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**PEDAGOGICAL ASPECTS OF CHILDREN'S COOPERATION
IN THE COURSE OF TEACHING NATURAL SCIENCE**

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Abstract

The article is devoted to the formation and development in primary school children of the ability to work in a group (team) by means of creating pedagogical conditions for organizing and conducting a group form work. It presents methods and techniques, criteria for diagnosing the level of these skills. The article substantiates the importance of group work, identifies difficulties in the organization of joint activities of pupils and provides recommendations to overcome them. It uncovers effective methods and techniques of group work organization while studying natural science at primary school. Group work requires a well-thought-out system of actions on the part of a teacher, both at the stage of developing group tasks, and at lessons themselves in the course of organizing them. The article describes the substantive and methodological support for the formation of younger schoolchildren communicative skills for group activity in the study of natural sciences, which is based on phased work. The process of organizing group work with younger children is divided into five stages, where the final stage is a reflexive discussion.

Keywords

Elementary school – Communication skills – Group methods

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Introducción

The changes taking place in the modern society require rapid improvement of the educational environment, setting educational targets, which are aimed to meet state, social and personal needs and interests¹.

In order to study the level of formation of younger schoolchildren ability to work in a group we conducted experimental work on the basis of the municipal budgetary educational institution "Secondary Education School No. 30" in the city of Naberezhnye Chelny of the Republic of Tatarstan of the Russian Federation. Two even-aged groups of children took part in the experiment: 1) the experimental group — 28 pupils of the 2nd grade "A"; 2) the checking group - 26 pupils of the 2nd grade "B".

The experimental work included several stages.

1. The ascertaining one. At this stage there was made a diagnosis of the level of formation of skills to work in a group according to the following methods: the task "Mittens"², the methodology "The Left and Right Sides"³, the task "Road to Home"⁴, the communicative game "Journey to a desert island" (Younger school children are divided into teams that are sent to a desert island. Each team member can take with them only one necessary thing. Teams must decide: what items they will take with them to the Isle, what each of them will do on the island). When diagnosing the level of formation of skills for working in a group, the method of pedagogical observation was also actively applied.

The results of the methods performed were evaluated according to the following criteria:

- understanding of the existence of different points of view, the ability to take into account a partner's position that is not similar to their own;
- the ability to present different opinions and points of view, understanding the possibility of different opinions and points of view (overcoming egocentrism);
- awareness of the possibility of different bases for evaluating the same subject, understanding relativity of assessments and approaches for a choice;
- the ability to reckon with various judgments and the ability to argue;
- the ability to take into account needs and interests of other people;
- the ability of children to prove, to justify, to agree, come to a unified conclusion;
- the ability to conduct a mutual control while fulfilling the work;
- mutual assistance in the course of conducting the work;
- emotional attitude to the mutual work: positive (they work with pleasure and interest), neutral (they interact with each other as it is necessary) or negative (they ignore each other, they quarrel).

¹ M. P. Zinovieva and T. G. Firsova, "Primary school teacher: state requirements and future teacher's representations", *Azimuth of Scientific Research: Pedagogy and Psychology*, num 4 Vol: 7 (2018): 105-108.

² G. A. Zuckerman, *Types of Communication in Training* (Tomsk: Peleng, 1993).

³ J. Piaget, *Child's Speech and Intellection* (Moscow: Pedagogika-Press, 1994).

⁴ A. G. Leaders, *Methods of psychological examination of the family (monograph-workshop)*. (Moscow: Akademiya, 2007).

2. The formative stage. At this stage, Natural science lessons were conducted using active teaching methods and techniques (brainstorming, bus stop, conflict, basket of ideas and others) in a group form of training.

3. The checking phase. At this stage, a re-diagnosis of the level of formation of the elementary schoolchildren's ability to work in a group was carried out. It was conducted according to the same methods as at the ascertaining stage with some changes in questions and tasks.

Results and discussions

The results of the ascertaining stage of the experimental work showed that the majority of elementary schoolchildren have a rather low level of skills for working in a group (Table1).

