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**ПСИХОЛОГИЧЕСКАЯ НАУКА  
И ОБРАЗОВАНИЕ**

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**PSYCHOLOGICAL SCIENCE  
AND EDUCATION**

№ **1**

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# **ПСИХОЛОГИЧЕСКАЯ НАУКА И ОБРАЗОВАНИЕ**

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# **PSYCHOLOGICAL SCIENCE AND EDUCATION**

Московский государственный психолого-педагогический университет  
Психологический институт Российской академии образования

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Moscow State University of Psychology & Education  
Psychological Institute of the Russian Academy of Education



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Dear readers!

We are pleased to introduce the first issue of the journal “Psychological Science and Education” in 2022.

The journal consists of two parts. The first part is devoted to the topic of psychology of education. The reader is introduced to two methodologies: the first one — “Puzzle” — allows to study the correlation of social competences development of young schoolchildren; the second one — the methodology on mastering the subjective and methodological competences to identify professional deficits of teachers. The reader can also learn about the modern theories of mechanisms which lay in the basis of dyscalculia; about the facts defining the effectiveness of mastering the symbolic models in a situation of problem-solving; become aware of the results of empirical studies on the value and sense basis of pedagogical activity on behalf of teachers and students of pedagogical classes, and with the results of the project “Adolescents' theatre as an educational technology of upbringing and mastering the personal educational results”.

In the part Psychology of Development, the reader can learn about the diagnostic criteria which help decide on how a child interprets the form of activity offered by an adult in the situation of an intellectual problem and offered help; become aware of the results of empirical verification of theoretical model of subjective prerequisites of psychological well-being of gifted children; study the materials of the reflexive aspect of the perception of each other by the subjects of the conflict; read about the results of the study related to students' mindset and subjective well-being during the period of “Emerging Adulthood” and the relationship between the students' attitude toward distance learning, alienation from studying and emotional burnout.

We hope that each reader can find interesting material in the first issue of the journal “Psychological Science and Education” in 2022.

*The Editorial Board*

# The Influence of Ways of Organizing Learning Interactions on the Development of Communicative and Reflexive Abilities of Children 6—10 Years Old

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The features of the development of communicative and reflexive abilities of children aged 6—10 years, depending on the ways of organizing educational interactions, are discussed. Basic social competencies defined by the requirements of the current Federal State Educational Standard of Primary General Education are considered as indicators of the development of abilities in the learning environment. Based on the selected indicators, a variant of the “Puzzle” diagnostic method has been developed, which allows to study the relationship between the development of social competencies in younger schoolchildren, and the joint way they perform while solving experimental problems. A comparative analysis of students' social competencies allows to prove the influence of ways of organizing educational interactions on the development of communicative and reflexive abilities of primary school children.

**Keywords:** communicative and reflexive abilities, social competencies, joint activity, ways of organizing educational interactions, primary school students, diagnostics.

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# Влияние способов организации учебных взаимодействий на развитие коммуникативно-рефлексивных способностей детей 6—10 лет

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Обсуждаются особенности развития коммуникативно-рефлексивных способностей детей 6—10 лет в зависимости от способов организации учебных взаимодействий. В качестве показателей развития способностей в условиях обучения рассматриваются базовые социальные компетенции, определенные требованиями действующего ФГОС начального общего образования. На основе выделенных показателей разработан вариант методики «Мозаика», позволяющей изучать взаимосвязь развития социальных компетенций у младших школьников в зависимости от совместного способа выполнения ими экспериментальных заданий. Проведен сравнительный анализ социальных компетенций учащихся, обсуждается влияние способов организации учебных взаимодействий на развитие коммуникативно-рефлексивных способностей детей младшего школьного возраста.

**Ключевые слова:** коммуникативно-рефлексивные способности, социальные компетенции, совместная деятельность, способы организации учебных взаимодействий, учащиеся начальной школы, диагностика.

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## Introduction

The assessment of the development of social competencies in our national education system has not been a special task for a long time. However, in the latest edition of the Russian Standard of Primary General

Education there appeared requirements for the formation of meta-subject results of primary education, and the list of meta-subject results included important social competencies. Thus, the Standard requires that a primary school should create conditions for the

comprehensive development of students' abilities. This provision is deeply consistent with the attitudes of the cultural-historical psychological theory of L.S. Vygotsky [1], defining the process of internalization of social experience as the main mechanism of a child's mental development. "The very emergence of a mediated structure of human mental processes is a product of his activity as a social person. Initially social and externally mediated, it only later turns into an individual psychological and internal, preserving in principle a single structure" [3, p. 19]. The results of recent studies confirm that the most important conditions for internal child development are the organization of meaningful child-child and child-adult interactions unfolding in the process of performing joint learning activity [4; 5].

Social meta-subject results, as they are presented in the current Standard of primary education, are both a result and a condition for the development of basic abilities of this age, manifested in situations of social interaction, and cover several different psychological processes.

Firstly, meta-subject results impose requirements on the communicative competence of younger schoolchildren. Communicative competence includes "the active use of language, information and communication technologies as the tools to solve communicative and cognitive problems", "the willingness to listen to the interlocutor in the conversation and conduct a dialogue"; "the willingness to recognize the possibility of the existence of different points of view and the right of everyone to have their own; to express their opinion and to argue their opinion and assessment of events" [7]. Communicative competence is characterized both by communicative means and indicators. Communicative means are used in a joint solution to analyze content, transmit information, evaluate actions and results, and they can be verbal, gestural, material, etc.). Communicative indicators describe dynamic

characteristics of joint activity: the use of the opponent's vocabulary, the development of a "common language", the ability to agree on common designations or techniques, the construction of schemes of joint actions and interactions. These skills allow students to hear and understand each other's speech, grasp the meaning of nonverbal communication and give an adequate response.

Secondly, meta-subject results impose requirements on the ability to organize a joint activity, participate in it and get a group result. In the Russian Standard of Primary General Education, it is formulated as: "defining a common goal and ways to achieve it; the ability to agree on the distribution of functions and roles in joint activities; to exercise mutual control in joint activity" [7]. The above actions are included in the basic set of skills necessary for the implementation of joint learning activity.

Thirdly, meta-subject results impose requirements on the child's behavior in various social situations. They include: "formation of the ability to understand the reasons for the success or failure in learning activity and the ability to act constructively in a situation of failure"; "readiness to resolve conflicts constructively — by taking into account the interests of the parties and cooperation" [7]. These meta-subject results indicate how much children, faced with a conflict situation in the process of joint problem solving, are able to resolve it meaningfully. At the same time, children develop their own opinions, exchange and compare them, analyze the points of view of each other and coordinate them in a common decision.

Any of the presented aspects of mastering social behavior include a reflexive analysis of the social situation as the most important mechanism. Thus, to develop a "common language", it is necessary to link one's vision of a common problem with the other's vision of the same problem and the way to solve it. The organization of a group work requires that each participant determines his position regarding the overall activity plan.



Overcoming cognitive conflict presupposes the ability to see the task from the point of view of other participants, find a contradiction of positions and on this basis propose a way to overcome the conflict situation. In other words, the main social competencies that are to be formed in primary school as a way to effectively solve educational tasks necessarily include a reflexive component.

