DOI: https://doi.org/https://doi.org/10.17759/pse.2024290301
ISSN: 1814-2052
ISSN: 2311-7273 (online)

DOI: https://doi.org/https://doi.org/10.17759/pse.2024290301
ISSN: 1814-2052
ISSN: 2311-7273 (online)

DEVELOPMENTAL PSYCHOLOGY (AGE PSYCHOLOGY) |
ПСИХОЛОГИЯ РАЗВИТИЯ (ВОЗРАСТНАЯ ПСИХОЛОГИЯ)

Association between Memory and Attention Performance among Preschoolers Playing Traditional and Digital Games (on the Example of “Dobble”)

Olga V. Rubtsova
Moscow State University of Psychology & Education, Moscow, Russia
ORCID: https://orcid.org/0000-0002-3902-1234, e-mail: ovrubsova@mail.ru

Yulia A. Tokarchuk
Moscow State University of Psychology & Education, Moscow, Russia
ORCID: https://orcid.org/0000-0003-0690-0694, e-mail: lyusindus@gmail.com

Olga V. Salomatova
Moscow State University of Psychology & Education, Moscow, Russia
ORCID: https://orcid.org/0000-0002-1723-9697, e-mail: salomatovaov@mgppu.ru

Evgeniya V. Gavrilova
Moscow State University of Psychology & Education, Moscow, Russia
ORCID: https://orcid.org/0000-0003-0848-3839, e-mail: gavrilovaev@mgppu.ru

The article presents the results of the project “The Impact of Digital Activity on the Development of Cognitive Functions in Preschool Age”. The study was conducted from February to May 2023 at the Center for Interdisciplinary Research of Contemporary Childhood at MSUPE, involving 76 children from preparatory groups of kindergartens in Moscow. The following methods were used: the “Learning 10 Words” Method (A.R. Luria), D. Weksler’s Subtest (the “Coding Method”), 3. “Test of Intertwined Lines” (A. Rey’s Test Modification), and the “Mark the Signs” Method (Pieron-Ruser Test). According to the obtained data, the digital version of the game “Dobble” has the greatest effect on the development of the studied parameters of memory and attention in preschool children. The obtained empirical data are consistent with the results of similar studies and are of interest to psychologists, educators, and parents in planning and conducting educational and play activities.

Keywords: board games; digital games; preschool age; cognitive functions; memory; attention; game applications; Dobble.

Funding. The reported study was funded by Russian Science Foundation, project number 23-28-01204.

For citation: Rubtsova O.V., Tokarchuk Yu.A., Salomatova O.V., Gavrilova E.V. Association between Memory and Attention Performance among Preschoolers Playing Traditional and Digital Games (on the Example of “Dobble”). *Psikhologicheskaya nauka i obrazovanie = Psychological Sci-*

ence and Education, 2024. Vol. 29, no. 3, pp. 5—19. DOI: https://doi.org/https://doi.org/10.17759/pse.2024290301 (In Russ.).

Связь показателей памяти и внимания с использованием настольных и цифровых игр дошкольниками (на примере игры «Dobble»)

Рубцова О.В.
ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-3902-1234, e-mail: ovrubsova@mail.ru

Токарчук Ю.А.
ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0003-0690-0694, e-mail: lyusindus@gmail.com

Саломатова О.В.
ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0002-1723-9697, e-mail: salomatovaov@mgppu.ru

Гаврилова Е.В.
ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация
ORCID: https://orcid.org/0000-0003-0848-3839, e-mail: gavrilovaev@mgppu.ru

В статье представлены результаты проекта «Влияние цифровой активности на развитие когнитивных функций в дошкольном возрасте». Исследование проводилось с февраля по май 2023 года на базе Центра междисциплинарных исследований современного детства МГППУ при участии 76 детей из подготовительных групп ДОУ г. Москвы. Были использованы следующие методики: Методика «Заучивание 10 слов» (А.Р. Лурия), Методика «Шифровка» (Субтест Векслера), Методика «Тест переплетенных линий» (Модификация теста А. Рея), Методика «Проставь знаки» (тест Пьерона-Рузера). Согласно полученным данным, наибольший эффект на развитие исследуемых параметров памяти и внимания детей дошкольного возраста оказывает цифровая версия игры «Доббль». Полученные эмпирические данные согласуются с результатами аналогичных исследований и представляют интерес для психологов, педагогов и родителей при планировании и проведении обучающих и игровых занятий.

Ключевые слова: настольные игры; цифровые игры; дошкольный возраст; память; внимание; игровые приложения; Dobble.

Финансирование. Исследование выполнено при финансовой поддержке Российского фонда научных исследований (РНФ) в рамках научного проекта от 13.01.2023 № 23-28-01204.

Для цитаты: *Рубцова О.В., Токарчук Ю.А., Саломатова О.В., Гаврилова Е.В.* Связь показателей памяти и внимания с использованием настольных и цифровых игр дошкольниками (на примере игры «Dobble») // Психологическая наука и образование. 2024. Том 29. № 3. С. 5—19. DOI: https://doi.org/https://doi.org/10.17759/pse.2024290301

Introduction

In Russian psychological and pedagogical science play is traditionally considered the leading activity of preschool age, in which central age-related new formations are developed, including voluntary behavior, subordination of motives, imagination, visual-figurative thinking, internal plan of actions, and mediation [3; 7; 17]. The exceptional importance of play for child development is primarily due to the peculiarities of play as a special type of activity. According to S.L. Rubinstein, play is “a meaningful activity, i.e., a set of meaningful actions united by a single motive” [14, p. 649]. According to A.N. Leontiev, the play motive, unlike all other types of activity, lies not in the result of the action but in the very process of play [10]. It is the presence of the play motive that allows us to distinguish a set of play actions performed by the child from the actual play activity, in which various mental functions and processes, including cognitive ones, develop. Today, researchers from different countries are increasingly attracted to the problem of developing cognitive processes in preschool children under the conditions of the rapid penetration of digital technologies into the child’s play.

In recent years there has been a decrease in the age at which children around the world become acquainted with gadgets and a steady increase in the time children spend interacting with them [15]. According to a report by the Joint Research Centre of the European Commission for 2017, most children get acquainted with digital technologies in the first months of life and become active users of gadgets by the age of two [20]. While abroad, digital devices specifically designed for children (toys connected to the Internet, books, and games with augmented reality) are particularly popular, preschoolers in Russia mainly use their parents’ gadgets—cellphones, tablets, and computers, which largely determines the digital content available to them [6]. Most often Russian preschoolers use educational programs and digital games.