Levels of skills for working in groups	Results of the experimental group	Results of the checking group
Low	50	46,1
Average	32,1	38,5
High	17,9	15,4

Table1

The results of diagnostic studies of the level of elementary school children's skills to work in a group at the ascertaining stage (in %)

For the formation and development of children's ability to work in a group (team) even at the initial stage of schooling, it is necessary to organize the educational process in such a way that there should be created pedagogical conditions for organizing and conducting group educational work.

At the formative stage of the experimental work there were planned the following tasks:

- to test the developed set of tasks for educational group work in the course of teaching Natural science;
- to provide pedagogical support in the formation of the subjective position and interaction of elementary school children in group activities;
- to stimulate the achievement of educational success of younger children in joint activities by the application of practice-oriented, activity-based approaches.

Since the ability to work in a group is closely connected with universal communicative educational activities, we have created certain conditions for the development of communicative skills of younger children. A child learns to communicate and speak from an early age.

Achieving the results in communication activities requires developing specific skills, because the communication is not only the information transfer from one person to another, but also it reveals the behavioral side of people's interacting. Psychological and Pedagogical sciences devote considerable attention to the development of speaking and writing abilities of junior schoolchildren, including communicative and speech fitness of

children before they start school⁵. Their research shows not only the possibility of practical organization of effective forms of pupils' cooperation aimed at learning school subjects, but also defines a positive impact of cooperation on the formation of communication skills⁶.

As an organizational form of learning in a dual system group work provides significant opportunities for the formation of motivation achievements, which helps to enhance the self-esteem, to develop such communication skills as interacting, mutual influence, understanding. Dialogue in the course of learning is the most favorable means for the manifestation and development of the pupil's personality. Our research is based on the communicative activity approach theory developed by V.V. Davydov⁷ and others, as well as on the generalization of the best pedagogical experience in the organization of group activities and on our experimental work. We defined the difficulties experienced by teachers in the organization of joint work on the formation and development of communicative learning skills. They are as follows:

- group formation does not always go in a calm atmosphere, because children may be reluctant to gather in groups (there are pupils who want to work independently);
- often children are noisy;
- some pupils do all the work in the group, while others avoid group work, some feel insecure and refuse to work, some children try to command and demonstrate intolerance.

Teachers who try to use group work at their lessons at first face many obstacles. The failure of group study is mainly due to either unwillingness or inability of pupils to work together. Providing elementary school children with the skills of teamwork is a holistic process of their gradual inclusion in the situational communicative activities on the basis of creating a motivating environment of communication, which contributes to the self-realization of a developing personality. We overcame internal resistance, unwillingness, inability to establish joint work by methods of creating an atmosphere of trust, mutual support, security. To do this we took into account the principles of personality-oriented approach, cooperation, democratic style of relations, recognition of a pupil as a subject of learning.

Group work requires a non-traditional organization of workplaces. The desks should be placed in such a way that every child could see his/her interlocutors, nobody should sit with their back to visual materials, and everyone should be able to get the educational supplies needed in the work, and reach the general sheet of paper, where the results of the work are recorded.

⁵ L. S. Vygotsky, Collected works: In 6 vol. Vol: 3. Problems of development of mentality (Moscow: Pedagogika, 1983); V. V. Davydov, Problems of Developmental Education: The Experience of Theoretical and Experimental Psychological Research (Moscow: Pedagogika, 1986); H. J. Leymets, Group work in class. (Moscow: Prosveschenie, 1975); D. B. Elkonin, Psychology of teaching junior schoolchildren (Moscow: Znanie, 1974); A. L. Venger and G. A. Zuckerman, Psychological examination of junior schoolchildren (Moscow: VLADOS-PRESS, 2007) y G. A. Zuckerman, Types of Communication in Training (Tomsk: Peleng, 1993).

⁶ I. S. Alekseeva and V.V. Grigorieva, "Designing the process of development of the educational abilities of younger schoolchildren in a group of the prolonged day". Azimuth of Scientific Research: Pedagogy and Psychology, num 4 Vol: 29 (2019): 22-25.

⁷ V. V. Davydov, Problems of Developmental Education: The Experience of Theoretical and Experimental Psychological Research. (Moscow: Pedagogika, 1986).