In preschool childhood, the child's social contacts with peers and adults develop spontaneously. At school, there appears an opportunity to build special forms and types of interaction of children that most effectively ensure the formation of the basics of learning activity among students. However, in the current practice of teaching, most of the educational interactions is determined, regulated, and stimulated by the teacher, and the student must respond to the teacher's initiative in a learned socially acceptable form. In the traditional teacher—student dyad, the child acts as a “guided performer” of an adult's initiatives. It means that the main structural elements of activity — its content and motivation — remain inaccessible to the student, and it means that a child cannot form learning activity in its complete structure. The current system of education does not involve child-child interactions that is another effective developing resource. Students in the classroom with the traditional frontal form of work are only co-present, and their spontaneous attempts to interact and communicate are strictly suppressed. As the main form of interactions at the traditional lesson is a teacher-class interaction, each student has a very small proportion of interactions that also reduces its effectiveness. Thus, the most important psychological mechanisms of child development are not properly used by traditional the pedagogical practice.

In the school of developmental learning (the educational system of D.B. Elkonin—V.V. Davydov [2; 8]), children's interactions are a necessary condition for mastering the

subject and meta-subject content [5]. The teacher specially and purposefully organizes various forms of group activity in which students exchange opinions, actions, control and evaluate each other, correct mistakes of partners.

## Description of the research

### *Hypothesis and goals of research*

We assumed that the teacher's organization of learning interactions in the classroom is a necessary condition for the formation of a set of competencies, which characterize the development of communicative and reflexive abilities of primary school students.

The goal of the research was to evaluate the development of communicative and reflexive abilities of students in schools with different ways of organizing learning interactions.

### *Method and procedure for diagnosing the development of communicative and reflexive abilities.*

To assess the development of communicative and reflexive abilities, we have developed an original version of the “Puzzle” method.

In the new version of the “Puzzle” method, the task for a group of students was to assemble four simple geometric figures from pieces of a colored puzzle. At the same time, specific conditions of the implementation of the joint work make it more complicated.

These difficulties were manifested in the following:

1 — features of the group work organization:

— the puzzle elements were divided between the four participants of the group work in a way that no geometric figure could be composed independently by any participant without using elements from the sets of other partners;

— the puzzle elements were distributed among the participants in a way that to lay down a specific geometric figure, it was necessary to interact with different partners;

— each participant could see only his own set of puzzle pieces (to achieve this, screens were placed between the participants of the group work, limiting the view of the puzzle elements);

— the rules of joint work limited the participants in a way that they were not allowed to show their puzzle elements or “peek” into someone else’s;

— the only available means of organizing a group solution (this was reported in the instruction) was the ability to talk to each other;

— the participants of the group work were not informed which geometric figures they could construct from the elements proposed to them;

— as soon as a couple of participants (or a group of participants) laid out certain puzzle elements on the table, they had the opportunity to see whether the desired geometric figure was being formed, i.e. to evaluate the productivity of their interaction and the effectiveness of a group work.

2 — features of material selection:

— each of the four geometric figures (that needed to be combined in the process of group work) was cut into two parts, these parts were necessarily in the sets of different members of the group;

— in addition to the required eight puzzle elements, participants received the so-called “extra” elements that were not suitable for solving the overall problem due to size or shape; in total, the group was offered 16 puzzle elements (4 for each participant), of which only eight pieces were suitable for solving the problem;

— the elements differed in three features — color, shape and size, and only two features — shape and size — were essential for the solution.

The procedure of the “Puzzle” technique included several stages. Initially, experimental groups were formed. To do this, children sitting in pairs at the desks in a classroom turned to face each other, forming groups

of 4 people each. A conditional “screen” (for example, a book) was placed in front of each participant, and an individual set of puzzle elements was laid out for this “screen” — four pieces of a puzzle of various shapes, colors, and sizes. The participants of the group work could get acquainted with their puzzle elements, consider them.

The experimenter gives the following instruction:

“Each of you has received a set of pieces of a colored puzzle. Examine your pieces so that the neighbors do not see them. Among the pieces, there are parts of simple geometric figures with well-known names. Each of these geometric figures was cut into two parts. You need to find these two suitable parts and put them together to construct a simple geometric figure. There are four such figures in total. You will look for suitable parts without showing your pieces to each other. You can’t peek into other people’s sets or show your pieces to others. Otherwise, the whole group is excluded from the game. You can only talk. Keep in mind that the pieces are divided between you so that no one can compose a whole figure by himself from his own set of pieces. As soon as you find two suitable parts of the figure among the pieces of the puzzle, you shall write down in the form (the presenter shows the form) which figure you are going to compose, and only after that shall you put the selected pieces on the table together and compose the figure (at this point the experimenter takes two triangles and composes a square). Look, here is a square made of two parts, this is a “correct” figure. (Then the experimenter folds a “wrong” figure — for example, a triangle and a semicircle.) These parts do not fit together, you cannot compose a “correct” geometric figure using them. It means that these parts have “burned out” and can no longer be used in the game. All the details you have laid out also cannot be used in the further assembly of the figures. They “burn out”. Therefore, negotiate properly, don’t

hurry. The task for each group is to collect as many figures as possible (preferably, all four figures). After you agree about the pieces, first write down the name of the geometric figure, that you are going to compose, in the form, and only then lay out the details on the table at the same time. Start working, the time has gone!”

During the joint work, the experimenter observed the behavior of the participants and recorded his observations in a special form.

The Puzzle technique is designed for 20 minutes of a children group work.

The material of the Puzzle technique includes:

- sets of puzzle elements — 4 elements for each participant, a total of 16 elements;
- “screens”;
- forms for participants to record the geometric figures that the group is going to compose (one for each group of children);
- a form for monitoring the process and results of children’s work — one for each group (for the experimenter).

In general, the Puzzle technique models the situation of joint problem solving and thus actualizes the basic reflexive and communicative competencies of the participants. Firstly, direct communication of participants becomes the main means of solution (as we mentioned above, the conditions of the Puzzle technique limit the possibility of using other means in the process of solving). Secondly, at each step of the joint work (i.e. composing each of the geometric figures), each participant needs to determine with whom he should interact and how to organize this interaction to get the overall result — to compose the desired figure. Thirdly, the procedure allows participants to receive a feedback on the effectiveness of their joint actions right at the moment of their execution (either the desired figure is composed, or the details are “burn out” and remain on the table, excluded from the sets of details for the next steps of joint work, but available for general viewing). Thus, in the

course of the work, the participants found themselves in a situation of success and failure, as well as conflict and mutual misunderstanding.

Once again, let’s pay attention to a number of significant features of our diagnostic procedure.

1. The main requirement for the diagnostic procedure was to create experimental conditions that force the participants of joint work to address each other and interact with each other. That’s why the elements for constructing geometric figures were distributed among the participants in a way that no one of the group members could fulfill the task independently, without involving other children’s participation.

