studies in Individual Differences: The Search for Intelligence*, pp. 81–111, 1961. https://doi.org/10.1037/11491-008

[12] C. Puranik and H. Li, "Self-regulation and early writing: A longitudinal examination from preschool through first grade," *Journal of Experimental Child Psychology*, vol. 220, p. 105420, 2022. https://doi.org/10.1016/j.jecp.2022.105420

[13] M. Burchinal, "Early care and education," *Advances in Child Development and Behavior*, vol. 65, pp. 135-167, 2023. https://doi.org/10.1016/bs.acdb.2023.05.004

[14] L. Darling-Hammond, L. Flook, C. Cook-Harvey, B. Barron, and D. Osher, "Implications for educational practice of the science of learning and development," *Applied Developmental Science*, vol. 24, no. 2, pp. 97-140, 2020. https://doi.org/10.1080/10888691.2018.1537791

[15] L. Raffington, J. Falck, C. Heim, M. Mather, and Y. L. Shing, "Effects of stress on 6-and 7-year-old children's emotional memory differs by gender," *Journal of Experimental Child Psychology*, vol. 199, p. 104924, 2020. https://doi.org/10.1016/j.jecp.2020.104924

[16] H. Ke, Q. C. Vuong, and E. Geangu, "Three-and six-year-old children are sensitive to natural body expressions of emotion: An event-related potential emotional priming study," *Journal of Experimental Child Psychology*, vol. 224, p. 105497, 2022. https://doi.org/10.1016/j.jecp.2022.105497

[17] J. M. Kim, D. M. Sidhu, and P. M. Pexman, "Effects of emotional valence and concreteness on children's recognition memory," *Frontiers in Psychology*, vol. 11, p. 615041, 2020. https://doi.org/10.3389/fpsyg.2020.615041

[18] T. Kushnir, "Imagination and social cognition in childhood," *Wiley Interdisciplinary Reviews: Cognitive Science*, vol. 13, no. 4, p. e1603, 2022. https://doi.org/10.1002/wcs.1603

[19] X. Zhao, A. Wente, M. F. Flecha, D. S. Galvan, A. Gopnik, and T. Kushnir, "Culture moderates the relationship between self-control ability and free will beliefs in childhood," *Cognition*, vol. 210, p. 104609, 2021. https://doi.org/10.1016/j.cognition.2021.104609

[20] A. Nyhout and P. A. Ganea, "The development of the counterfactual imagination," *Child Development Perspectives*, vol. 13, no. 4, pp. 254-259, 2019.

[21] H. M. Feldman, "How young children learn language and speech," *Pediatrics in Review*, vol. 40, no. 8, pp. 398-411, 2019. https://doi.org/10.1542/pir.2017-0325

[22] J. Brodin and K. Renblad, "Improvement of preschool children's speech and language skills," *Early Child Development and Care*, vol. 190, no. 14, pp. 2205-2213, 2020. https://doi.org/10.1080/03004430.2018.1564917

[23] V. N. Panjeti-Madan and P. Ranganathan, "Impact of screen time on children's development: Cognitive, language, physical, and social and emotional domains," *Multimodal Technologies and Interaction*, vol. 7, no. 5, p. 52, 2023. https://doi.org/10.3390/mti7050052

[24] S. K. Rayhan, "What matters most for early childhood development? Evidence from Malda district, India," *PloS One*, vol. 17, no. 6, p. e0268985, 2022. https://doi.org/10.1371/journal.pone.0268985

[25] A. L. A. Rauf and K. A. Bakar, "Effects of play on the social development of preschool children," *Creative Education*, vol. 10, no. 12, pp. 2640-2648, 2019. https://doi.org/10.4236/ce.2019.1012191

[26] J. Gubbels, E. Segers, and L. Verhoeven, "How children's intellectual profiles relate to their cognitive, socio-emotional, and academic functioning," *High Ability Studies*, vol. 29, no. 2, pp. 149-168, 2018. https://doi.org/10.1080/13598139.2018.1507902

[27] A. Bucaille, C. Jarry, J. Allard, S. Brochard, S. Peudenier, and A. Roy, "Neuropsychological profile of intellectually gifted children: A systematic review," *Journal of the International Neuropsychological Society*, vol. 28, no. 4, pp. 424-440, 2022. https://doi.org/10.1017/S1355617721000515

[28] B. Nagima, N. Saniya, Y. Gulden, Z. Saule, S. Aisulu, and M. Nazigul, "Influence of special learning technology on the effectiveness of pedagogical ethics formation in future teachers," *Journal of Education and E-Learning Research*, vol. 10, no. 1, pp. 1-6, 2023. https://doi.org/10.20448/jeelr.v10i1.4313

[29] N. C. Dag, E. Turkkan, A. Kacar, and H. Dag, "Children's only profession: Playing with toys," *Northern clinics of Istanbul*, vol. 8, no. 4, pp. 414–420, 2021.

