

Development of Social Competence in Preschoolers with Different Levels of Executive Functions: Role Play and Project-based Learning

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The research is aimed at clarifying and comparing the influence of role play and project-based learning on the development of social competence in older preschoolers. The paper presents the materials of the pilot phase of the study. 30 preschoolers aged 5—6 years (average age 5,8 years) participated in the experiment. At the pre-test children's executive functions were assessed using NEPSY-II subtests and their social competence was assessed using the SCBE-30 test, which includes the scales "Social Competence", "Anxiety-detachment", "Anger-aggression". Further, the participants were distributed to three experimental conditions so that in each group there were an equal number of preschoolers with low and high levels of executive functions according to cluster analysis. In each group 12 meetings were held in accordance with the developed programs: Free play, Research project, Creative project. After completing the programs children's social competence was tested similar to the initial diagnostics. The results showed that preschoolers with a low level of executive functions had a stronger decrease in social anxiety in a free role play than in the project activities. At the same time, children with a high level of executive functions showed a greater decrease of the social anxiety when participating in a research project. Role play and project-based learning have proved to be equally effective for the development of social competence. The results clarify and expand the possibilities of using the described activities for the social competence development in kindergartens.

Keywords: early childhood; role play; project-based learning; social competence; anxiety; executive functions.

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Возможности развития социальной компетентности дошкольников с разным уровнем регуляторных функций: сюжетно-ролевая игра и проектная деятельность

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В работе представлены материалы исследования, направленного на уточнение и сопоставление специфики развития социальной компетентности у старших дошкольников в сюжетно-ролевой игре и проектной деятельности. Показаны результаты пилотного этапа исследования, в котором приняли участие 30 дошкольников 5—6 лет (средний возраст — 5,8 лет). На этапе пре-теста у детей были продиагностированы регуляторные функции с помощью методики NEPSY-II и социальная компетентность — с помощью методики SCBE-30, включающей шкалы «Социальная компетентность», «Тревога-отстранение», «Гнев-агрессия». Далее участники были распределены по трем экспериментальным условиям так, чтобы в каждой группе было равное число дошкольников с низким и высоким уровнем регуляторных функций согласно кластерному анализу. В каждой группе было проведено 12 занятий в соответствии с разработанными программами: Свободная игра, Исследовательский проект, Творческий проект. После завершения занятий была проведена диагностика социальной компетентности детей аналогичная начальной. Дошкольники с низким уровнем регуляторных функций показали наиболее сильное снижение социальной тревожности в свободной сюжетно-ролевой игре. В то же время дети с высоким уровнем регуляторных функций показали большее снижение баллов по данному показателю при участии в исследовательском проекте. Сюжетно-ролевая игра и проектная деятельность в оказались в равной степени эффективны для развития социальной компетентности. Полученные результаты уточняют и расширяют возможности применения описанных инструментов для формирования социальной компетентности дошкольников в рамках детских садов.

Ключевые слова: дошкольный возраст; сюжетно-ролевая игра; проектная деятельность; социальная компетентность; тревожность; регуляторные функции.

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Introduction

In contemporary scientific research, social competence is defined as the general ability to effectively cope with situations of social interaction [5; 40; 44]. One of the most common models for assessing social competence in childhood includes: social competence as the ability to prevent conflict situations and build positive interaction, social anxiety-detachment and social anger-aggression [37; 38]. Preschool age is one of the most intensive periods of social competence formation [7; 29; 52]. An important factor of social development in this period is active communication with peers, in which the child begins to perceive the other as a subject of interaction with his desires, feelings and beliefs [12]. According to research, the level of development of social competence at preschool age is a significant predictor of academic success at school [39; 40], educational motivation [45], cognitive development [8; 22; 41], life satisfaction and mental health in adulthood [15; 32]. However, the analysis of modern childhood shows an increase in children's communication difficulties, as well as an increase in helplessness and aggressive behavior when interacting with peers [5; 10; 11; 27]. This situation is crucial for preschool education where children interact with their peers, build a

system of interpersonal relations, which determines the development of their social competence and social well-being. Therefore, the search for ways to develop social competence in preschoolers within the kindergarten is an urgent task of the modern education system.