The concept of “digital game” (hereinafter referred to as DG) encompasses two phenomena for which the terms “digital play” and “digital game” are used in English-language scientific discourse. The term “digital play” refers to the actual play activity as a system of rules, roles, plots, and play actions. “Digital game” primarily refers to software and implies a certain material and/or virtual content: the goal of the game, predefined settings, game levels, a system of characters, etc. [28]. In this study, the term DG is considered in the meaning of “digital game,” the closest synonym of which is “video game.”

At present, psychological and pedagogical science has already accumulated a significant amount of data on the influence of DG on the development of preschoolers [8; 13; 18; 19; 21; 22; 23; 26]. Several studies have shown that when screen time norms are observed, DGs contribute to the development of a child’s working memory [18; 22], with reaction speed games having a particularly strong effect [13]. In addition to working memory, voluntary attention is also developed [8].

It should be noted that alongside studies on the impact of digital games on preschool development, there is a growing body of work focusing on board games (hereinafter referred to as BG). This trend is partly due to the increasing popularity of BGs among preschoolers [24; 25; 27; 29]. For example, according to a survey conducted in 2023 by the Center for Interdisciplinary Research on Contemporary Childhood at MSUPE among parents of preschoolers, 91.5% of children aged 3—7 play board games and 70.1% play digital games [16]. Studies on board games often explore their impact on the development of communication skills, the acquisition of counting skills and mathematical operations, the formation of regulatory functions, and the expansion of knowledge about the surrounding world [24; 27; 29]. At the same time, the problem of the influence of board games on the development of cognitive processes remains insufficiently studied.

In 2023—2024, with the support of the Russian Science Foundation a project is implemented at the Center for Interdisciplinary Research on Contemporary Childhood at MSUPE, which aims to identify differences in memory and attention indicators in older preschool children who play board games and their digital analogs (using the popular game “Dobble” as an example).

Methodological Basis and Research Design

Unlike several contemporary studies in this field, whose authors rely on the currently popular model of executive functions, this study was conducted in the framework of the Cultural-Historical Theory and Activity Approach.

It is necessary to clarify the interpretation and content of the key concepts used in this study. The concept of attention is understood as “the process of selecting the necessary information, ensuring selective programs, actions, and maintaining constant control over their progress” [11 p. 168]. Attention is determined by the structure of human activity, reflects its dynamics, and serves as its control mechanism. S.L. Rubinstein identifies six main properties of attention [14], which include: concentration, distribution, stability, switch ability, flexibility, and volume.

In turn, memory, according to A.R. Luria, is interpreted as “the recording, retention, and reproduction of traces of past experience, giving a person the ability to accumulate information and deal with traces of past experience after the phenomena that caused them have disappeared” [11, p. 192]. The process of memory formation in a child is associated with mastering the mechanism of mediation [3; 4]. Traditionally, various types of memory are distinguished in psychological and pedagogical science [2; 5; 9]. This study focuses on auditory, visual, short-term, and long-term memory.

The design of the study presented in this article included the experiment itself, as well as pre- and post-diagnostics, within which the following methods were applied:

1. “Learning 10 Words” method (A.R. Luria) was used to assess such parameters of auditory short-term and long-term memory as memorization, retention, and reproduction;
2. D. Weksler’s Subtest (the “Coding” method) was used to study the volume of visual memory;
3. “Test of Intertwined Lines” (A. Rey’s Test Modification) was used to study the degree of concentration of voluntary attention.
4. The “Mark the Signs” method (Pieron-Ruser Test) was used to assess such parameters of voluntary attention as stability, distribution, switch ability, and pace of activity.

The data from the pre- and post-diagnostics were tested for normal distribution using the Kolmogorov-Smirnov criterion. The distribution indicators of all variables differed from normal, so non-parametric methods of statistical analysis were used. Specifically, the statistical non-parametric Wilcoxon t-test was applied to compare effects within each group before and after the experimental impact (intra-group comparisons), the Mann-Whitney U test for inter-group comparisons, and Spearman’s correlation coefficient. The calculations were carried out using the IBM SPSS Statistics 23 package.

The experimental study was conducted from February to May 2023 at two kindergartens in the city of Moscow (Southern Administrative District and Central Administrative District). The sample included 76 children from preparatory groups (M=6.60 years, SD=0.41, 51.32% girls).

According to the research design, the children were divided into three groups: Experimental Group 1 (EG 1), where the children played the board game version of “Dobble,” Experimental Group 2 (EG 2), where the children played the digital game “Dobble” — “Double Match: one common image” on tablets, and the Control Group (CG). 19 children were in EG 1 (11 boys and 8 girls), 26 children in EG 2 (10 boys and 16 girls), and 31 children in CG (16 boys and 15 girls). The experiment used the board game “Dobble” and its digital equivalent. The game aims to develop the ability to concentrate, distribute, and switch attention, as well as cognitive flexibility, and reaction speed. The digital equivalent chosen was the app “Double Match: one common image.” This app’s card appearance closely resembles the board game’s cards, and it allows for joint play with a familiar partner, which is crucial for this study.

According to the research design, over 8 weeks, children from the experimental groups played the board (EG 1) or digital (EG 2) version of “Dobble” twice a week. Thus, each child participated in about 16 game sessions during the experimental study.

Participants in EG 1 played the board game for about 10-15 minutes in pairs or in groups of three. If the children were highly engaged, the game could continue longer. At the beginning of the experiment, a few children from EG 1 (N=2) refused to play the board game, saying they were more interested in playing with construction sets. During the experiment, around the 2nd-3rd week, more children (N=4) refused to play the board game, saying they were “bored with playing ‘Dobble’.” By the end of the experiment, only 6—8 children showed interest in the board game, while the rest participated only after persuasion, though they usually became involved during the game. In the 6th-8th weeks of the experiment, the children began to invent their own game rules: they were allowed to play with the cards by their own rules after the experiment time had passed. At the beginning of the experiment, the children reacted strongly to winning or losing; by the end of the project, the intensity of their emotional responses decreased.

