

THE DEVELOPMENT OF COOPERATION SKILLS OF SENIOR PRESCHOOLERS IN THE EXPERIMENTATION PROCESS

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Abstract. *The authors of the article consider the importance of cooperation skills as some of soft skills of a person. The significance of developing these skills from preschool age on is emphasized. The influence of children's experimentation on their all-round development and readiness of senior preschool children to study at school is considered. The interrelation between group activities in the process of experimentation and the development of senior preschoolers' cooperation skills is shown. Based on the observation of children's activities in the process of experimentation, the educator's participation in this process and the survey of senior preschoolers and educators reveal the aspects of the organization of children's group activities that have to be improved. The peculiarities of the educator's participation at all stages of the experiment done by senior preschool children in groups are analyzed – during the goal setting, discussion of the experimental procedure, summarizing, as well as during the verbal report on the results of the experiment. Emphasis is placed on the fact that it is important to organize experimentation centres at preschool institutions, which will allow children to freely experiment and form a team to carry out search activities. The psychological and pedagogical conditions for the children's experimentation in groups being organized at preschool institutions by educators for the successful formation of senior preschoolers' cooperation skills are formulated.*

Keywords: *educational process at preschool institutions, children of senior preschool age, children's experimentation, cooperation skills, group forms of work, personality-oriented approach.*

Introduction

The social need of the cooperation skill of children grows with each passing day. In any sphere a valuable employee is a person who is able to cooperate with other members of the team. A cooperation skill, as one of the human's soft skills, is a personal breadth of knowledge which helps a child to solve important tasks in an easy and productive way and to constantly move forward. The cooperation skill will help children to apply the knowledge gained and to easily achieve their goals in future: a prestigious university, a successful career, a happy family and a real friendship.

A child of pre-school prefers a game as a main activity. He plays with a great interest, uses his own experience for creating gaming concepts where he implements his cognitive, social, moral and aesthetic needs. The easiest way of creating the cooperation skill is to form it in a preschool age while the usual scenario and behavioral patterns have not yet been established. A game being a main activity of the pre-school children, appears to be a fundamental instrument of forming the social, vital and constantly changing skills which will develop during all the human's life.

The aim of this article is to investigate the connection of the group activity in the process of the experimentation with the development of the cooperation skills of the senior pre-school children.

The theoretical background

It is proven that the collaboration is inherent to all children from an early age and it is some unconscious striving. (Tomasello et al., 2009). However by the age of 6-7 children feel the need for collaboration. (Vaish & Tomasello, 2014).

When the senior preschool children's experimental activity takes place outdoors – in the field, in the garden, in the school orchard, and when it is conducted spontaneously, it helps reveal the collaboration skills. (Ozer et al., 2007; Block et al., 2012; Gibbs et al., 2013; Pollin & Retzlaff-Fürst, 2021). One of the researches describes the process of the children's division into groups and the organization of the observing of the plants growing, ground testing and snail watching. (Pollin & Retzlaff-Fürst, 2021). Another study proved the effect of learning in groups of children on the effectiveness of their experimental activities (Karuk et al., 2021).

How does a game influence collaboration skills forming? It was observed that when four- five years old children were in the process of the free game (when children organize groups by themselves), they built more complex entities, were observant and communicated more positively than when a teacher organized their activity (Ramani, 2012).

A collaboration will appear in the preschool child when he possesses such qualities as kindness and empathy. Researchers discovered in one study that such

games as «Islands», «Timeball» when played for 12 weeks, led to the small but visible improvements of children's prosocial behavior. The children as a rule, showed more kindness, help and empathy. (Street et al., 2004). The biggest advantage of the games is in encouraging children to act in a more pleasant way. Some other research shows that a successful collaboration experience forces the children to continue such a tendency: if you are working with me today, I will probably cooperate with you tomorrow. (Blake et al., 2015; Keil et al., 2017). So it is likely that cooperative games can serve as tools for «creating allies» between players.