2. The task proposed for the group solution was quite simple. The subject of our study was the ability to build effective group interaction. So, the result of the joint work was to be determined precisely by the implementation of the communicative, interactive, and reflexive means of problem solving, and not by the complexity of the task.

3. The Puzzle method allowed not only to state the presence or absence of interactions but also to determine and describe their effectiveness, analyze the features of interactions development in the process of joint problem solving. Therefore, the task allowed the children to have several attempts to solve it. It means that they had the opportunity to assess the correctness of the hypothesis or effectiveness of the strategy during the joint work itself, and not only after its completion. In addition, the Puzzle procedure was developed in a way that artificially hindered the possibility of a direct solution and required the development of a group strategy, hypotheses, and meaningful communication. Thirdly, we used the means of “concealing” essential features, which were introduced into the material itself. These “concealing” means to include both insignificant additional features (that is color in our procedure) and very similar characteristics

of “suitable” and “unsuitable” puzzle elements (size and shape).

Thus, despite the external simplicity of the task, its solution required building special reflexive interactions, “seeing” the elements of partners and identifying them as “suitable” or “unsuitable” according to the features that are revealed in the process of group communication. In some groups, it was the reflexive position that determined the style of communication itself. For example, a group member, instead of describing the features of his puzzle element, requested about the element he “lacks” to compose the figure. It means that he proposed a hypothesis about the possible overall result, and managed to describe specific characteristics of the element of someone from the partners which is necessary to compose the geometric figure.

#### *A sample of subjects.*

The study involved students of the 4th grade- of three Moscow schools. Students of the 4th grades of the school that implements the program of developmental education of D.B. Elkonin-V.V. Davydov (a total of 78 groups, 312 people) form Sample 1. It’s Moscow school No. 91, in which the program of developmental education of D.B. Elkonin-V.V. Davydov has been developed for many years. This program includes the practice of using specially developed subject content that is focused on the development of the foundations of theoretical thinking among students, and special forms of organization of the educational process, including various types of a group work and meaningful interactions between students and teachers, students themselves in the process of solving learning problems. The original version of the Puzzle technique was used to diagnose reflexive and communicative competencies in 2021. Further, the results obtained were statistically correlated with data from another version of the method (2019, 2017, 2016, 2014, and 2012). According to a number of indicators, the results of the statistical analy-

sis made it possible to combine samples from 2021 and previous diagnostic years. Therefore, the results of the full sample were used in the further analysis.

Sample 2 consisted of students of the 4th grades of two schools who implement in the learning process the established ways of organizing educational interactions in the classroom (a total of 48 groups, 192 students). The article presents diagnostic data on the development of social competencies of primary school students obtained in 2021.

#### *Analysis of the results*

We used several indicators while analyzing the results.

1. The main indicator is *the correctness of the group solution*. The correctness of the group solution was determined by the number of correctly assembled geometric figures. The maximum is four figures — a circle, a square, a hexagon, a triangle (instead of a hexagon, children sometimes compose a parallelogram from the same elements).

2. The additional indicator is *a strategy of a group solution*. The following data were used to analyze the group solution strategy:

*The number of attempts.* The analysis of the results showed that the groups choosing different strategies performed a different number of trials. So, there were groups that laid out the figures until they used all the elements of the puzzle. This strategy indicates that in the process of joint work these children did not analyze their mistakes, i.e. the content of reflection was limited to developing an interaction strategy and was not aimed at solving the task assigned to the group itself. If the group was focused on the content of the task, then the participants “work on errors” after each attempt to compose a figure. Sometimes, in the process of this “work on errors”, one of the participants took out a piece of the puzzle and laid it on the table as “burnt out”. This action simplified further collaboration and allowed all group

members to analyze which feature was not taken into account or correctly described. There are groups that, departing from the original instructions, tried to collect not geometric figures, but some object images, for example, “mushroom” or “boat”. They composed 2 pieces of the puzzle (sometimes 3 or 4 puzzle elements), saw the result, and attributed some subject name to it, entering it into the protocol. Such substitution of the assigned task for a simpler one in the process of joint problem solving indicates a low level of development of group reflection.

*The number of geometric figures.* Comparing the “number of attempts” with the “number of geometric figures” indicated the effectiveness of the group work strategy. If the number of the attempts is greater, then the strategy is less effective, because it includes a lot of unnecessary unproductive proposals. If the number of attempts coincides with the number of figures, it means that the group is focused on the task, fulfils the instruction and is concentrated on the process of content communication.

*The sequence of composing geometric figures.* The analysis of the features of joint work on effective and ineffective groups showed that there are figures easier to identify in the conditions that are set by our method, and more complex figures. So, the easiest to recognize is a circle. In order to assemble this geometric figure correctly, one participant needs to describe correctly the size of the sector cut from the whole circle (there are 3 sectors of different sizes in the puzzle set), and the other participant — the size of the missing part of the circle. Even if the group who started its work with the assembly of the circle chose the wrong pieces of the puzzle (for example, a sector larger than the cutout in the circle), then the group could easily learn to assemble other figures on the basis of the analysis of this mistake. If the group started working with a triangle or a hexagon, then it turned out to be more difficult for the participants to detect significant

and insignificant signs on these elements, to create a general way of describing the pieces of the puzzle.

*Characteristics of communication in the process of the group work.* The Puzzle method proposes meaningful communication as a necessary means to solve the joint task. The material used in the Puzzle method (pieces of geometric figures) was chosen in a way that there were no ready-made designations for most elements of the puzzle in the language. That’s why we had an opportunity to observe the real process of building some artificial “common language”. Firstly, each participant had to master the way of describing the elements that were presented in his set, and secondly, he had to agree with others about the method of describing itself. Even if one participant came up with the “right” way to describe the elements, but others did not understand it, they could not compose the required figure. Therefore, each group had its own special way of communication, used its original means, built interaction in different ways due to the reflexive organization of the communicative process.

The following *indicators of communication* in the process of the joint work were used:

— the number of participants of the discussion while assembling geometric figures (often the number of participants at the beginning of the collaboration and at its end, as a rule, differs);

— the presence of a clear leader at the beginning and at the end of the joint work;

— various means of communication (despite the prohibition, many groups were looking for additional non-verbal means, for example, they measured their details with a ruler or a finger, described the details in “conventional units”, etc.). Fixing of these means allowed to describe specific elements of the language developed by a particular group to solve the problem.

The data obtained using the Puzzle method allowed us to evaluate a set of meta-sub-



ject results characterizing various aspects of the formation of socio-reflexive competencies of younger schoolchildren, to evaluate them quantitatively and describe qualitatively.

The evaluation of the group solution was carried out in points. For a correctly assembled geometric figure, the group got 1 point. Thus, the minimum number of points in the Puzzle technique is 0, and the maximum is 4. Statistical data analysis was carried out. The samples were compared by means of averages, standard deviations and the percentage of the maximum score.