In EG 2, the duration of the game session was fixed and was approximately 10-15 minutes per day, since, according to Sanitary Regulations and Norms 2.4.1.2660-10, the continuous duration of computer work in the form of educational games for children aged 6-7 should not exceed 15 minutes per day. The game was played in pairs under adult supervision. In EG 2, each child used their tablet with the installed digital game (DG). The tablets were connected to each other over the network for joint play. Around the 3rd week of the experimental study, children from EG 2 (N=2) began showing signs of fatigue and reluctance to play the DG. Additionally, some children (N=3) tried to take on the role of game organizers, inventing their own rules for turn-taking. After this, a constant change of gaming partners was introduced, and a competitive motive appeared in the game, which helped to restore interest in the gaming process. Throughout the study, a group of children (N=6) stood out, showing a desire to support their gaming partner (children helped their partner find matching images on their cards).

Results of the Experimental Study

At the stage of the initial diagnosis using the “10 Words” method, there were no differences between the three groups: the average reproduction scores did not show statistically significant differences ($Z = -0.24$; $p \leq 0.81$ for EG 1 and EG

2; Z = –0.19; p ≤ 0.85 for EG 1 and CG; Z = –0.34; p ≤ 0.74 for EG 2 and CG), indicating equal cognitive performance among preschoolers in each group at the initial testing stage. Significant results were found in all the three groups between the data from the initial and final diagnostics, i.e., the average number of words reproduced increased in each group (Table 1).

Differences between the memory capacity indicators before and after the experiment are observed in all three groups (Z = -5.59; p ≤ 0.000). There is a clear trend of increasing the number of reproduced words by the 4th trial and successful delayed retention of the stimulus material as per the results of the initial and final diagnostics. Overall, these data can be attributed to the general cognitive development of the children due to their age.

Significant differences in the average number of reproduced words were found among the three groups during the final testing phase (Fig. 1). The children in EG2 demonstrated the best memory retention. The average number of reproduced words was nearly 9 (8.75), significantly higher than the results of children in EG1 (Z = –2.96; p ≤ 0.003) and CG (Z = –3.68; p ≤ 0.000) (Fig. 1).

The comparative analysis results show an effect on the development of short-term and long-term auditory memory in EG2 children after the experimental study.

Positive effects observed in the average indicators of visual memory capacity using the Weksler’s Subtest before and after the experiment in all three groups indicate positive dynamics in overall memory development. For example, in EG2, where children demonstrated an average level of visual memory development before the experiment (9.43), they achieved a significantly higher level (11.79) by the end of the experiment. A similar effect, though less pronounced, was observed in CG (9.69 before and 10.59 after). Children in EG1 also improved their results, reaching the threshold of a high level of visual memory development (9.63) (Fig. 2). Significant differences between the final testing indicators in the experimental groups (NI and CI) were identified (Z = –2.17, p ≤ 0.03). Also, significant differences were found between the final testing indicators in EG2 and CG (Z = –1.9; p ≤ 0.06). In both groups, the average indicators before and after the experiment correlated with each other (in EG2 (r = 0.64; p ≤ 0.03) and CG (r = 0.51; p ≤ 0.01)). However, differences between the indicators of respondents from EG1 and CG could not be identified (Z = –0.73; p ≤ 0.5).

The obtained effect indicates that children who played digital games became

Table 1

Comparison of average scores for each test at the stages of initial and final testing

	EG1		EG2		CG	
	Before	**After**	**Before**	**After**	**Before**	**After**
1st trial	4,31	6,16	3,77	6,39	4,03	5,9
2nd trial	5,52	7,16	6,31	8,26	6,19	7,17
3rd trial	6,57	8,32	7,32	9,48	7,13	8,07
4th trial	7,63	8,84	8,16	9,7	8,26	8,14
5th trial	8,26	9,21	8	**9,82**	9	8,1
After 1 hour	7,68	7,53	6,92	**8,9**	7,23	7,44
M (5 trials)	6,458	7,938	6,712	8,73	6,922	7,476
M (5 trials + delayed reproduction)	6,67	7,86	6,62	8,75	6,68	7,47

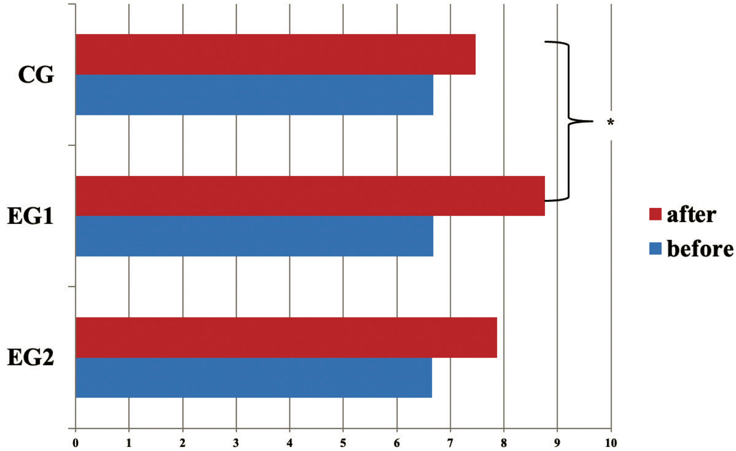

Fig. 1. Comparison of initial and final testing indicators across all groups

more effective at memorizing and reproducing visual stimuli compared to children who played board games and those in the control group.

The results of the "Intertwined Lines Test" (Modification of A. Rey's Test) were analyzed based on the parameters of time and the number of errors during task performance.