[30] M. Garaigordobil, L. Berrueco, and M. Celume, "Developing children's creativity and social-emotional competencies through play: Summary of twenty years of findings of the evidence-based interventions "game program," *Journal of Intelligence*, vol. 10, no. 4, p. 77, 2022. https://doi.org/10.3390/jintelligence10040077

[31] G. Şen and S. Yazıcı, "he effect of mind and intelligence games on reading skills and reading attitudes of primary school first grade students," *E-International Journal of Educational Research*, vol. 14, no. 2, pp. 272-288, 2023. https://doi.org/10.19160/e-ijer.1194085

[32] J. C. Yang, B. Quadir, and N.-S. Chen, "Effects of children's trait emotional intelligence on digital game-based learning," *International Journal of Human–Computer Interaction*, vol. 35, no. 4-5, pp. 374-383, 2019. https://doi.org/10.1080/10447318.2018.1543088

[33] A. Flogie, B. Aberšek, M. Kordigel Aberšek, C. Sik Lanyi, and I. Pesek, "Development and evaluation of intelligent serious games for children with learning difficulties: Observational study," *JMIR Serious Games*, vol. 8, no. 2, p. e13190, 2020. https://doi.org/10.2196/13190

[34] M. d. R. Bonilla-Sánchez, M. A. García-Flores, I. Méndez-Balbuena, J. G. Silva-González, and E. V. Ramírez-Arroyo, "The benefits of role play in the development of drawing in preschool children," *Frontiers in Psychology*, vol. 13, p. 1010512, 2022. https://doi.org/10.3389/fpsyg.2022.1010512

[35] C. Iordanou, M. L. Allen, and L. Warmelink, "Drawing and memory: What is the content of children's drawings and how does it differ from their verbal reports?," *Empirical Studies of the Arts*, vol. 40, no. 2, pp. 245-258, 2022.

[36] D. Laranjeiro, "Development of game-based m-learning apps for preschoolers," *Education Sciences*, vol. 11, no. 5, p. 229, 2021. https://doi.org/10.3390/educsci11050229

[37] M. D. Şahin and G. Ozturk, "Mixed method research: Theoretical foundations, designs and its use in educational research," *International Journal of Contemporary Educational Research*, vol. 6, no. 2, pp. 301-310, 2019.

[38] S. Dawadi, S. Shrestha, and R. A. Giri, "Mixed-methods research: A discussion on its types, challenges, and criticisms," *Journal of Practical Studies in Education*, vol. 2, no. 2, pp. 25-36, 2021. https://doi.org/10.46809/jpse.v2i2.20

[39] O. Atashbahar, A. A. Sari, A. Takian, A. Olyaeemanesh, E. Mohamadi, and S. H. Barakati, "Integrated early childhood development policy in Iran: A qualitative policy process analysis," *BMC Public Health*, vol. 21, pp. 1-13, 2021. https://doi.org/10.1186/s12889-021-10646-7

[40] A. H. Qamar, "Social value of the child in the global south: A multifaceted concept," *Journal of Early Childhood Research*, vol. 20, no. 4, pp. 610-623, 2022. https://doi.org/10.1177/1476718X221089581

[41] C. Cohrssen and F. Niklas, "Using mathematics games in preschool settings to support the development of children's numeracy skills," *International Journal of Early Years Education*, vol. 27, no. 3, pp. 322-339, 2019. https://doi.org/10.1080/09669760.2019.1629882

[42] S. Jin, "Evolution of game in the history of preschool education laws and regulations in China," *Early Childhood Education*, vol. 4, no. 1, pp. 39-48, 2022. https://doi.org/10.25236/FSST.2022.040108

[43] R. M. Lozada, L. R. Escriba, and F. T. M. Granja, "MS-Kinect in the development of educational games for preschoolers," *International Journal of Learning Technology*, vol. 13, no. 4, pp. 277-305, 2018. https://doi.org/10.1504/IJLT.2018.098500

[44] M. B. Garcia, "Kinder learns: An educational visual novel game as knowledge enhancement tool for early childhood education," *The International Journal of Technologies in Learning*, vol. 27, no. 1, pp. 1-25, 2020. https://doi.org/10.18848/2327-0144/CGP/v27i01/13-34