Experimentation can be considered as one of the kinds of games. A game is one of the important parts of healthy child development (Kruty, 2019). In particular, a scientist (Frishman, 2014) emphasizes the influence of the game with the children of their own age and the effectiveness of preschool child development and the transition from the education pedagogics to the development pedagogics (personal qualities and psyche). On the contrary, a popular psychologist (Podd'jakov, 1977) formulated an hypothesis that the main activity in the school age is not a game, as it's considered to be, but the experimentation. When playing, preschoolers gain not only such academic skills as mathematics, natural science, reading, languages and literacy, but also learn social skills, such as effective communication conflicts and problem solving and collaboration. Senior school children are more interested in investigating the properties of water, ground, sand, etc together with their schoolmates. Such concern can be used in forming the senior pre school children cooperation skill.

Methodology, organization and results of the research

In this research we used such methods of investigation: - theoretical: the analysis of the scientific sources for clarification of the conceptual apparatus; synthesis, the systematization and the organization of the theoretical regulations of the studied issue; empirical: pedagogical observation (of the process of work of the senior schoolers in groups), conversations and teachers' interviews.

In October 2020 a questionnaire was conducted where 82 preschool teachers of Vinnytsia and Vinnitsa region were involved. The aim of the event was to check if Ukrainian educators obtain skills to organize group activity of the senior preschool children in the process of the experimentation. The questionnaire members are 43 preschool teachers who have work experience of 1-5 years (53,4%), 27 members – 6-10 years (32,9%), 7 members – 11-15 years (8,5%) and 5 people – 16 years and more (6,1%). The event took place remotely; the questionnaire tool we chose was Google forms. Let's analyze the answers of the questionnaire survey.

The first question was: «Do you think that educators should form the cooperation skill of the senior preschool children?», and the answer

variants were «yes», «no», «didn't think about it». All the respondents answered positively.

The second question was: «What factor most influences the forming of the senior preschool children's cooperation skills?», and the answer variants were «the child's age», «parental education», «pre-school institution education» and «your own variant» (*Table 1*).

Table 1 Respondents' answers to the second question of the questionnaire «What factor most influences the forming of the senior preschool children's cooperation skills?» (created by the authors)

Possible answers to the questions	Number of respondents in percent
Age of the child	58 people (70,7%)
Family upbringing	12 people (14,6%)
Education in kindergarten	10 people (12,3 %)
Your option	2 persons (2,4 %)

From the answers of educators we can see that the vast majority did not give complete answers, because among these factors is not the main thing: a positive result of the formation of older preschool children skills to achieve cooperation can be achieved through interaction between preschool and parents. These influences are most inherent to the senior preschool children and form the development of the cooperation skill.

The third question was: «What methods and techniques are effective in forming the senior preschool children's cooperation skills?», and the answer variants were: conversation, explanation, direction; elementary experiments; examples of the grown-up; the organization of the common activity, watching cartoons and TV shows of moral content. Respondents could also write their own variant. The answers are shown in picture 2. The total result is not 100%, as the responder could give several variants. After analyzing the results, one can find out that all the members of the questionnaire chose “the organization of the common activity” variant. Thus, all the preschool teachers realize the important role of the common activity in forming the senior preschool children's cooperation skills.