In the experimental group 1 (EG1), the average time to complete the tasks decreased from 1.94 (pre-test) to 1.7 (post-test) with a significance level of $p \leq 0.05$. In the experimental group 2 (EG2), the time spent on the game decreased from 2.58 (pre-test) to 1.91 (post-test), although these values slightly missed the acceptable level of statistical significance at $p \leq 0.1$. In the

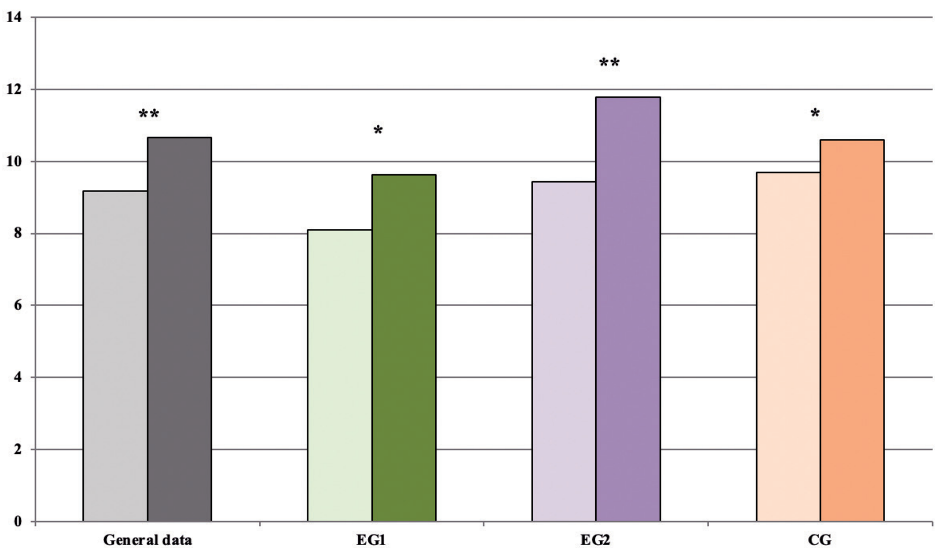

Fig. 2. Comparison of initial and final testing indicators across all groups in visual memory

control group (CG), the indicator dropped from 2.13 (pre-test) to 1.69 (post-test) with a significance level of $p \leq 0.01$ (Fig. 7). Overall, across all three groups, the trend of decreasing time was observed from 2.23 to 1.76 ($p \leq 0.000$), indicating that all children completed the tasks faster by the post-test (Fig. 3). This trend could be explained by the familiarity with the methodology.

The indicator of the number of errors in all three groups also showed a decreasing trend (Fig. 4). In EG1, the number of errors during task performance decreased from 4.53 (pre-test) to 3.42 (post-test), and in EG2, from 4 (pre-test) to 3.05 (post-test) (significance levels $p \leq 0.05$). The control group improved its results from 4.1 (pre-test) to 3.5 (post-test); however, this indicator did not reach the necessary level of statistical significance ($p \leq 0.24$). Overall, the number of errors across all three groups decreased from 4.15 to 3.35 with a significance level of $p \leq 0.000$.

Additionally, a correlation analysis was conducted between the time indicators and the number of errors. In EG1, a significant positive correlation was found between the time indicators and the number of errors made in the post-test — 0.52 ($p \leq 0.01$). Thus, the faster the children in this group completed the task, the fewer errors they made. A positive correlation

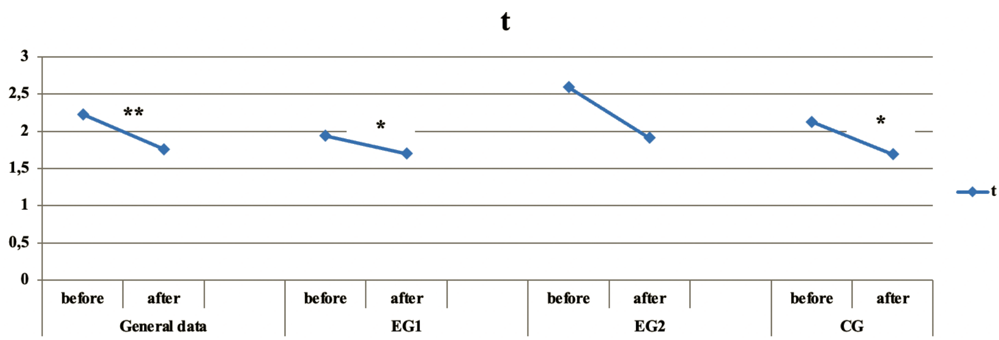

Fig. 3. Comparison of time indicators across all groups (*$p \leq 0.05$; $p \leq 0.000$)

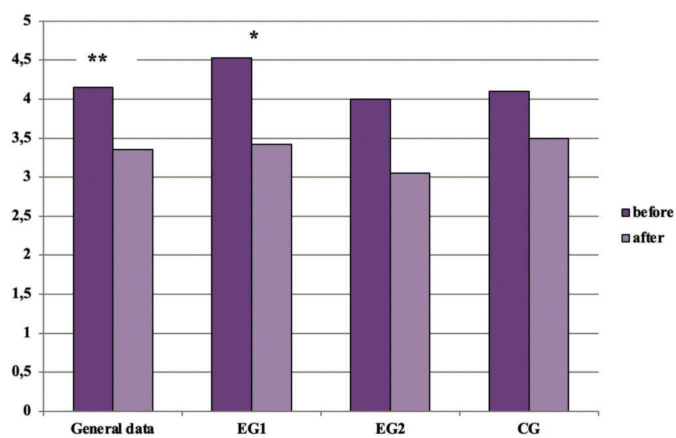

Fig. 4. Comparison of the number of errors across all groups (*$p \leq 0.05$; $p \leq 0.000$)

was also observed between the time indicators in both instances — 0.47 ($p \leq 0.01$). No significant correlations were found in EG2 or CG, except for a positive correlation between the time and the number of errors in the pre-test in CG — 0.47 ($p \leq 0.01$). Overall, there were no statistical differences in the time indicators and the number of errors among the three groups, which could be explained by individual differences among the children and the presence of additional factors. The time indicators and the number of errors in all three groups significantly decreased in the post-test compared to the pre-test, indicating that all children completed the tasks more efficiently, spending less time. These findings suggest a trend towards increased attention stability.

The results obtained from the “Mark the Signs” methodology (Pierón-Ruser’s test) were analyzed across all groups based on the following indicators (Fig. 5):

1. “time” — total time taken to complete the task. At the stage of the initial diagnosis, the groups did not differ in terms of time. After the experiment, significant differences were found between the experimental groups: children in EG2 completed the tasks significantly faster than children in EG1 ($Z = -3.89$; $p \leq 0.000$). Children in CG also completed the task faster than preschoolers in EG1 ($Z = -2.61$; $p \leq 0.009$). However, preschoolers in EG2 completed the task faster compared to the children in CG, although the coefficients did not reach an acceptable level of statistical significance ($Z = –1.8$; $p \leq 0.07$).

2. “false” — number of errors (total and at each stage). No differences were found between the groups in this indicator (except for subjects in CG and EG2 at the second testing stage); however, overall, each group improved their results in the post-test compared to the pre-test.