According to the data obtained, sample 1 significantly differs from sample 2 in the number of correctly assembled figures (Mann-Whitney U-test =179,  $p<0.01$ ). And sample 1 significantly differs from sample 2 in the number of attempts to assemble a geometric figure (Mann-Whitney U-test =179,  $p<0.05$ ). As a result, we made the following conclusions about the influence of ways of organizing educational interactions on the development of reflexive and communicative abilities of children 6-10 years old:

1. In the school of developmental education that implements the educational system of D.B. Elkonin—V.V. Davydov (sample 1), we see a more pronounced tendency to search for a joint solution to the task. The students made more attempts to compose a geometric figure from the elements offered to them, than the students from a traditional school. This fact is confirmed by the behavior of the group participants: even after all the elements of the puzzle were laid out on the table (i.e. the students had no more elements left to continue their work), the chil-

dren often stayed and analyzed which figures could be composed, which signs they did not notice or described incorrectly .

2. A smaller number of attempts to compose a geometric figure from a given set of elements in sample 2 could indicate a pronounced reflexive position of the participants if it was accompanied by a group analysis of errors and laying out parts on the table that “burned out” due to an assembly error. However, we didn’t fix a reflexive position of the participants in sample 2. In sample 1, 67% of groups after the failure in composing a geometric figure stopped searching for the following geometric figures and fulfilled the error analysis, that demonstrates their reflexive position. During this reflexive stage of the joint work, either the participant himself (who had not laid out his “correct” element of the desired figure), took it out, or other group members suggested doing it. The content of the group communication indicates that the group works out a joint strategy: “Who has the right piece of the triangle left? Throw it away, now you don’t need it.” Thus, the analysis of an error in the process of completing a task is the most important indicator of the formed reflexive position of the joint work participants.

3. In a school implementing a developmental learning program (sample 1), students follow the instruction better and organize their activity according to it. Throughout the work, they searched for the correct geometric figures. It is probed by the fact that the difference between the number of attempts and the number of geometric shapes is insignificant. Students of the traditional school (sample 2), in turn, often moved from the search

Table 1

**Quantitative Data on the Implementation of the Diagnostic Technique “Puzzle” in Two Samples of Subjects**

Sampling	Number of attempts	Number of geometric figures	Number of correctly composed figures
Sample 1 (78 groups)	5,3	5,2	2,10
Sample 2 (48 groups)	4,35	3,62	1,06

for geometric figures to the search for shapes in general. In the protocols of groups from sample 2 we can find “a house with a pipe”, “a Christmas tree”, “a boat”, just a “figure”, etc. Thus, by acting together, the participants from sample 1 held the task throughout the entire solution process, and the participants from sample 2 “substituted” the task with a simpler one during the solution process. It allowed them to consider themselves successful in a situation when they actually did not solve the problem. This fact is also confirmed by the behavior of most groups of sample 2. After the end of the experiment, they enthusiastically informed classmates (participants of other groups) that they had composed many different figures. Thus, social success for them turned out to be much more important than the actual success in solving a joint problem. Consequently, the students from sample 2 had significant difficulties in case when the content of the reflexive analysis was not only the subject content of the task, but at the same time the way and means of interaction.

4. In sample 1 there were more correct decisions than in sample 2. On average, students of the school of developmental learning (sample 1) correctly assembled two geometric figures out of four possible ones. In schools with a traditional way of organizing educational interactions (sample 2), the average result is one figure. It means that students of the school of developmental learning built a more productive strategy of the joint problem solving. Productive strategy means that the content of reflexive actions is both a common problem and a way to coordinate individual actions in the process of solving it.

We will specifically consider the distribution of points within each sample of subjects.

Table 2 shows the data on the quantitative distribution of the groups that received from 0 to 4 points in the “Puzzle” method.

The data given in Table 2 allows us to draw the following conclusions:

- In the school of developmental learning (sample 1), most groups collect two geometric figures, that means that in the process of searching for solutions and analyzing failures, they find an effective method of interaction. This method allows the group in the conditions of searching for an uncertain overall result to build an effective solution strategy. Using this strategy participants of the joint work correlate individual elements based on the selection and description of their essential features. It leads to the reconstruction of that common geometric figure, the elements of which each of the group members has. This strategy, in particular, manifests itself in the fact that participants not only describe their elements but also describe what element is needed to compose the intended figure.

- In schools with a traditional way of interaction (sample 2), the largest number of groups either did not make up a single geometric figure at all, or collected one figure (19 and 16 groups, respectively). This means that the participants of the group solution failed to build the strategies for productive interaction, they did not use their mistakes to analyze and highlight the essential features of the puzzle elements, so they repeated an inefficient way of searching for a solution while composing the next figure. In the samples of students from schools with different ways of organizing educational interactions, qualitatively different strategies for the implementation of communicative and reflexive competencies

Table 2

**Distribution of Points in the “Puzzle” Method in Two Samples of Subjects**

Sample	Score 0	Score 1	Score 2	Score 3	Score 4
Sample 1 (78 groups)	5 groups	18 groups	28 groups	18 groups	9 groups
Sample 2 (48 groups)	19 groups	16 groups	6 groups	5 groups	2 groups

in the process of solving a joint problem are presented. Thus, the school of developmental learning by the end of the primary education forms the ability to build productive interaction in accordance with the joint task that is offered to students. The main mechanism for building productive interaction is the discovered ability of participants to reflect the situation, which simultaneously takes into account the purpose of collaboration, resources of participants and means of interaction itself. The most important means for building reflective strategy are the “feedback” (in the course of the joint work the group members see the result, can evaluate it and analyze errors) and the restrictions imposed on individual actions by the conditions of the organization of the joint work.

Thus, our hypothesis was confirmed by the results obtained under the conditions of using the Puzzle technique. In the school of developmental learning, communication and interaction are determined by the conditions of solving the problem. Therefore, in the process of solving a joint problem, based on the analysis of intermediate results (correctness or errors in the assembly of previous geometric figures), new means of communication appear, a “common language” for describing puzzle elements is formed, group tools are developed (they allow to describe individual features of elements more adequately using fingers, a pen, drawing on a table, cells in a notebook, etc.), the solution strategy changes (transition from the description of its element to the description of the “missing” element for the joint assembly of a geometric figure, which seems to be correct to the group members). Thus, the most important function of communication in this case becomes a reflexive function — the attribution of one’s actions and the actions of partners to the content of the task as well as to the method of its

solution which is developed by the group. In sample 2 — a school with a traditional way of organizing children’s interactions — the way of interaction and the content of communication are arranged in groups as separate tasks that are not connected with the content of a joint problem. This conclusion is confirmed by the following features of children’s behavior. Firstly, the problem is often replaced in the course of solution: instead of geometric figures, the groups compose just shapes. Secondly, after the failure in laying out of details, participants don’t fulfil meaningful analysis of the error, and don’t rebuild the method of interaction and content of communication. Thirdly, in the course of the joint work, the participants do not put the elements paired with “burnt” details on the table, i.e. the connection of individual elements in the construction of a common product does not become the content of their reflexive analysis. Fourthly, after the end of the work, the groups do not analyze mistakes, i.e. they don’t try to figure out why their way of interacting turned out to be ineffective. Finally, the subjective assessment of the effectiveness of the group work does not coincide with the objective one: the participants either express a great satisfaction with the very fact of working together and in this case evaluate it as more successful than the actual score, or make claims to each other and look for those to blame for the low result of the joint work. Thus, communication does not perform a reflexive function either in the process of solving a problem or after the completion of the joint work and it leads to poor results in the situation of solving a group task. Additional confirmation of our hypothesis is provided by the data obtained in the process of expert analysis of lessons in schools with different ways of organizing educational interactions [6].