The ways of creating training groups can be different according to the desire of creators. They can be formed randomly, according to the desire of the teacher or at the choice of the "leader". Numerous studies of pedagogical psychology and experience of practicing teachers suggest that it is impossible to allow arbitrary arrangement of groups of pupils sitting at one or neighboring desks. Groups formation should take account of the subject specifics. With such subjects as Mathematics, the Russian language it is advisable to create groups of pupils of about the same level of knowledge. The academic level within the primary stage of Natural science education has no fundamental importance. Joint fulfillment of tasks by a group, consisting of weaker and stronger pupils, may cause some problems for teachers. With such an arrangement of groups, the role of a leader will initially belong to a strong student, who will predominantly fulfil the task. And other students can use the results of the work of more efficient classmates. In this case, the role of a teacher increases, because he/she should strive to create equal cooperation between the participants on the basis of dialogical interaction. For example, they may appoint as a leader a weak student, who will speak on behalf of the entire group.

Yu.N. Kulyutkin⁸ considers that a group shows higher efficiency of joint activity if we take into account the character of interpersonal relations of pupils.

Group activity requires a teacher to work out an elaborate system of actions, both at the phase of preparation of group tasks, and at the lessons themselves in the process of their organization. Group tasks are compiled exclusively for a joint search of a solution, which only a group can cope with for a limited time. The structure of a task should be such that it could be divided into "subtasks", the implementation of which is distributed to all the members of the group. It is important for teachers to think over in advance all the details of the upcoming work, to imagine their own activities and the activities of pupils in group work⁹.

The teacher monitors the work of the groups. The organization of group activities changes the position of a teacher in the educational process, as he/she becomes an organizer of communicative activities of children. At the elementary school age, the development of communication begins with the formation of children's readiness to be engaged in the activities of their class. Pupils should learn to express their thoughts, based on their personal social experience, clearly and specifically. Only after that there are consolidated skills of communicative cooperation of children, such as conversational skills, interactivity skills, work in pairs and in groups, participation in the protection of the project tasks result.

The programmatic content of each subject at the primary level of education reveals certain opportunities for the development of communicative abilities of pupils in case of the optimal way of organization of educational activities. It is especially important to organize group work at the lessons in such a way, that initiatives of pupils, their ability to defend their point of view, to find a solution in certain situations should develop through the joint work. However, the importance of such an organization is underestimated in the practice of primary education, and group work is often not embodied in the process of acquiring learning competences, including communicative ones.

⁸ Yu. N. Kulyutkin, Psychology of adult education (Moscow: Prosveschenie, 1985).

⁹ D. Burgess, Learning as an adventure: how to make lessons interesting and fun (Moscow: Alpina Publisher, 2017).

The course of Natural science should reflect two interlocking paths of development of communicative skills: the practice of speaking and the formation of a set of skills, which are based on the experience of effective interaction.

For the efficiency of the formation and development of skills for working in a group (team) among younger schoolchildren within the framework of educational group work organization at Natural science lessons, we worked out the following pedagogical conditions:

- implementation of practices and methods, that provide cognitive motivation of pupils and encourage active discussion of a task;
- involvement of learners into reflexive assessment of their social and communicative experience.

To implement these pedagogical conditions, we developed and tested a system of tasks for a group form of work in the process of teaching Natural science to younger children within the framework of the educational methodic complex "The Outlook" for the 2nd year school children.

To prepare young pupils for group work we first of all organized the work in pairs. At this stage it was important to develop the children's ability to negotiate and communicate. Through the work in pairs while considering new material, revising the obtained knowledge, its consolidation and monitoring, that is at any phase of the lesson, we brought the children to the discussion. To discuss means to talk points, to ask each other questions, to express one's opinion, to check each other.

For a smooth transition from the work in pairs to the group work at Natural science lessons we used the method "Snow Ball" – work in a group, which begins with the solution of an individual task. This was followed by the work in pairs. At this last phase, the groups did not discuss the solutions but reported on their work¹⁰. At the lesson "How do different animals prepare for the winter to come" we organized the group work according to the method "A hunt for treasures". The children had to answer the question about different animals' preparations for hibernation: "What animals change wool cover?", "What animals do stocks winter supplies?", "How do reptiles and amphibians get ready for winter?", and «Who flies away to warm territories»? The children were able to use their textbook, additional literature and apply to the resources of the Internet. Preparation of answers was accompanied by heated discussions within the groups, almost immediately there were leaders who shared responsibilities - who would look for the necessary information in the textbook, who - on the Internet, who would write, who would read. Many children remembered their personal experience connected with the topic of the conversation. Someone needed an encyclopedia. Some pupils got read fairy tales. Others gave examples from cartoons. At the end of the task, each group read out its answer, then assessed their own activity and the activities of other groups. At the lesson "Be healthy" pupils were asked to answer a problem question: "What should be done to be healthy?" To solve the problem, we organized group work, where each group had to make its own list of actions to promote and preserve health. At the lesson "Our spaceship Earth" we applied the method "Basket of ideas". Each group after a preliminary discussion expressed its assumptions on the theme "Earth is...".