3. “step” — number of steps. The number of steps, i.e., the number of figures, filled in 30 seconds, was used to evaluate the children’s performance. Statistical differences were noted between the experimental groups at the pre-test stage: children in EG1 made significantly more steps compared to children in EG2 ($Z = –2.1$; $p \leq 0.04$). At the post-test stage, the differences between the experimental groups increased to a significance level of $p \leq 0.000$. The group of children who played the digital game made the fewest steps when completing the tasks.

4. “coeff” — task performance coefficient (calculated as the number of steps divided by the total number of figures). This indicator was calculated to identify the individual performance of each child. Differences at the level of $p \leq 0.04$ were found between the experimental groups at the pre-test stage.

Thus, children in EG2 performed the task more efficiently than children in EG1: they filled a greater number of figures for each 30-second step. Similar differences were found between CG and EG1 in favor of the control group children, whose performance was higher ($Z = –2.5$; $p \leq 0.01$). Post-test results also showed differences between the experimental groups (at the level of $p \leq 0.000$). Additionally, differences were found between CG and EG1 at the significance level of $p \leq 0.01$. These data suggest that preschoolers in EG2 performed the tasks more efficiently than children in EG1, and children in CG also showed greater productivity compared to participants in EG1.

Thus, children from EG2 showed better results across all analyzed parameters. They completed the task more accurately and efficiently, spent less time, and made fewer moves. The group quickly memorized the symbols for each figure, retained the instructions, and rarely referred back to them during the process. The observed effects suggest a high degree of sustained voluntary attention and a high activity rate among children in this group.

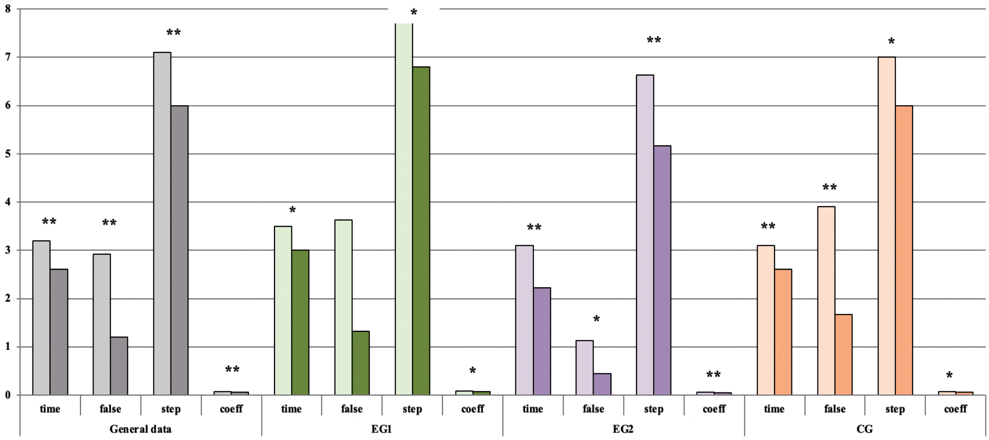

Fig. 5. Comparison of groups across all indicators (*p ≤ 0.05; p ≤ 0.000)

Discussion and Conclusions

The presented study aimed to identify differences in memory and attention indicators among older preschool children playing board games and their digital counterparts (using the popular game "Dobble" as an example). The analysis results showed significant positive effects in the group of children who played the digital version of the game "Double Match: one common image" in developing short-term and long-term auditory memory, visual memory, and sustained voluntary attention, compared to the control group and the group of children who played the board game "Dobble." Thus, the digital version of the game "Dobble" had a more significant developmental impact on the studied parameters of memory and attention in preschoolers from the experimental sample compared to its traditional analog.

The obtained results confirm the findings of studies on related topics. For instance, in the study by E.E. Klopotova and T. Kuznetsova, it was shown that developmental DG (memories "Deer" and "Numbers") used for about 20 minutes a day can positively influence concentration, distribution, and switching of voluntary attention [8]. In the work of V.A. Plotnikova, it was proven that children who prefer DG for quick reaction demonstrate a higher level of development of visual working memory compared to their peers who do not like playing such games [13]. Moreover, several studies have shown improvements in visuospatial working memory indicators in groups of preschoolers exposed to video games [18; 22].

Regarding digital games, it should be noted that the authors could not find studies specifically analyzing the impact of digital games on the memory and attention of preschoolers. In this context, it is worth highlighting the research conducted under the guidance of A.N. Veraksa [25; 29], as these projects focus on the relationship between digital and board games and the development of regulatory functions in children. These studies have shown that in the short term, digital games positively influence the formation of regulatory functions in preschoolers [29]. However, in the long term, the effect of digital games is not stable, and the best results are achieved through the use of board and role-playing games. The authors explain this by noting that role-playing and board games can not only improve individual executive function indicators but also reorganize inter-functional connections, leading to a qualitative shift in children’s mental development [25].

It is necessary to dwell separately on the theoretical and methodological basis of the aforementioned works. The theoretical and methodological apparatus of most of these studies [13; 18; 25; 29] is based on the model of executive functions, understood as “a set of top-down mental processes necessary for concentration when automatic, instinctive, intuitive behavior becomes ineffective or impossible” [12, p. 62]. Executive functions include working memory, cognitive flexibility, and inhibitory control. Inhibitory control is responsible for selective attention, suppression of certain behaviors (self-control), and cognitive inhibition (interference control). Working memory integrates all the elements needed to solve a specific task that appears at different times. Cognitive flexibility involves adapting to changing demands or priorities and allows transitioning from one rule to another [1; 12].

The authors of this study, in turn, rely on the Cultural-Historical Concept and Activity Theory (works of L.S. Vygotsky, A.R. Luria, S.L. Rubinstein, A.N. Leontiev), where cognitive (intellectual and thinking) processes are inextricably linked with activity and are considered, along with emotional and volitional processes, as an integral characteristic of mental processes. Mental processes are formed within the context of various specific activities. In other words, it is in the process of activity, specifically play activity for preschoolers, that the formation and development of cognitive processes such as attention and memory occur [10; 11; 14].