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# Numeracy Skills Disorders: Review of Causes and Neuropsychological Mechanisms of Dyscalculia

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The article presents a review of foreign studies on the numerical difficulties and numerical disorders. The main modern theories of the mechanisms underlying the difficulties and disorders of counting are reflected, various classifications of dyscalculia are compared, and the neuropsychological foundations of the brain organization of counting are analyzed according to foreign scientists. It is noted that in the world of psychological science, the issues of the causes and mechanisms of difficulties and disorders of counting are still insufficiently developed, and the results of empirical researches are contradictory. It is concluded that for further study of dyscalculia it is necessary to analyze the psychological structure of counting and its changes under the influence of learning, taking into account the structural and functional features of the brain organization of quantitative information processing.

**Keywords:** numeracy skills disorder, dyscalculia, mathematical learning difficulties.

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## Нарушения счетных навыков: обзор причин и нейропсихологических механизмов дискалькулии

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Представлен обзор зарубежных исследований, посвященных нарушениям счета. Отражены основные современные теории механизмов, лежащих в основе дискалькулии, сравниваются различные классификации нарушения счетных

навыков, анализируются нейропсихологические основы мозговой организации счета по данным зарубежных ученых. Отмечается, что в мировой психологической науке вопросы причин и механизмов трудностей и нарушений счета еще недостаточно разработаны, а результаты эмпирических исследований являются противоречивыми. Делается вывод, что для дальнейшего изучения дискалькулий необходим анализ психологической структуры счета и ее изменений под влиянием обучения с учетом структурно-функциональных особенностей мозговой организации процессов переработки количественной информации.

**Ключевые слова:** нарушения счетных навыков, дискалькулия, трудности обучения математике.

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## Introduction

At various times many Russian and foreign scientists (V.A. Krutetsky, P.Ya. Galperin, V.V. Davydov, N. I. Nepomnyashchaya, J. Piaget, E. Thorndike, etc.) paid attention to the problem of mathematical abilities and searched for the most effective methods for helping children to master the elementary course of mathematics. An important place in the scientific literature on pedagogy, psychology, speech therapy and special education is occupied by the studies of numerical skills disorders and ways of their remediation (T.V. Akhutina, N.M. Polonskaya, A. Germakovskaya, R.I. Lalaeva, G. Kapustina et al.), as well as by the studies of computational skills disintegration resulting from local brain lesions and of restorative learning (A. Luria, L.S. Tsvetkova, M.G. Khrakovskaya, etc.).

Despite the fact that the researches on numerical skills and their disorders occupy an important place in neuropsychology, the results obtained cannot be called exhaustive and there are several reasons for this. On the one hand, subtests involving numeracy skills are included in almost all neuropsychological batteries and tests of intellectual abilities. On the other hand, there are much fewer neuropsychological studies specifically focused on arithmetical operations and their disorders as compared

to the studies of reading disorders despite the approximately similar severity of the effect on functioning during life span [5; 9; 24; 26]. At the same time, even fewer studies pay sufficient attention to the psychological structure of the numerical skills in connection with the solution of the question of the brain substrate of arithmetical operations. L.S. Vygotsky also noted that the problem of localization involves solving the question of the ratio of structural and functional units of the brain and insisted on the importance of understanding what is to localize in order to clarify the nature of localization [1]. The vast body of the Russian literature on the problem of numerical disorders was published in the middle or end of the last century, while modern Russian studies are represented by a very limited set of articles that pay relatively little attention to the brain mechanisms of the numerical information processing and the mechanisms of math disorders (Rysina N.N., Gribanov A.V., O.V. Stepkova, L.V. Selkina, Yu.V. Krasilnikova, S.U. Kondratiev, Tikhomirova T.N., Malykh S.B., etc.). That is why it seems important to us to present an overview of modern, mainly foreign studies devoted to the classification of dyscalculia, the causes and mechanisms of impaired acquisition of numerical skills and the brain organization of numerical information processing in general. Understanding

the causes of difficulties in forming basic mathematical skills in children, such as the concept of numbers and the four basic arithmetic operations, as well as identifying the types and kinds of difficulties that can be detected in children when mastering the numerical skills, is important both for early identification of children at risk of developing dyscalculia and for the development of intervention programs to overcome the difficulties that have already arisen.

### **Neuropsychological analysis of the cerebral mechanisms of arithmetical operations**

The numerical skills are a multi-component functional system based on an extensive chain with a large number of links [2; 5; 9]. It is often disturbed both in focal and diffuse brain lesions of various localization, for example, in diffuse axonal injuries resulted from traumatic brain injuries in children [26].

At the initial stage of research, the definition of the brain substrate for arithmetical operations was based mainly on observations of neurological and neurosurgical patients [2; 5]. Based on the data of brain pathology, scientists around the world associated the processing of numerical information primarily with the parietal lobes of the cerebral cortex. This picture is also generally confirmed by the methods of modern radiology. Studies conducted using neuroimaging methods indicate unambiguous involvement of the post parietal regions in the numerical information processing and arithmetical operations, mainly the intraparietal sulcus, angular gyrus and supramarginal gyrus, which is part of the inferior parietal lobule. In addition, the processes of arithmetical operations and calculating involve the prefrontal, occipitotemporal areas of the brain and the hippocampal region [9; 24].

With the expansion of the methodological possibilities of studying the brain organization of counting, primarily due to the methods of EEG, fMRI, PET and other modern technologies, a large number of studies of children with dyscalculia or, more broadly,

with mathematical disorders (MD) was added to the traditional studies involving neurosurgical patients [28], as well as healthy adults [19]. Until recently, the majority of studies of this kind have focused on exploring the differences in the structure of gray matter [3; 13; 28]. And only in the last few years scientists have begun to pay attention to the problem of intracerebral connections, and there are studies, including longitudinal ones, concerned with differences in white matter of the brain in children with MD and in typically developing peers [23; 24].

Modern studies using neuroimaging emphasize the connections going from the parietal lobes to the left frontal lobes in the case of presenting the subject with more complex tasks [9]. In Russian neuropsychology, the connections between mathematical abilities, including the ability to proceed with arithmetical operations and solve problems, with the frontal lobes of the brain have already been obtained on the basis of local brain lesions [2], and modern studies of brain processes using neuroimaging technologies have only once again confirmed the findings of our scientists.