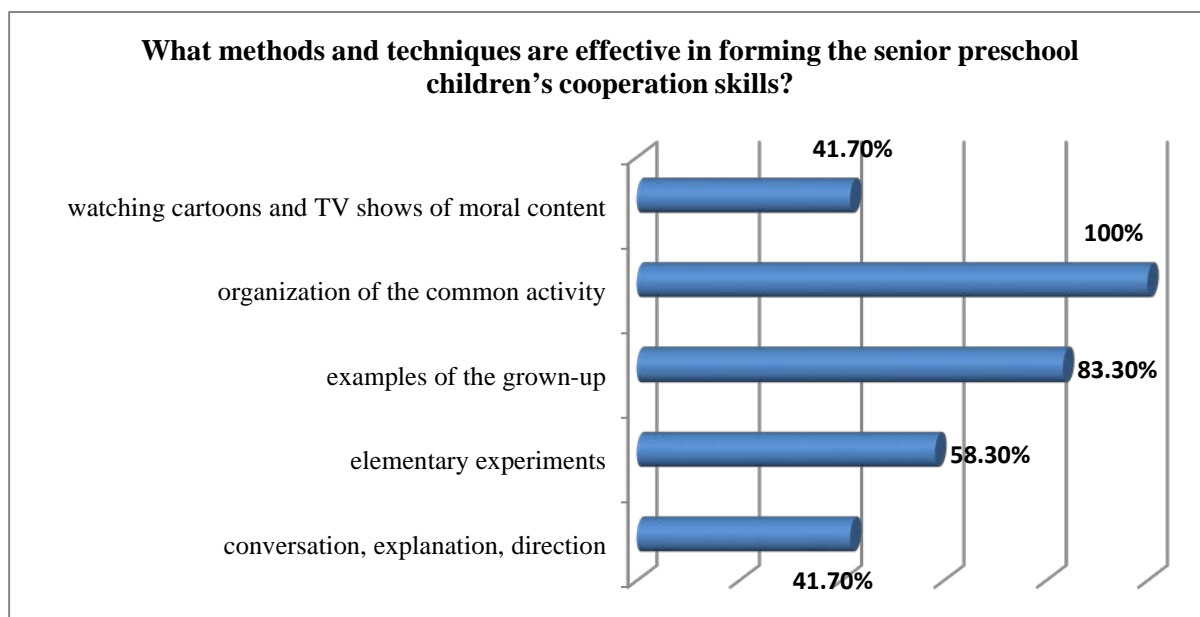


Figure 1 Educators' answers to the third question of the questionnaire (created by the authors)

The next question was: «What skills should an educator possess during developing of the senior schoolers' cooperation skills?». The answer was open (Table 2).

Table 2 Respondents' answers to the fourth question of the questionnaire «What skills should an educator possess during developing of the senior schoolers' cooperation skills?» (created by the authors)

1.children organization skills	9 people (11 %)
2.developmental psychology skills	7 people (9 %)
3.observing children activity skills and its correction	5 people (6 %)
4.group activity basis and special skills to use them in practice	6 people (7 %)
5.children involving in process skills, the ability of making children interested in objective, helping skills for children to be right in this chain	8 people (10 %)
6.teachers should have the ability to organize the team; should show the level of the children development and individual characteristics of every child	9 people (11 %)
7.organization skills; teachers should possess skills to identificate the children knowledge level in order to divide them into groups and to control the tasks execution	11people (13 %)
8.preschool teacher should know the rules of conducting experimentation in a child sensitive manner	11 people (13 %)
9.teachers should have skills to organize the cooperation	16 people (20 %)

Most of the respondents (more than 67%) pointed out the facilitation skills and deep knowledge of developmental psychology. Such conclusions were made from the answers 1-8. However, none of the responders mentioned such important factors as praise of the schoolers and praise of their collaboration skills, the teacher's focus on the children's desire to help each other.

And, finally, the last question was «Is children experimentation possible without forming cooperation skills?». This question also offers an open answer (Table 3).

Table 3 Respondents' answers to the fifth question of the questionnaire «Is children experimentation possible without forming cooperation skills?» (created by the authors)

Because, during children's experimentation, children perform all tasks together, help each other.	5 people (6 %)
If you do not have skills in anything, it is not advisable to conduct experiments.	8 people (10 %)
The educator is like a link between the child and the result of research, or the goal to be achieved.	9 people (11 %)
When there is cooperation, the child will rely on the auxiliary instructions of the educator, he will be interested in getting the result that will be satisfied by both parties.	7 people (8 %)
Because during experimentation, children have to explore or influence a certain object or phenomenon of nature together, and if children do not develop the skill of cooperation, they will not succeed in joint research.	6 people (7 %)
Because the child during the experiment must act together and cooperate to get the result.	9 people (11 %)
Any activity is communication and interaction with each other.	9 people (11 %)
To achieve this goal it is necessary to develop children's skills of cooperation.	13 people (16 %)
A common goal is a common result.	10 people (13 %)
Together you can succeed.	6 people (7 %)

Some respondents mentioned the important cooperation skills for organization of the experimentation in groups. When children cooperate and support each other, the result will be more effective: children's thinking, interests and imagination will develop in a more powerful way. There were also replies which didn't deeply demonstrate the connection of the children's collaboration skills and impact of the experimentation activity. The replies are as follows: «during experimentation children have to examine and influence a certain object or natural phenomena, and when children don't have cooperation skills, they won't have a co-research», «children have to act together and cooperate in order to get a result», etc. There were also replies when it was difficult to understand the deepness of the teachers' comprehension of the investigated connection of the

children's cooperation skills and experimentation activity (for example, «Any activity is a communication and interaction», «if there aren't formed skills in anything, one should not conduct an experiment»).