It is also essential to emphasize that the authors of this study paid particular attention to the “purity of the experiment” by selecting a board game that met several characteristics. Firstly, the game involved memory and attention. Secondly, the printed and digital versions of the game were as visually similar as possible. Thirdly, a mandatory feature of the digital version of the game was the possibility for collaborative play, with each child playing from their own device. Fourthly, in both the board and digital games, the researchers encouraged interaction among the children. Thus, the authors aimed to make the board and digital game situations as identical as possible. This approach underlines the novelty and originality of this study.

Interestingly, despite the differences in theoretical and methodological approaches, the results of the aforementioned studies and the research presented in our work are remarkably similar. All studies have demonstrated that moderate use of digital games can positively affect the development of visual memory and voluntary attention. The use of various theoretical and methodological approaches and research designs further confirms the reliability of the obtained data.

As potential future directions for this project, expanding the diagnostic tools and increasing the sample of respondents could allow for the extrapolation of the observed effects to a broader audience. Based on the results of similar studies, it also seems important to conduct follow-up diagnostics several months after the experiment’s conclusion to obtain data on the long-term impact of digital and board games on the development of cognitive processes.

The obtained data are of interest to psychologists, educators, and parents, and can be used in planning and conducting educational and play activities in preschool educational institutions.

References

1. Almazova O.V., Bukhalenkova D.A., Veraksa A.N. Proizvol'nost' v doshkol'nom vozraste: sravnitel'nyi analiz razlichnykh podkhodov i diagnosticheskogo instrumentariya [The voluntariness in the preschool age: a comparative analysis of various approaches and diagnostic tools]. *Natsional'nyy psikhologicheskiy zhurnal* [*National Psychological Journal*], 2016. Vol. 4, pp. 14—22. DOI:10.11621/npj.2016.0402 (In Russ.).
2. Blonskii P.P. Pamyat' i myshlenie [Memory and thinking]. M.-L.: Gosudarstvennoe sotsial'no-ekonomicheskoe izdatel'stvo, 1935. 215 p.
3. Vygotskii L.S. Psikhologiya razvitiya rebenka [Psychology of child development]. Moscow: Smysl, Eksmo, 2004. 512 p.
4. Vygotskii L.S. Psikhologiya razvitiya cheloveka [Psychology of human development]. Moscow: Smysl, Eksmo, 2005. 1136 p.
5. Gippenreiter Yu.B. Vvedenie v obshchuyu psikhologiyu: kurs lektsii [Introduction to general psychology: a course of lectures]. Moscow: «Izdatel'stvo AST», 1996. 206 p.
6. Klopotova E.E., Smirnova S.Yu., Rubtsova O.V., Sorokova M.G. Dostupnost' tsifrovykh ustroistv detyam doshkol'nogo vozrasta: razlichiya v roditel'skikh pozitsiyakh [Accessibility of Digital Devices to Preschool Children: Differences in Parents' Positions]. *Konsul'tativnaya psikhologiya i psikhoterapiya = Counseling Psychology and Psychotherapy*, 2022. Vol. 30, no. 2, pp. 109—125. DOI:10.17759/cpp.2022300207 (In Russ.).
7. Karabanova O.A. Vozrastnaya psikhologiya [Age psychology]. Moscow: Izdatel'stvo Airis-Press, 2005. 238 p.
8. Klopotova E.E., Kuznecova T.Yu. Vliyanie komp'yuternyh igr na proizvol'noe vnimanie starshih doshkol'nikov [The influence of computer games on the arbitrary attention of older preschoolers]. *Doshkol'noe vospitanie* [*Preschool education*], 2018, no. 10, pp. 76—82. (In Russ.).
9. Korsakov I.A., Korsakova N.K. Naedine s pamyat'yu [Alone with memory]. Moscow: Znanie, 1984. 78 p.
10. Leont'ev A.N. Psikhologicheskie osnovy doshkol'noi igry [The psychological foundations of preschool play]. *Psikhologicheskaya nauka i obrazovanie = Psychological Science and Education*, 1996, no. 3, pp. 19—31. (In Russ.).
11. Luriya A.R. Lektsii po obshchei psikhologii [Lectures on general psychology]. Saint Petersburg: Piter, 2006. 320 p.
12. Nikolaeva E.I., Vergunov E.G. Chto takoe "executive functions" i ikh razvitie v ontogeneze [What are "executive functions" and their development in ontogenesis]. *Teoreticheskaya i eksperimental'naya psikhologiya* [*Theoretical and experimental psychology*], 2017. Vol. 10, no. 2, pp. 62—81. (In Russ.).
13. Plotnikova V.A., Bukhalenkova D.A., Chichinina E.A. The relationship between preferred types of digital games and regulatory functions in children aged 6—7 years [The Relationship of the Preferred Types of Digital Games and Executive Functions in 6—7-Year-Old Children]. *Psikhologicheskaya nauka i obrazovanie = Psychological Science and Education*, 2023. Vol. 28, no. 4, pp. 32—51. DOI:10.17759/pse.2023280402 (In Russ.).
14. Rubinshtein S.L. Osnovy obshchei psikhologii [Fundamentals of general psychology]. Saint Petersburg: Piter, 2002. 720 p.
15. Rubtsova O.V., Salomatova O.V. Detskaya igra v usloviyakh tsifrovoi transformatsii: kul'turno-istoricheskii kontekst (Chast' 1) [Child's Play in the Context of Digital Transformation: Cultural-Historical Perspective (Part One)]. *Kul'turno-istoricheskaya psikhologiya = Cultural-Historical Psychology*, 2022. Vol. 18, no. 3, pp. 22—31. DOI:10.17759/chp.2022180303 (In Russ.).
16. Tokarchuk Yu.A., Salomatova O.V., Gavrilova E.V. Ispol'zovanie nastol'nykh i tsifrovykh igr doshkol'nikami: rezul'taty oprosa rossiiskikh roditelei [The Use of Board and Digital Games: The Results of a Survey of Parents]. *Psikhologo-pedagogicheskie issledovaniya = Psychological-Educational Studies*, 2024. Vol. 16, no. 1, pp. 76—95. DOI:10.17759/psyedu.2024160105 (In Russ.).
17. Shapovalenko I.V. Vozrastnaya psikhologiya (Psikhologiya razvitiya i vozrastnaya psikhologiya) [Age psychology (Developmental psychology and age psychology)]. Moscow: Gardariki, 2005. 349 p.
18. Nin V., Delgado H., Goldin A.P. Fernández-Slezak D., Belloli L., Carboni A. A Classroom-Embedded Video Game Intervention Improves Executive Functions in Kindergarteners. *Journal of Cognitive Enhancement*, 2023, no. 7, pp. 19—38. DOI:10.1007/s41465-023-00262-1
19. Bukhalenkova D., Almazova O. Active screen time and imagination in 5—6-years-old children. *Frontiers in Psychology*, 2023. DOI:10.3389/fpsyg.2023.1197540
20. Chaudron S., Di Gioia R., Gemo M. Young Children (0—8) and Digital Technology — A qualitative study across Europe [Elektronnyi resurs]. Luxembourg: Publications Office of the European Union, 2017. 266 p. URL: https://publications.jrc.ec.europa.eu/repository/handle/JRC110359 (Accessed 12.04.2024).
21. Chu C., Paatsch L., Kervin L., Edwards S. Digital play in the early years: A systematic review. *International Journal of Child-Computer Interaction*, 2024. Vol. 40. DOI:10.1016/j.ijcci.2024.100652
22. Bergman Nutley S., Söderqvist S., Bryde S., Thorell L.B., Humphreys K., Klingberg T. Gains in Fluid Intelligence after Training Non-Verbal Reasoning in 4-Year-Old Children: A Controlled, Randomized