An important discovery of modern neuroimaging research is the objective confirmation of the fact that the organization of brain networks involved in performing arithmetic operations is dynamic, heterochronous, and the areas of brain activity responsible for performing mathematical tasks shift from one neural subsystem to another as learning progresses. Thus, in a groundbreaking study by Rivera and co-authors, healthy right-handed participants (children from 8 years old and adults) were asked to determine whether the arithmetic calculations presented to them were correct. In adult participants carrying out calculations in their heads, there was greater activity of the left parietal cortex, including the supramarginal gyrus and the anterior part of the intraparietal sulcus adjacent to these areas, together with the lateral sections of the occipitotemporal cortex. In children, the activation pattern was significantly different. Thus, they showed greater activity in the prefrontal cortex and

anterior cingulate cortex. The authors of the study explain this activation pattern by the fact that children needed more attention resources and working memory to achieve the same productivity of calculations in the mind as adults. The fact that the younger participants had greater activation of the hippocampus and dorsal basal ganglia zones as compared to the older ones was connected by researchers with the fact that young participants rely more on the resources of both declarative and procedural memory in the process of calculations [27]. That is, there is a certain pattern of development in the organization of brain connections as a person masters the numerical skills which changes with age and competence of the actor. As more and more competence in calculations is acquired, the focus of activity shifts from the frontal lobes and medial temporal lobes to the parietal and occipitotemporal divisions, showing a comparative decrease in the need for working memory resources to perform the necessary calculations as the process is automated and symbolic designations are mastered, greatly facilitating work with mathematical information [4]. These data could be generalized more broadly to show that in the study of the brain organization of numerical skills, it is legitimate to separate the already obtained arithmetic facts and the use of newly acquired math knowledge, since in the process of calculations in the first case, the left angular gyrus is more activated (when extracting facts from memory), and in the latter case, the frontal lobes and the interstitial furrow is more activated [16; 18].

The key point is that almost all math or numerical processes are directly related to the parietal lobe of the brain, especially the intraparietal sulcus, and to their connections with the left frontal lobe, which suggests that these areas are the most important for processing numerical information and performing arithmetical operations.

### **Causes of dyscalculia**

Despite the fact that performing calculations and other mathematical tasks involves

the same brain areas, different researchers interpret these connections and their functional orientation differently, trying to identify one or more fundamental deficits that lead to mathematical difficulties. Accordingly, they distinguish different types of dyscalculia based on the alleged cause of mathematical difficulties.

Some researchers believe that the basis of the mathematical difficulties is a specific, often innate, 'core' deficit associated with a disturbance of processing information about quantity in the brain. Others are of the opinion that in addition to specific problems with the representation of quantity, calculations difficulties are also associated with disturbances of such processes as visual-spatial information processing, the ability to reject irrelevant stimuli and defects in working memory. Still, others find it more correct to speak not about a single deficit specific to mathematical difficulties, but rather about several areas of the brain specific to numerical skills. Let's take a closer look at each of their concepts.

The recently widely used model of the "triple code" processing of numerical information (The Triple Code model), first proposed by Dehaene in 1992 [14], designates three important domains responsible for mathematics. These include the numerical representation of quantity (which can include the "number sense" associated with the activation of the intraparietal sulcus), visual-spatial numerical representations (posterior upper-parietal regions) and auditory-verbal representations (extraction of mathematical information from memory) associated with the angular gyrus and areas near the Sylvian sulcus.

Another theory of the origin of arithmetical operation disorders currently widespread in Western neuropsychology is the theory of damage to the system in the brain responsible for the ideas of quantity (magnitude representation theory), according to which the relationship between a numeric symbol and the quantity that this symbol represents is disrupted or not developed in a dyscalculic person [9; 31].

The cerebral substrate of magnitude representation is considered to be the region of the intraparietal sulcus [9]. Now there is a large amount of data in the literature that the intraparietal sulcus is responsible for representations of the quantitative value (magnitude) of a numeric symbol [15; 25], equally as an analog value or as a discrete representation that encodes the number of elements in the set. This is proved by the activation of the zone of the intraparietal sulcus during the processing of information about the number of objects in the set [12]. Moreover, when the functioning of the intraparietal sulcus is disrupted by magnetic stimulation, the ability to evaluate discrete quantities is affected [11; 20].

Patterns of brain activity in 4-year-old children and adults show the involvement of areas in the parietal lobes of both hemispheres in response to changes in the number [10].

The fact that the intraparietal sulcus is involved in both simple and complex calculations is interpreted by representatives of this theory as confirmation of the fact that the basic idea of quantity is always involved, even with a simple extraction from memory of well-acquired knowledge about the addition and subtraction of numbers within a dozen [34]. According to the magnitude representation theory proponents who suggest the ability to represent of quantity to be the most important marker of the ability to calculate, this is consistent with the well-known “problem size effect”, in which solving arithmetical tasks within a dozen takes the longer time the greater the value of the number was involved, even if these are well-known arithmetical operations [33]. Thus, researchers who are adherents of this theory assume that typically developing people, even when extracting mathematical facts from memory, cannot but simultaneously use their knowledge about the composition of a number (number bonds). If such a connection has not been established, the ability to perform arithmetical operations is necessarily damaged [9]. This interpretation is confirmed

by the activation of the intraparietal sulcus, which is associated with the magnitude representation, when arithmetical operations are performed [9].

Adherents of the magnitude representation theory talk about several mechanisms, or deficits, in the representation of quantity, which lead to difficulties in performing arithmetical operations. The so-called theory of the approximate number system (ANS) is being developed. According to this theory, there is a special mechanism in the brain that allows you to quickly compare several sets (for example, in tasks about where there are more points — on the right or on the left). It is this mechanism that is disrupted in people with dyscalculia. Also, people with mathematical disorders have a decreased ability to estimate the number of elements in small sets roughly, “by eye” (the so-called “subitizing”). Normally, people can say without counting how many dots they were presented with if the number of the stimuli presented is less than 3 or 5. This ability is severely damaged in people with dyscalculia. It is interesting that all these abilities are associated with the activity of the intraparietal sulcus, and the activation of the intraparietal sulcus during neuroimaging studies with participants involved in performing arithmetical operations is considered by adherents of this theory as confirmation of its validity.

However, it is noted in the literature that the intraparietal sulcus can be associated not only with the magnitude representation. This allows the development of theories explaining the origin of dyscalculia by other causes. Thus, a number of researchers associate dyscalculia with visual-spatial functions, in particular, visual-spatial working memory and problems of inhibition of irrelevant stimuli (inhibitory control), which are also associated with the cerebral cortex, including the intraparietal sulcus [31].

Thus, Szucs et al. concluded after their study that the magnitude representation theory was not confirmed. Instead, it was argued that the central problem in dyscalculia



culia sufferers is disruption of visual-spatial immediate and working memory, as well as inhibition control impairment with impaired ability to suppress interfering influences. It is noted that both of these functions are associated with the functioning of the intraparietal sulcus [31]. Based on the data obtained in their study, scientists put forward a very interesting hypothesis for further verification. They suggest that 'pure' dyscalculia can be characterized by a specific disruption of the visual-spatial short-term memory together with a specific disruption of the processes of inhibition, key to the visual-spatial central executive, which leads to a decrease in working memory. The researchers suggest that an intervention aimed at improving these functions in children with dyscalculia will help shed light on this issue. In conclusion, the researchers express their idea that, apparently, the mechanisms of processing spatial information themselves remain intact in children with dyscalculia, but access to them is slowed down due to memory impairment/inhibition impairment [31].