To summarize the results of the experimental research, we can mention that some part of the preschool teachers who took part in the questionnaire survey, understands the importance of the children cooperation skills but they need to gain additional knowledge of interaction with the children's families for working together in forming the skills and they need the competencies of organizing of the children's experimentation in groups and managing such activity.

Also we conducted the observation of the educators' organization of the group activity of the senior scholars during the experimentation. 17 preschool institutes in Vinnytsia and Vinnytsia region were under the investigation (Preschool educational institution №10 "Kalinka" in Vinnytsia (<https://dnz10.edu.vn.ua/>), Preschool educational institution №30 "Firefly" in Vinnytsia (<https://vn.isuo.org/preschools/view/id/56849>), Vendychany preschool institution of Mohyliv-Modilskyi district of Vinnytsia region (isuo.org)) The results of the study are correlated with the results of the questionnaire survey, so we noticed not enough motivation of teachers in forming the children's cooperation skills during the experimentation. This is due to the lack of materials and devices for children's experiments, the ignorance of educators in the structure of their conduct. It also takes a lot of time and effort to prepare and conduct this type of preschool activity.

To identify the influence of the above in the formation of skills for cooperation, we conducted an experimental study. 158 children of senior preschool age took part in the pedagogical experiment (78 children in the control group and 80 in the experimental group).

The structure of the children's experiment:

1. To find out what children are interested in and are eager to learn.
2. The decision and formulation of the problem.
3. Proposing assumptions (results prognosing).
4. Safety rules forming.
5. The hypothesis checking (the experiments conducting), the fixation of the results by the group and the analysis of the data received.

Let's examine the approach a preschool teacher should use for forming the children's cooperation skills using the example of the experiment «Properties of water» (experiments with water, snow, ice, paints and oil).

The objective is to develop children's thinking, imagination; to form the children's realizing of the properties of water and ice.

The materials are parts of pictures, containers for snow and water freezing, a marker, stickers, colors, a brush, oil.

Duration of the experiment: 20-30 minutes.

Group division: we create children groups of 3-4 before the beginning of the experiment. The groups can be created on arbitrary guidelines (for example, to cut the pieces of paper and give the children the pieces placing the facial part down. The paper is cut into 3-4 pieces (it depends on the number of children in the group). The children should make the whole picture - this is a group.

The review of the children's experiment:

1. Children are interested in what the snow is?
2. The tasks of this stage of the experiment are suggested to children step by step. Scoolers together with the preschool teacher formulate the problem, for example, what will happen to the snow if we take it to the classroom and then freeze it and add some colors and oil.
3. Preschoolers express their thoughts about the snow melting, about the color of water, white or gray; what will happen if they put the water into the refrigerator, if it freezes or if it changes color when they add color or if it melts when they add oil.
4. The children with the pedagog revise safety rules; they mustn't eat the substances and ingredients; they should demonstrate kindness and respect for each other; the experiments should be conducted with the permission of adults and in their presence.
5. At first, the preschool teacher tells the children what they should get in the containers (for example, during the walking). Upon request, children can mark their container in any way (using a marker, a sticker, etc). It should be emphasized to take the snow from different places. Learning the topic, children observe the creation of ice from water of different colors - the color of water determines the color of ice; the form of the container defines the form of the ice. In order to form the cooperation skills in the process of this research we should choose a responsible person for the form of the ice (it is divided into 3-4 parts), colors (1 set of colors for a group) and the brush. It is important to prepare the required instruments one for a group. Thus every child will learn to share and ask. After children get the containers with ice, we leave them in the classroom for some time and offer the children to watch their containers. Every group should be given a separate table where children can set their equipment. At this stage children watch the snow in their containers, observe where the snow is melting faster and express conclusions why it happens and discuss their ideas. After water melts, the members are suggested to observe the color of the snow, discussing it in their groups (we offer doing it by comparing with the objects the children got familiar with (the piece of paper, a white color, child's clothes, dishes).