Role play and project-based learning as tools for the development of social competence in preschoolers

From the point of view of the cultural and historical approach, role play has the most significant impact on mental development in preschool age, including the development of social competence [13; 58]. Research shows that role play is indeed an effective way to develop social skills in preschool age [28; 34; 42; 50]. A.V. Zaporozhets and D.B. Elkonin noted that preschoolers enter into two types of relationships in the role play: "First, children enter into real relationships with each other as partners in the game. ... Secondly, children who play enter into relationships with each other, determined by the roles they have assumed." Choosing a role involves establishing agreements with peers, following the rules and interacting with other players based on role obligations and the game context, resolving inter-role conflicts, achieving common goals, etc. Role play becomes a space for preschoolers where

they hone their skills of cooperation and conflict resolution, learn to share game materials with other children, and master the social relations of the “adult world”.

Project-based learning has become widespread in modern preschool education along with role play. It contributes to the versatile mental development of young children [6; 16; 19; 31]. Project-based learning is a joint activity of an adult and a child, based on the support of independent activity and initiative of a preschooler. There are three main types in it: research, creative and normative [2]. The research project is aimed at finding answers to questions about various phenomena and the causes of their occurrence. The main goal of the creative project is to create a new product. Normative projects, in turn, are aimed at establishing and developing new norms and rules of behavior in a group based on real-life situations and problems that arise in kindergarten. Research shows that project activities contribute to the significant development of social competence of preschoolers [18; 29; 47; 60]. Problem situation that cannot be solved by child on his own requires him to cooperate with other project participants in the process of setting goals, completing intermediate tasks, discussing and making decisions. The presentation of the project's product contributes not only to the development of speaking skills, but also the ability to listen and treat others with respect.

Despite the widespread use of role play and project activities in the practice of preschool institutions, there is extremely little data in the scientific literature reflecting the specifics and comparison of the develop-

ment of social competence of preschoolers in these types of activities [9]. Thus, the first research aim of this study was to compare the development of social competence in a story-role-playing game and project activities in order to clarify the specifics and conditions of the organization of these types of activities.

Executive functions and development of social competence.

Social competence is influenced by the wide range of factors, including cognitive processes and behavioral skills of a child. Research and meta-analyses show that cognitive processes, in particular self-regulation, are significant predictors of social competence in preschool age [49; 52; 53]. Therefore, it is necessary to take into account the peculiarities of the development of self-regulation of preschoolers in the formation of social competence. Self—regulation are often considered in the context of executive functions (EF). EF provide purposeful task solving and adaptive behavior in new situations, including situations of social interaction [25]. According to the concept of A. Miyake, basic EF include working memory, cognitive flexibility and deterrent control [43]. In a broader context, EF can be considered as a variety of mental processes that contribute to the purposeful regulation of cognitive processes and are formed by cultural norms, knowledge and values [26]. From the point of view of the cultural and historical approach, EF represent a systematic indicator of higher mental functions [17; 56]. The ability to control one's emotional and behavioral reactions contributes to the successful establishment

of social relations, therefore, EF are closely linked to the development of social competence, in particular, at preschool age.

Children with a high level of EF are more likely to cooperate with their peers than children with a low level of EF [33]. While children with low EF levels are more aggressive and competitive towards their peers [20; 33]. In addition, high level of inhibitory control is associated with cooperative behavior, joint problem solving tasks and achieving common goals [24; 48]. Inhibitory control allows children to more effectively suppress impulsive, aggressive reactions, which allows them to build a harmonious interaction with a partner. Thus, the level of EF is an important factor of the social competence development.

The connection of EF with the development of social competence reflects the importance of taking this factor into account when forming the social competence of preschool children. Therefore, the second research aim of this study was to analyze the development of social competence in preschoolers with different levels of EF in role play and project-based learning.

The main hypotheses of the study

This study is aimed at comparing the effectiveness of role play and project-based learning for the development of social competence in older preschoolers, including preschoolers with different levels of EF. Taking into account peculiarities of mentioned types of activities [3] and ideas about child development in the cultural-historical approach [4; 7; 12; 13], the following hypotheses were put forward:

1. Reduction of social anxiety and withdrawal in children during the role play will

be more significant than in project-based learning. This assumption is related to the unproductiveness of the play and, as a result, the lack of any assessment of the results of the child's activity.