Interestingly, if this assumption is true, then in order to identify such problems with mathematics in children it will be necessary to develop a more subtle methodological apparatus, since this hypothesis assumes that neither the visual-spatial functions themselves, nor the visual or visual-spatial memory are significantly damaged. The rejection of irrelevant stimuli in other modalities may also be unaffected, or only slightly affected. But there is a deficit at a much more subtle level — these are difficulties in using visual-spatial memory (speed and regularity of access). That is, the ability to work in the mental "space" of short-term visual-spatial memory is damaged in the sense of the possibility of a quick and consistent change of frames (while showing resistance to interfering influences).

It should be noted that in Russian neuropsychology, it was true acalculia (unlike frontal and optical ones) that was associated with a deficit of visual-spatial repre-

sentations and occipital-parietal areas of the cerebral cortex [2]. Having considered the mechanisms underlying the arithmetical operations disorders, let us consider the types of dyscalculia most often identified in the literature.

### Dyscalculia classification

There are many classifications of counting difficulties in foreign literature, especially in relation to children's dyscalculia.

Kosc [22] describes six types of dyscalculia characterized by the following disorders: ability to verbalize mathematical terms and connections (1); ability to manipulate symbols/mathematical objects (2); ability to read numbers (3); ability to write numbers (4); ability to understand mathematical ideas (5); ability to perform mathematical operations (6).

Badian [6] found that dyscalculia sufferers often have spatial difficulties associated with numbers, primary anarithmia (primary difficulties in performing arithmetical operations), defects in attention and serial organization, but quite rarely dyslexia and dysgraphia when reading and writing numbers.

Geary [17], having analyzed studies on both developmental dyscalculia and acquired deficits in the field of arithmetical skills, based his classification of arithmetical operations disorders on the type of errors. He identified three types of dyscalculia. The first type, according to this classification, includes disorders characterized by difficulty in retrieving arithmetical facts from memory, including difficulties in remembering tabular values (such as the multiplication table). Moreover, he pointed out that children belonging to this type are also more likely to suffer from comorbid reading disorders (1). The second type includes difficulties of a procedural nature, such as the inability or difficulty in mastering the techniques of arithmetic operations, such as, for example, knowledge of the possibility of 'exchanging' units when using column subtracting or strategies used in addition (2). The third

type includes counting disorders associated with difficulties in understanding and using visual-spatial relations to represent and interpret numerical information (3). The first two types of dyscalculia correlate with dysfunctions or lesions of the posterior cortical parts of the left hemisphere or subcortical structures, and the last type is associated with disorders of the posterior parts of the right hemisphere [17].

Rourke [29] distinguished between two types of developmental dyscalculia: 1) dyscalculia associated with speech problems (dyslexia), impaired understanding of instructions and verbal tasks and with a reduced amount of verbal memory (left hemisphere); 2) dyscalculia associated with spatio-temporal difficulties with disruptions of order and rearrangement of numbers (right hemisphere).

Karagiannakis [21; 30] (2014) identified four types of dyscalculia. The first type involves dyscalculia resulting from a presumed damage in systems of internal magnitude representation, such as the approximate number system (ANS), object tracking system (OTS), symbolic representation, encoding of numerical information. The second type includes dyscalculia associated with memory disorders (working and semantic). The third type includes dyscalculia observed as a result of dysfunctionality of thinking due to a disruption of controlling functions. The fourth type is associated with visual-spatial functions [21].

In the modern Russian literature that we have analyzed, including articles published in the last 10-15 years, most authors do not offer their own classifications of dyscalculia. As a rule, in the reviewed works the authors distinguish between secondary and primary dyscalculia, as well as congenital and acquired. The main attention is paid to the classification proposed by Kosc back in the 70s of the last century (R. I. Lalaeva, A. Germakovskaya, S. Y. Kondratieva, N. N. Rysina, A.V. Griбанov, A. A. Plotnikova)

As can be seen from the above works, the types of dyscalculia identified by different scientists differ both in the principle un-

derlying the classification and in the types distinguished on the basis of a similar principle. Analysis of various classifications of dyscalculia shows that the identification of various types of arithmetic operations disorders is often of external nature, based on phenomenology and clinical manifestations, without taking into account the mechanisms underlying the deficiency. In our opinion, the typology of mathematical difficulties should be based on structural and functional differences that cause one or another type of mathematical difficulties, and should take into account the principles of consistency in the structure of higher mental functions [2].

## Conclusions

The analysis of studies devoted to the problem of identifying the mechanisms and causes of arithmetic operations disorders and arithmetic learning difficulties leads to the conclusion that the empirical results are contradictory and suggests that these issues are insufficiently developed. With a similar effect on functioning and quality of life, the problems of dyscalculia are less studied than the problems of dyslexia. The success of new research methods has led to the agreement of most scientists regarding the brain substrate of quantitative information processing, with the greatest involvement of the parietal and frontal regions. However, there is no such unity regarding the causes of arithmetical operations disorders and difficulties in mastering numerical skills, as well as the designation of types of dyscalculia. Most of the classifications of dyscalculia presented in the literature are based on their clinical manifestations rather than on a psychological analysis of the systemic dynamic organization of arithmetical operations and without taking into account the structural and functional differences in brain organization characteristic of a particular subtype of dyscalculia. Meanwhile, these issues are of primary importance for special education and developmental training of children with numeracy difficulties as well as for re-



habilitation of children and adults following brain damage of both traumatic and non-traumatic genesis. Future research should focus on clarifying the causes of dyscalculia basing on the analysis of the psychological

structure of arithmetical operations and its changes under the influence of learning, taking into account the structural and functional characteristics of the brain organization of quantitative information processing.

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# Mastering Models in a Quasi-learning Situation of Problem-solving

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The purpose of our work was to study the factors that determine the effectiveness of model acquisition in solving inquiry-based problems (balance scale problem). An experimental lesson, which we conducted in the 4th grade, revealed the differences in the way children refer to a general method of assessing equilibrium provided by the teacher. At the end of the lesson a test was conducted. Its results allowed us to divide the participants (22 students) into two groups according to their success, which depended on whether they applied the model, that they had tried out during the lesson. The performance of students in the «Transpositions» test (A.Z. Zak), which was designed to identify students' approach to solving inquiry-based problems («empirical» or «theoretical»), showed significant differences in the level of reflection, analysis, and planning between the two groups (according to the Mann-Whitney criterion  $p < 0.01$ ). These results and data analysis allow us to connect the success of the modeling means' acquisition to the predominance of either an «empirical» or a «theoretical» approach to mastering ways of solving a new problem.

**Keywords:** meta-subject results of primary school graduates, «theoretical» and «empirical» approaches to problem-solving, the balance-scale problem, symbolic means in concepts' formation.