We emphasize that children should formulate one conclusion from each group. During discussion children share their thoughts, learn to express their

minds, and listen to their schoolmates, formulate their own mind and understand that it is not pleasant when they are interrupted or not listened to, so they learn to cooperate.

In the second part – in order to learn the fact that the color of the ice is determined by the color of the water, we suggest that the children should choose the color and remember it. As the brush is only one, children should learn to share it and wait for their queue. Besides, different situations appear in the process of such activity, when children should ask to hold the container with water, colors, etc. And schoolers will understand that if one does not help his schoolmate, no one will agree to help him. When the container for freezing is ready, the educator puts it into the refrigerator. After the water freezes, he gives it back to the children.

The scholars observe that the color of ice depends on the color of snow. At the end of the experiment the preschool teacher should praise every group for their working together and should express his joy observing their cooperation and helping each other. The educator should emphasize that the positive result (he should generalize the conclusion the children made) is gained only in collaboration with each other.

Such an experiment can be continued by adding some oil (put multicolored pieces of ice in one container and add some oil, mix the ice and watch its melting and discuss the thought about the experiment). By the way, children should be given a chance to mix ice and oil - one by one or one child from the group. Thus, we will learn to interact with each other and cooperate.

And finally, The third part of the experiment can be in researching the form of the ice depending on the form of the container. We give every child from the group a container of a different form. Children can freeze the ice of different colors in these containers. The children will learn to discuss issues, deal with one another, help each other, that is cooperate.

The formulation of conclusions. The educator summarizes about the properties of water and about the children's work during the experiment. Schoolers ask questions which can appear during the research.

The pedagog provides children with all the necessary materials in the process of the preparation, and the content of the experiments are formed by the children headed by the teacher. Thus, children experimentation is organized by the children's request and its structure can be as follows:

The role of the preschool teacher is a facilitator. He should appear off-screen. We advise to interfere only in exceptional cases, when there is misunderstanding between children when they can't deal by themselves (for example, children can't agree upon the instruments sharing). It's important to praise schoolers during and after the experimentation process. The educator should emphasize that the achieving of the positive result is possible only in collaboration, when children help and support each other, are concessive and patient.

To do this, we used Pearson's correlation analysis. The choice of this analysis is due to the need to establish a relationship between two independent data samples: X - the results of determining the level of older preschool children skills, Y - the results of teacher skills purposefully and effectively promote the development of cooperation skills in children in their experimental activities.

To calculate the Pearson correlation coefficient, we used the formula:

$$r_{xy} = \frac{N \cdot \sum x_i y_i - (\sum x_i)(\sum y_i)}{\sqrt{[N \sum x_i^2 - (\sum x_i)^2][N \sum y_i^2 - (\sum y_i)^2]}}$$

Final calculations show that 0.95. Thus, there is a direct link between the level of cooperation skills of older preschool children and the level of teacher skills to purposefully and effectively promote the development of cooperation skills in children in the process of their experimental activities.

Conclusions

Generalization of the scientific literature, the results of the teachers' interview, and the observation of the senior preschool children group activity in the process of experimentation helped to make such conclusions.

The social value of the cooperation skill was proven by the scientists and was confirmed by the pedagogical and life experience.

The teachers' interview and the observation of the senior preschool children group activity in the process of experimentation in the preschool establishments in Vinnytsia and Vinnitsa region proves the relevance of the teachers skills of intentionally and effectively contributing to the development the cooperation skill and in particular in the process of the experimentation activity.

In the course of the experiment preschool teachers should have excellent relations with children, should encourage cooperation and mutual help and should motivate children with positive comments about their success. On the other side, in the circumstances of the children experimental activity and creating the atmosphere of the collaboration and mutual support, preschool teachers get the opportunity to implement their manager function: to focus the children's thought process on the willingness to observe invisible, to understand hidden and to consider unusual in the common objects, to realize cause-effect relationship phenomena which are being explored.

The sphere of the further investigation comprises the search of the effective ways of cooperation of the preschool teacher and children's family forming together the collaboration skills.

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