2. Reduction of aggressive behavior in children during the role play will be more significant than in project-based learning. The procedural nature of the play helps preschoolers "throw out" negative emotions, such as anger.

3. The development of children's social competence in project-based learning will be more effective than in role play, since it involves a more accurate orientation of the child in the system of social interactions between project participants.

4. The development of social competence in children with a low level of EF will be more effective when in role play and creative projects than in research projects. This assumption is explained by fewer restrictions on the spontaneous behavior in these types of activity than in research projects.

5. The development of social competence in children with a high level of EF will be more effective when applying research projects. The assumption is based on the fact that children with a high level of self-regulation get the opportunity to express themselves in a situation where they are competent.

Methods

Participants

The pilot study in the 2022-2023 academic year involved 30 preschoolers aged 5-6 years (average age — 5.8 years), among whom 15 boys and 15 girls. All the

children attended one state kindergarten in the Moscow region. The parents of all the children who took part in the study gave written consent to participate. The study was approved by the Ethics Committee of the Faculty of Psychology of Lomonosov Moscow State University.

Children who attended less than half of the classes (N= 1), children who did not participate in the post-test (N=5) due to illness, absence from kindergarten on the days of the post-test were excluded from the study. Thus, 24 children, including 15 boys (62.5%) and 9 girls (37.5%), were included in the final sample for analysis.

Procedure

The study consisted of three stages. At the first stage the assessment of EF and social competence was carried out. The assessment was carried out individually with each child. After the EF assessment, the children were divided into two subgroups according to the levels of cognitive development (low, high) in accordance with the results of cluster analysis (clustering of K-means) in Jamovi 1.6.23.0.

Further, in the second stage, participants from each subgroup with low and high levels of EF were randomly assigned to three experimental groups: Free Play, Research Project, and Creative Project. At the same time, the ratio of participants with different levels of EF in the groups was equal. Each group had 12 training sessions lasting 20-30 minutes in groups of 10 people. Training was held twice a week in classroom for additional education located at kindergartens. Trainings were completed in all groups at the same time. At the third

stage, a post-test similar to the initial assessment was conducted to measure the level of EF and social competence.

Techniques

To assess EF the NEPSY-II subtests [43] adapted for the Russian-speaking sample were used [1]. The “Memory for Designs” subtest for memorizing images and their location was used to evaluate visual working memory. To assess verbal working memory, the “Sentence Repetition” subtest was used to repeat sentences that gradually become more complex lexically and grammatically. The “Naming and Inhibition” subtest was used, aimed at assessing the level of information processing speed and inhibition of cognitive impulsive reactions. The “Statue” subtest was used to evaluate physical inhibitory control. To assess cognitive flexibility the “The Dimensional Change Card Sort” test was used to sort cards by a variable criterion [1; 61].

The questionnaire for educators “Social Competence and Behavior Evaluation (SCBE-30)” was used as a tool for diagnosing social competence [24]. This questionnaire includes three scales: social competence, social anxiety-withdrawal and anger-aggression. Each scale includes 10 statements reflecting the emotional and behavioral characteristics of children. The social competence scale in this questionnaire reflects the child’s ability to cooperate and resolve conflicts with peers.

Study groups

Three experimental groups were represented in the study: Free Play, Research project, and Creative project. As part of

the Free Play, the experimenters helped the children start a role play, for example, organized a discussion about the choice of the theme of the game and the roles, and then did not interfere in the game. The play took place in an environment enriched with non-game materials, such as sticks, cones, boxes, leaves and others.

Research and creative projects were organized as part of the project activities. The normative project was not included in the experiment, since its implementation should be justified by the real situation in the life of the kindergarten group and implies a change in the rules of functioning of this group, the active involvement of the teacher in normative project activities. The described conditions impose significant limitations on the organization of the experiment and the interpretation of the data.