¹⁰ A. A. Pleshakov, The world around us. The 2nd grade, Part 1 (Moscow: Prosveschenie, 2017).

The method "Round-table discussion" was used at the lesson "The Calendar is the Time Keeper and Memory Guard". We suggested the pupils defining in turn, what calendar meant to them. Other methods and techniques such as "Puzzle", "Group discussion", «Catch a mistake", "Bus stop", "Zigzag", "Conflict", "Recognize me" also afforded the development of children's ability to hear other people, to formulate their statements, to distribute responsibilities among themselves, to negotiate with each other, to evaluate the work of their group. While applying the method "Catch a mistake" the children got texts in which they had to correct semantic mistakes. After completing the task, the groups checked each other's works and assessed them according to the assigned by the teacher criteria.

The methodology of the "Puzzle" technique presupposes the distribution of the whole theme between some groups of students. All the groups also receive a list of necessary sources or the training materials, with which they learn the basics of the proposed part of the topic. Having studied the sources or having fulfilled the task, the children in groups are rearranged in such a way that each new group comprised 1 person from each previous group. Each member of the new group explains to his/her new colleagues their part of the topic, the basis of which they learned in the previous group and answers questions. In the end, the groups should draw general conclusions. Performing the task by the method of "Zigzag" involves dividing into groups of 4-5 pupils to work on the training material, which is split into fragments. Then the children studying the same problem, but being in different groups, meet and exchange information as experts on this issue. This is called "Meeting of experts". Then they return to their groups and teach everything they have learned from the members of other groups. Taking turns they also describe their own role in the mission. Using the methodical technique "Recognize me" under the topic "Spring in the world of insects" contributed to the development of skills to formulate their thoughts in written and verbal form, to listen and understand the speech of others. Each group chose one insect and had to think of some clues and the other group guessed¹¹. Work on the method "Bus stop" involves the distribution of groups between bus stops. We put a sheet of a large format with the questions according to the theme at each bus stop (on a table). The groups' mission was to write down on the sheet the main ideas relevant to the question. Then, according to our command, the groups moved clockwise to the next bus stop and got acquainted with the existing records, and if necessary, supplemented them within 3 minutes. Then there was the next transition to a new bus stop and another 3 minutes to read, discuss and add their records. The group, returning to its first stop, during 3 minutes got acquainted with all the records and defined a group member who would represent the material. In conclusion, the teacher had to summarize what had been said by all the groups and, if necessary, to make corrections and summarize the results of the work. The organization of group work with the use of these methods and techniques in its motivational orientation is similar to the game activity, which facilitated the learning process and contributed to the formation and development of the following communication skills of elementary school children: the ability to interact, cooperate and express their attitude; the ability to take into account the situation and the opinions of other participants; the ability to justify their point of view; the ability to evaluate themselves and their friends; to recognize the feelings of others and one's own emotions; the ability to express thoughts by verbal and non-verbal means. Even the most timid and anxious children overcame their fears associated with the mastering the lesson material. It is important to conduct an individual research and exchange ideas to ensure continued

¹¹ A. A. Pleshakov, The world around us. The 2nd grade, Part 2 (Moscow: Prosveschenie, 2017).

motivation of elementary school children to achieve educational success in joint activities. At first, everyone thinks and acts independently. Then there is an exchange of views and a general reflection on the problems under solution. The teacher shouldn't compel pupils to work together, require absolute silence, and punish a child by the deprivation of the right to participate in joint work. Informative and methodological supply of the process of formation of communicative skills of pupils in group activities at the Natural science lessons relied on a phased work. We will reveal these phases of our work. The group work started with making assumptions and expressing points of view by each participant. It is quite difficult for children of the 2nd grade to have a discussion alongside with the selection of ideas. Therefore, at this stage it was important to teach children to be patient and respectful for someone else's point of view and to fix on a piece of paper all the assumptions. The next stage of the mutual work was dedicated to the discussion of the suggested ideas. For a competent discussion, we tried to instill into pupils the ability to listen, to observe a certain order of discussion, to argue their consent or disagreement.