Study: Fluid Intelligence Gains after Training Non-Verbal Reasoning. *Developmental Science*, 2011. Vol. 14, no. 3, pp. 591—601. DOI:10.1111/j.1467-7687.2010.01022.x

23. Nikolaeva E.I., Kalabina I.A., Progackaya T.K., Ivanova E.V. Ground Rules for Preschooler Exposure to the Digital Environment: A Review of Studies. *Psychology in Russia: State of the Art*, 2023. Vol. 16, no. 4, pp. 37—54. DOI:10.11621/pir.2023.0403

24. O’Neill D.K., Holmes P.E. The Power of Board Games for Multidomain Learning in Young Children. *American Journal of Play*, 2022. Vol. 14, no. 1, pp. 58—98.

25. Veraksa A.N., Veresov N.N., Sukhikh V.L., Gavrilova M.N., Plotnikova V.A. Play to Foster Children’s Executive Function Skills: Exploring Short-and Long-Term Effects of Digital and Traditional Types of Play. *International Journal of Early Childhood*, 2023. DOI:10.1007/s13158-023-00377-8

26. Qian H., Wang C., Li H. Parental risk factors and moderators of prolonged digital use in preschoolers: A meta-analysis. *Education and Information Technologies*, 2024. DOI:10.1007/s10639-024-12558-6

27. Sum Kwing C., McBride C. Effectiveness of Parent-Child Number Board Game Playing in Promoting Chinese Kindergarteners’ Numeracy Skills and Mathematics Interest. *Early Education and Development*, 2017. Vol. 28, pp. 572—589. DOI:10.1080/10409289.2016.1258932

28. Veresov N., Veraksa N. Digital games and digital play in early childhood: a cultural-historical approach. *Early Years*, 2022. no. 3. DOI:10.1080/09575146.2022.2056880

29. Veraksa A., Sukhikh V., Veresov N., Almazova O. Which play is better? Different play types and development of executive functions in early childhood. *International Journal of Early Years Education*, 2022. Vol. 30, no. 3, pp. 560—576. DOI:10.1080/09669760.2022.2091979

Литература

1. *Алмазова О.В., Бухаленкова Д.А., Веракса А.Н.* Произвольность в дошкольном возрасте: сравнительный анализ различных подходов и диагностического инструментария // Национальный психологический журнал. 2016. Том 24. № 4. С. 14—22. DOI:10.11621/npj.2016.0402

2. *Блонский П.П.* Память и мышление. М.-Л.: Государственное социально-экономическое издательство, 1935. 215 с.

3. *Выготский Л.С.* Психология развития ребенка. М.: Смысл, Эксмо, 2004. 512 с.

4. *Выготский Л.С.* Психология развития человека. М.: Смысл, Эксмо, 2005. 1136 с.

5. *Гиппенрейтер Ю.Б.* Введение в общую психологию: курс лекций. М.: «Издательство АСТ», 1996. 206 с.

6. Доступность цифровых устройств детям дошкольного возраста: различия в родительских позициях / Е.Е. Клопотова, С.Ю. Смирнова, О.В. Рубцова, М.Г. Сорокова // Консультативная психология и психотерапия. 2022. Том 30. № 2. С. 109—125. DOI:10.17759/cpp.2022300207

7. *Карабанова О.А.* Возрастная психология. М.: Издательство Айрис-Пресс, 2005. 238 с.

8. *Клопотова Е.Е., Кузнецова Т.Ю.* Влияние компьютерных игр на произвольное внимание старших дошкольников // Дошкольное воспитание. 2018. № 10. С. 76—82.

9. *Корсаков И.А., Корсакова Н.К.* Наедине с памятью. М.: Знание, 1984. 78 с.

10. *Леонтьев А.Н.* Психологические основы дошкольной игры // Психологическая наука и образование. 1996. № 3. С. 19—31.

11. *Лурия А.Р.* Лекции по общей психологии. СПб.: Питер, 2006. 320 с.

12. *Николаева Е.И., Вергунов Е.Г.* Что такое «executive functions» и их развитие в онтогенезе // Теоретическая и экспериментальная психология. 2017. Т. 10. № 2. С. 62—81.

13. *Плотникова В.А., Бухаленкова Д.А., Чичинина Е.А.* Взаимосвязь предпочитаемых типов цифровых игр и регуляторных функций у детей 6—7 лет // Психологическая наука и образование. 2023. Том 28. № 4. С. 32—51. DOI:10.17759/pse.2023280402

14. *Рубинштейн С.Л.* Основы общей психологии. СПб.: Питер, 2002. 720 с.

15. *Рубцова О.В., Саломатова О.В.* Детская игра в условиях цифровой трансформации: культурно-исторический контекст (Часть 1) // Культурно-историческая психология. 2022. Том 18. № 3. С. 22—31. DOI:10.17759/chp.2022180303

16. *Токарчук Ю.А., Саломатова О.В., Гаврилова Е.В.* Использование настольных и цифровых игр дошкольниками: результаты опроса российских родителей [Электронный ресурс] // Психолого-педагогические исследования. 2024. Том 16. № 1. С. 76—95. DOI:10.17759/psyedu.2024160105

17. *Шаповаленко И.В.* Возрастная психология (Психология развития и возрастная психология). М.: Гардарики, 2005. 349 с.