In the Research Project, the experimenters created a problematic situation related to the topic of space. As part of the discussion about space, the children formulated the question "what do you need to know about Mars in order to travel to it?", which was accepted as a specific research task. As part of the discussion, preschoolers proposed to compile a book-note, which will contain all the necessary information for a trip to Mars. In the following classes, the questions and topics that need to be covered in the note book were selected and distributed among the children; information was collected from various sources (books, cartoons, a survey of parents and kindergarten workers); the information received was recorded in the form of pages of a book with drawings; the information collected was evaluated for reliability, importance and personal attitude of

children to it; a cover contest for the book notes was organized; a discussion was held on how to in what order it is necessary to assemble the note book, how it can be finalized and decorated, who will be interested in it; the note book was presented in several kindergarten groups. As part of the classes, the experimenters helped preschoolers organize the stages of work and supported children's initiatives.

In the Creative Project, the experimenters also created a problematic situation related to space, but its key point, as a result of children's discussion, was the creation of a model of space (crafts). In subsequent classes, a competition for sketches of a space model was held; a list of necessary materials and a work plan were compiled; responsibilities were assigned; the direct implementation of the space model took place; its presentation to kindergarten groups. As part of the Creative Project, the experimenters helped preschoolers organize the stages of work, supported the initiative and helped preschoolers in case of operational and technical difficulties (cutting out shapes of complex shapes, sewing a button, etc.).

Results

Descriptive statistics

Children with high and low EF levels were proportionally distributed among experimental groups during the pre-test period, in addition, the proportional distribution of children with different levels of EF remained equal after the post-test ($\chi^2(2)=0.254$, $p=0.881$, $N=24$). Gender differences in distribution by experimental groups ($\chi^2(2)=0.0879$, $p=0.957$, $N=24$), EF levels in the entire final sample ($\chi^2(1)=0.1688$, $p=0.682$, $N=24$),

Table 1

Distribution of participants by experimental groups and EF levels (N=24)

Group / EF level	Low EF level		High EF level	
	Boys	Girls	Boys	Girls
Free Play	2	2	2	1
Research Project	2	2	2	2
Creative Project	3	1	2	3

EF levels within experimental groups ($\chi^2(5)=0.138$, $p=0.927$, $N=24$) were not detected. The data on the sex composition of the groups is shown in Table 1. Sex differences were found on the pre-test for the social competence (Mann-Whitney test, $U(1)=28$, $p=0.013$): girls showed higher scores for this parameter. In order to compensate for the sex differences, the sex factor was taken into account and controlled in the further analysis.

At pre-test significant differences were found between the experimental groups in social competence (Kruskal-Wallis test, $\chi^2(2)=6.92$, $p=0.031$, $\varepsilon^2=0.301$). There were also differences in the “anxiety-withdrawal” for the interaction of group factors and the

EF level (Kruskal-Wallis test, $\chi^2(5)=11.8$, $p=0.038$, $\varepsilon^2=0.513$), but the pairwise comparison did not show significant differences. Therefore, in a further analysis, an assessment of the differences in pre- and post-test scores for the diagnosed parameters was conducted. Descriptive sample statistics for the pre- and post-test period are presented in the table 2 and 3.

Analysis of the effectiveness of role play and project-based learning

In order to assess the effectiveness of role play and project-based learning, nonparametric variance analysis with repeated measurements (Friedman’s test), as well as nonparametric variance analysis

Table 2

Descriptive statistics for the pre-test period (N=24)

Parameter/experimental group	Social competence Me±SD		Anxiety-withdrawl Me±SD		Anger-aggression Me±SD	
	Low	High	Low	High	Low	High
EF level						
Free Play (N=7)	31±4,79	38±10,7	26,5±2,89	15±3,21	11,5±10,2	10±11,4
	32±7,72		23±6,09		11±9,76	
Research Project (N=8)	39±8,04	29±14,2	15±10,4	21±1,83	9,5±6,29	17±11,8
	36±11,9		19,5±7		11,5±9,62	
Creative Project (N=9)	41,5±6,78	44±2,88	17±2,22	15±2,28	13±5,26	9±4,34
	43±4,64		17±2,12		9±4,58	
The Kruskal-Wallis test for experimental groups	$\chi^2(2)=6,92$, $p=0,031$, $\varepsilon^2=0,301$		$\chi^2(2)=4,5$, $p=0,105$, $\varepsilon^2=0,196$		$\chi^2(2)=1,03$, $p=0,599$, $\varepsilon^2=0,045$	
The Kruskal-Wallis test for the interaction of experimental group and EF levels	$\chi^2(5)=9,52$, $p=0,09$, $\varepsilon^2=0,414$		$\chi^2(5)=11,8$, $p=0,038$, $\varepsilon^2=0,513$		$\chi^2(5)=2,43$, $p=0,787$, $\varepsilon^2=0,106$	

of differences between pre- and post-test (analysis of differences in changes in the studied parameters, the Kraskel-Wallis test) were carried out.