At the third phase of group work, children had to develop a group decision. This solution emerged in the process of critical discussion of the proposed educational problem solutions and the choice of the general and the most optimal solution for the group. The group was preparing to justify their choice. Our pedagogical observation has shown that it is quite difficult for young pupils to find a unified solution because there are often children who do not agree with the majority in the group in groups solved task-oriented problems, it was important for us to bring them to a unified way of solving educational problems (rule, pattern, algorithm, etc.), we tried to give individual pupils the opportunity to put forward all reasoned ideas and present their own opinions. The fourth phase was devoted to the discussion of the group work results. When a representative of each group spoke, we recorded the views of the groups and then discussed them. We asked the following questions to choose the correct solution: "Which of the suggested options do you like more? How is it different from others?" If we wanted to underline the different possibilities of the solution, we put forward the questions: "Why have you come to different conclusions? What was considered to be the most important by the first, second and other groups? And what other options could you suggest?". The fifth phase of group work is a reflexive discussion. Here were asked questions of the following type: "What difficulties did you face in solving the learning tasks? Why was it difficult (easy) to cope with the task?" The work of groups proved to be successful only if some children understood the rules of the discussion and observed the possibility of self-improvement. Purposeful pedagogical work at the formative stage of the experimental work was carried out taking into account the level of manifestation of children's cognitive interests based on their personal social experience and creating a benevolent creative atmosphere in the classroom. Observing the phases of group work, we provided pedagogical support to the formation of subjective position and interaction of pupils in group activities, where every child tried to show initiative, openness, kindness, creativity. So, we can say that group form of work is an efficient way to develop communicative skills while studying the course "Natural science". In group work each child is forced not just to sit in the classroom, but to think, express their opinion. Each group is interested in learning, as the success of the group depends on the personal contribution of each participant, as well as on the mutual solution of the group's learning tasks. To evaluate the effectiveness of the formative stage of the experimental work, there was conducted a checking experiment with the application of the same methods (with some changes in questions or tasks) that were used at the ascertaining stage. In order to identify the obtained results at the checking stage, there were set the following tasks:

- to diagnose once again the formation of the ability of younger children to work in a group and compare research results;
- to identify the dynamics of the formation of the ability of younger children to work in a group (team).

Comparative results of the ascertaining and checking stages of the experimental work are presented in table 2.

Levels of skills for working in groups	The results of the experimental group (in %)		The results of the checking group (in %)	
	Ascertaining stage	Checking stage	Ascertaining stage	Checking stage
Low	50	21,4	46,1	42,3
Average	32,1	32,2	38,5	30,7
High	17,9	46,4	15,4	27

Table 2

Comparative analysis of the results of diagnostic studies of the formation in primary school children of the ability to work in a group (in %)

Conclusion

The effectiveness of the formation and development of primary school children's skills for working in a group is ensured by creating the necessary pedagogical conditions, where the main ones are: a) development of cognitive situational tasks for group work with the acquisition of modern teaching methods and techniques; b) continuous motivation of younger students to achieve educational success in joint activities by taking into account the general development of children, their mastering of the subject, as well as the initial degree of cooperation skills y c) substantive and methodological support of the process of formation and development of skills for working in a group (team), providing for the phased organization of younger students' group work. The results of our study prove that systematic organization of group work with younger students in the process of teaching Natural science creates favorable conditions for active and productive communication. A well-thought-out group form of work encourages research, manifestation of initiative and creativity, the formation of communicative personality traits, the ability to evaluate various points of view, and find compromises. The ability to cooperate, establish favorable interpersonal relations, the ability to build their activities taking into account the positions of others, to form communication, ensuring the implementation of the processes of distribution, exchange and mutual understanding, the ability to evaluate themselves and companions – all these begins with the first years at school during specially organized group activities based on educational cooperation.

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