18. A Classroom-Embedded Video Game Intervention Improves Executive Functions in Kindergarteners / V. Nin, H. Delgado, A.P. Goldin, D. Fernández-Slezak, L. Belloli, A. Carboni // Journal of Cognitive Enhancement. 2023. № 7. P. 19—38. DOI:10.1007/s41465-023-00262-1

19. *Bukhalenkova D., Almazova O.* Active screen time and imagination in 5—6-years-old children // Frontiers in Psychology. 2023. DOI:10.3389/fpsyg.2023.1197540
20. *Chaudron S., Di Gioia R., Gemo M.* Young Children (0—8) and Digital Technology — A qualitative study across Europe [Электронный ресурс] / Luxembourg: Publications Office of the European Union, 2017. 266 p. URL: https://publications.jrc.ec.europa.eu/repository/handle/JRC110359 (дата обращения: 12.04.2024).
21. Digital play in the early years: A systematic review / C. Chu, L. Paatsch, L. Kervin, S. Edwards // International Journal of Child-Computer Interaction. 2024. Vol. 40. DOI:10.1016/j.ijcci.2024.100652
22. Gains in Fluid Intelligence after Training Non-Verbal Reasoning in 4-Year-Old Children: A Controlled, Randomized Study: Fluid Intelligence Gains after Training Non-Verbal Reasoning / S. Bergman Nutley, S. Söderqvist, S. Bryde, L.B. Thorell, K. Humphreys, T. Klingberg // Developmental Science. 2011. Vol. 14. № 3. P. 591—601. DOI:10.1111/j.1467-7687.2010.01022.x
23. Ground Rules for Preschooler Exposure to the Digital Environment: A Review of Studies / E.I. Nikolaeva, I.A. Kalabina, T.K. Progackaya, E.V. Ivanova // Psychology in Russia: State of the Art. 2023. Vol. 16. № 4. P. 37—54. DOI:10.11621/pir.2023.0403
24. *O'Neill D.K., Holmes P.E.* The Power of Board Games for Multidomain Learning in Young Children // American Journal of Play. 2022. Vol. 14. № 1. P. 58—98.
25. Play to Foster Children's Executive Function Skills: Exploring Short-and Long-Term Effects of Digital and Traditional Types of Play / A.N. Veraksa, N.N. Veresov, V.L. Sukhikh, M.N. Gavrilova, V.A. Plotnikova // International Journal of Early Childhood. 2023. DOI:10.1007/s13158-023-00377-8
26. *Qian H., Wang C., Li H.* Parental risk factors and moderators of prolonged digital use in preschoolers: A meta-analysis // Education and Information Technologies. 2024. DOI:10.1007/s10639-024-12558-6
27. *Sum Kwing C., McBride C.* Effectiveness of Parent-Child Number Board Game Playing in Promoting Chinese Kindergarteners' Numeracy Skills and Mathematics Interest // Early Education and Development. 2017. Vol. 28. P. 572—89. DOI:10.1080/10409289.2016.1258932
28. *Veresov N., Veraksa N.* Digital games and digital play in early childhood: a cultural-historical approach // Early Years. 2022. № 3. DOI:10.1080/09575146.2022.2056880
29. Which play is better? Different play types and development of executive functions in early childhood / A. Veraksa, V. Sukhikh, N. Veresov, O. Almazova // International Journal of Early Years Education. 2022. Vol. 30. № 3. P. 560—576. DOI:10.1080/09669760.2022.2091979

Информация об авторах

Рубцова Ольга Витальевна, кандидат психологических наук, доцент, руководитель Центра междисциплинарных исследований современного детства, доцент кафедры «Возрастная психология имени проф. Л.Ф. Обуховой» факультета «Психология образования», ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-3902-1234, e-mail: ovrubsova@mail.ru

Токарчук Юлия Александровна, научный сотрудник Центра междисциплинарных исследований современного детства, ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0003-0690-0694, e-mail: lyusindus@gmail.com

Саломатова Ольга Викторовна, младший научный сотрудник Центра междисциплинарных исследований современного детства, ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0002-1723-9697, e-mail: salomatovaov@mgppu.ru

Гаврилова Евгения Викторовна, кандидат психологических наук, заведующая Лабораторией исследования когнитивных и коммуникативных процессов у подростков и юношей при решении игровых и учебных задач в цифровых средах, ФГБОУ ВО «Московский государственный психолого-педагогический университет» (ФГБОУ ВО МГППУ), г. Москва, Российская Федерация, ORCID: https://orcid.org/0000-0003-0848-3839, e-mail: gavrilovaev@mgppu.ru

Information about the authors

Olga V. Rubtsova, PhD in Psychology, Associate Professor, Head of Center for Interdisciplinary Research on Contemporary Childhood, Associate Professor of the Department of "Developmental Psychology named after Prof. L.F. Obukhova" of the "Faculty of Educational Psychology", Moscow State University of Psychology & Education, Moscow, Russia, ORCID: https://orcid.org/0000-0002-3902-1234, e-mail: ovrubsova@mail.ru

Yulia A. Tokarchuk, Researcher of the Center for Interdisciplinary Research of Contemporary Childhood, Moscow State University of Psychology & Education, Moscow, Russia, ORCID: https://orcid.org/0000-0003-0690-0694, e-mail: lyusindus@gmail.com

Olga V. Salomatova, Junior Research Fellow of the Centre for Interdisciplinary Research of Contemporary Childhood, Moscow State University of Psychology & Education, Moscow, Russia, ORCID: https://orcid.org/0000-0002-1723-9697, e-mail: salomatovaov@mgppu.ru

Evgeniya V. Gavrilova, PhD in Psychology, Head of the Laboratory for the Study of Cognitive and Communication Processes of Adolescents and Young Adults by Solving Game and Educational Tasks in Digital Environments, Moscow State University of Psychology & Education, Moscow, Russia, ORCID: https://orcid.org/0000-0003-0848-3839, e-mail: gavrilovaev@mgppu.ru

Получена 13.04.2024
Принята в печать 30.06.2024

Received 13.04.2024
Accepted 30.06.2024