Children in all groups showed a significant increase in social competence (Friedman's test, $\chi^2(1)=4.55$, $p=0.033$). However, no significant differences were found between the experimental groups, as well as children with different levels of EF (Kraskel-Wallis test, $p>0.05$). There were no differences in social competence changes for boys and girls (Kraskel-Wallis test, $\chi^2(1)=1.56$, $p=0.211$, $\varepsilon^2=0.068$), at the post-test. Girls showed higher scores for this parameters at post-test (Mann-Whitney test, $U(1)=35$, $p=0.037$). The sex differences remained.

Preschoolers in all experimental groups showed a significant decrease in the "anxiety-withdrawal" (Friedman's test, $\chi^2(1)=13.8$, $p<0.001$). At the same time, the decrease in anxiety was significantly different depending on the interaction of the experimental group and the EF level (Kraskel-Wallis test, $\chi^2(5)=12.7$, $p=0.026$,

$\varepsilon^2=0.553$), pairwise comparison did not reveal significant differences (Post Hoc, $p>0.05$). Separately, the influence of the group factor (Kraskel-Wallis criterion, $\chi^2(2)=1.23$, $p=0.539$, $\varepsilon^2=0.0537$) and the EF factor (Kraskel-Wallis test, $\chi^2(1)=0.716$, $p=0.397$, $\varepsilon^2=0.0311$) was not detected. At the same time, the initial differences in the "anxiety-withdrawal" indicator for the interaction of group and the EF level were leveled (the Kraskel-Wallis criterion, $\chi^2(5)=8.61$, $p=0.126$, $\varepsilon^2=0.374$). Children with low EF levels showed the greatest decrease in anxiety during Free Play (Me=-8, SD=1.91), while children with high EF levels showed the greatest decrease in Research Project (Me=-5, SD=2.22). The data is more clearly reflected in the Figure 1. No significant changes were found for the anger-aggression.

Discussion

The main purpose of this study was to compare the effectiveness of role play and project-based learning for the development

Table 3

Descriptive statistics for the post-test period (N=24)

Parameter/experimental group	Social competence Me±SD		Anxiety-withdrawl Me±SD		Anger-aggression Me±SD	
	Low	High	Low	High	Low	High
Free Play (N=7)	38,5±9	39±7,55	19±2,94	16±2,65	15±7,3	9±5,51
	39±8,04		17±3,35		11±6,32	
Research Project (N=8)	39±3,56	38,5±6,78	12±12,2	16±2,99	10±4,79	14±5,2
	38,5±5,45		14±8,29		11,5±4,94	
Creative Project (N=9)	46,5±2,89	45±5,45	11,5±2,16	14±2,70	14±6,38	8±4,87
	46±4,29		12±2,47		9±5,41	
The Kraskel-Wallis test for experimental groups	$\chi^2(2)=8,77$, $p=0,012$, $\varepsilon^2=0,381$		$\chi^2(2)=5,92$, $p=0,052$, $\varepsilon^2=0,257$		$\chi^2(2)=0,131$, $p=0,937$, $\varepsilon^2=0,006$	
The Kraskel-Wallis test for the interaction of experimental group and EF levels	$\chi^2(5)=9,52$, $p=0,09$, $\varepsilon^2=0,414$		$\chi^2(5)=8,61$, $p=0,126$, $\varepsilon^2=0,374$		$\chi^2(5)=2,59$, $p=0,764$, $\varepsilon^2=0,112$	

of social competence in older preschoolers. The results showed that both free role play and project-based learning contribute to reducing social anxiety and promoting social competence in children. However, children with lower levels of EF demonstrated the greatest improvement in social competence through free role play, while children with higher levels of EF improved more through project-based learning. There were no significant changes in social aggression levels before and after the classes. It was found that girls had a higher level of social competence at the pre-test compared to boys. The initial sex difference in the level of social competence was not leveled after classes. These sex differences in social competence were consistent with other studies that found a higher level of social development among girls at preschool age. This may be due to differences in their upbringing and playing preferences [14; 54].

Preschoolers who participated in role play and project activities showed a similar decrease in the level of social anxiety, but the results also indicated different grounds for their orientation in educational activities in kindergartens. These grounds seem to be related to the EF level. Children with a low level of regulation may experience difficulties in social interactions due to their inability to control aggressive and impulsive reactions [20; 33]. This can lead to deficits in interpersonal relationships, as other children may not want to interact with them. However, within the context of play, preschoolers with low EF levels are able to better control their behavior [4]. This suggests that play can be an effective tool for helping children with these difficulties. Role play helps children with a low

level of self-regulation to successfully cope with social situations, as it involves interacting from a role in an imaginary context. Role and the associated rules allow the child to act independently, relying on the imaginary situation's semantic space, which makes it easier to follow the game's plot and brings more pleasure than impulsively acting on desires [4; 13]. In a safe play environment, a child can display various behaviors. Thus, role play becomes a space where a children with low self-regulation finds success, including in social interactions, which can significantly reduce their social anxiety [50; 51]. The process of playing is more important than the outcome. In addition, role play involves the active use of symbolic means, which are most accessible to preschool children. Studies have shown that these means are most effective for children with low levels of EF [57]. The results suggest the possibility of using role play as a method for reducing childhood anxiety. This is consistent with research on the psychotherapeutic function of play [23; 59] and complements it, clarifying the specific aspects of the development of preschoolers with different levels of EF in play.

At the same time, children with a high level of self-regulation showed the greatest reduction in social anxiety in research project. Preschool children with a high EF level focus on recognizing their own productivity, which is possible through research project activities. Project activity, on the one hand, creates conditions for successful communication between children and peers, providing opportunities for the realization of their own ideas. Children can be heard in this process. On the other hand, research projects have a special role, as they allow

children to work individually to a greater extent, and the results of their work can be more accurately presented.

The results of the study demonstrated the development of social competence among preschoolers through play and project-based learning. The findings are consistent with prior research on the impact of these activities on the ability to treat others with respect, work in teams, present oneself effectively, and demonstrate tolerance [18, 28, 29, 34]. Additionally, the findings clarify the outcomes of previous research by demonstrating that an integral aspect of a child's social development (social competence) can be fostered through play and project work. However, while processing the data, specific details and variations in children's development within these activities were not identified. The hypotheses regarding changes in social anxiety, aggression, and competence due to play and project-based learning were not supported. Nevertheless, it is important to consider the short duration of the interventions in this study. The classes lasted for 6 weeks. Considering that the manifestation and development of social competence depend on various factors, such as the physical condition of the child, family relationships, stressful events, and others [40; 44], this period could be sufficient for the development of some social skills and an increase in interactions with peers. However, it is not sufficient to see the specific impact of role play and project activities on social competence development.

The main limitation of this study is the lack of a control group, which prevents us from reliably assessing the effectiveness of role play

and project-based learning in the development of social competence compared to the natural development of children. Although the main aim of the study was to compare these two types of activities, data from other studies using a control group suggests that both activities significantly contribute to the development of specific social skills in preschoolers. Additionally, the duration of the experiment (6 weeks) may not be sufficient for the full manifestation of natural social competence development in preschoolers, as it is a complex process involving various behavioral patterns. Furthermore, the small sample size limits the generalizability of the findings, making it difficult to draw definitive conclusions about the effectiveness of these activities. Nevertheless, the study provides valuable insights into trends in the relationship between these activities and social competence development.

Conclusion

The study found that role play and project-based learning contribute to the development of social competence in preschoolers. For children with low levels of EF, role play was more effective in reducing social anxiety compared to project-based learning, while for those with high EF, participating in a research project helped them better manage social anxiety. These findings clarify and expand our understanding of how role play and project activities can be used in kindergarten settings to support the development of different groups of preschoolers, and open up opportunities for further research on the impact of these activities on other aspects of children's mental development.

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