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## Особенности освоения моделирования в квазиучебной ситуации поиска решения задачи

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Представлены результаты работы, целью которой было установление факторов, определяющих эффективность принятия знаковой модели в решении задачи поискового характера (уравновешивание равноплечего рычага). Проведенный авторами экспериментальный урок в четвертом классе показал различия в характере ориентировки детей на заданный обобщенный способ оценки равновесия. Обращается внимание на то, что по результатам выполнения проверочных заданий учащиеся (22 человека) были разделены на две группы в соответствии с успешностью использования заданной и опробованной ими на уроке модели в решении новых задач. Полученные в обеих группах по методике «Перестановки» (А.З. Зак), предназначенной для определения подхода учащихся к решению поисковых проблем («эмпирического» и «теоретического»), результаты показали значимые различия выявленного уровня рефлексии, анализа и планирования (по критерию Манна-Уитни  $p < 0,01$ ). Делается вывод о том, что эти данные позволяют связывать успешность освоения модельных средств на уроке с преобладанием «эмпирического» или «теоретического» отношения к освоению способа решения новой задачи.

**Ключевые слова:** метапредметные образовательные результаты четвероклассников, «теоретический» и «эмпирический» подход к решению задач, задача уравновешивания рычага, знаковое моделирование в формировании понятий.

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## Introduction

The standards for school education emphasize the “use of symbolic means of presenting information to create models of objects and processes of interest, and/or schemes for learning and solving practical tasks” [12, p. 6] as one of the most important components of meta-subject educational results. As we apply the Activity approach to educational design, we are to consider model mediation of learning actions as the core of students’ mastering of conceptual thinking. It is through models, that the meaning of a future concept is presented and delivered to students. This defines the quality of forming new actions, which is required for problem-solving [3, 8]. Thus, the assessment of students’ capability to work with models within a learning situation, becomes an urgent issue, in particular, the functions of new means of knowledge presentation, which are provided by the teacher. In most cases, students do not refer to any means to organize their own actions and simply manipulate the data from the task without any success. Thus, the adoption of a “conceptual” way of problem-solving by students, is in question — and it brings forth the problem of working with models as the means of one’s own work. Models should not be considered by students as simple “visual” illustrations of the content of the task, to which they should refer only at the teacher’s request, using symbolic means “formally”, and not “meaningfully” [2, 5, 10].

Therefore, the analysis of factors, which determine the effectiveness of the application of modeling means by students, should reflect the indicators of their meaningful use. It is important to choose tasks, which can be solved only if one refers to modeling means.

We have conducted a study to investigate students’ actions with the model, which demonstrates the general way to construct solutions for a problem. 22 fourth-grade students of a regular Moscow school participated in the study. The goals of our research were:

— to set up a quasi-learning situation of model acquisition during a lesson. A model should reflect the essential relations within some class of problems;

— to assess the results that students achieve through this kind of instruction;

— to compare students’ performance in these tasks to a number of their meta-subject characteristics, which are related to how students act as they search for solutions to a new problem.

## Procedure and results

The experimental one-lesson instruction elaborated the balance scale problem, which is difficult, as both parameters of equilibrium — the weight and the distance of each weight from the fulcrum — have to be considered simultaneously. There are numerous studies [9, 13, 15, 18], which examined the strategies to achieve balance for participants of different age categories, either in the situations of hands-on work with a dynamic model or based on analysis of weights’ configuration drawn on paper. The results of these and other studies [14, 16, 17] convinced us, that the age of our participants (10—11 years) allows them either individually, or with some help from an adult to determine the “rule of balance” in its simplest form and apply it to the tasks of balancing a scale. Most children are familiar with similar situations in their everyday life and know, how they can deal with them (see-saw swing, primitive scale constructions, and others). However, common balancing strategies, which children design as a result of their own search for this problem’s solution, mainly comprise a series of comparisons of “weight” values and “distance from fulcrum” values which also involve the attempts to compensate the lacking or excessive weight with corresponding transpositions [6, 19]. The “rule of balance”, which is thus deduced, enables one to solve “simple” problems of equilibrium identification. However, it usually does not provide for grasping the general rule



of equilibrium assessment in situations with “scattered” weights (when weights are distributed over several suspension points).

Thus, the problems with “scattered” weights were chosen for the quasi-learning situation design. The instruction suggested students master the general way and means to assess the balance of a weights’ configuration, while they were working with a regular school balance scale device. Students were introduced to the matter through a challenging task of balancing three weights, attached to one side of the “scales”, with two weights on the other side, their suggestions were tried out with the real balance scale (Figure 1).

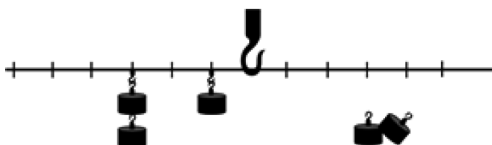


Fig. 1. Balancing unequal amounts of weights on the scale

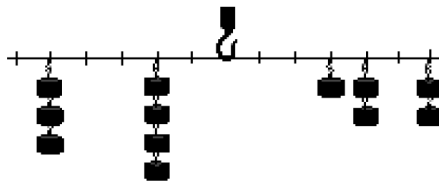
The procedure for our study was set as a lesson for students, who were to solve a quasi-learning problem. The most common features of a learning situation were reproduced: introducing students to some practical problem; finding out, that the suggested ways to place weights are insufficient; trying out the general way (assessing the “contribution” of each weight to the state of balance) to solve a number of problems and testing the solutions on a dynamic model of the scale; and then — the application of the verified model of equilibrium to solving control tasks. The balance scale problem is not included in the fourth-grade curriculum, and those children, who participated in our study, were not familiar with the way of balancing scattered weights, which was provided during the lesson. The ideas, which students put forward during the introductory problem, confirmed that their placement of the two weights while balancing the other three, was random.

Students were offered a general way to assess (and predict) the balance, which allowed

to check any solution: the “load” inflicted by each weight depending on its distance to the fulcrum had to be calculated and the sum of “load” values on each side had to be equal. The rule of modeling the “load” was also explained to children: they were to lay down a “coin” for every “step” that distanced the weight from the fulcrum by one scale mark. This model allowed to assess the present configuration of weights, as well as its possible transformations. The calculations involved (counting “steps” for every weight, laying down “coins” and comparing summary “loads” achieved for each side) were of no difficulty for students.

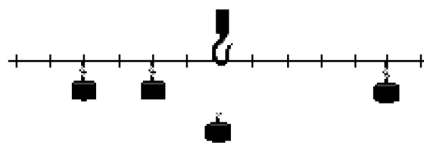
The training educational tasks, which were provided for students to test the model of equilibrium evaluation (8 tasks: see examples Fig. 2, 3) included the following types:

- to estimate the equilibrium for the given weights’ configuration: “Is the scale balanced? Which side outweighs the other?”;
- to restore the balance by adding only one weight unit;
- to suggest several ways to balance an unequal number of weights for both sides of a scale.



Is it balanced? \_\_\_\_\_

Fig. 2. The estimation of the weights’ configuration



Is the scale balanced? \_\_\_\_\_

**If not, add one identical weight to achieve balance.**

Fig. 3. Balancing the scale by adding one weight

During the lesson the teacher organized the collective work on the problems and oversaw that each participant of the joint problem-solving had the opportunity to check his suggestions on how the weights are to be attached and the coins are to be laid with the actual lever device in front of the class. It was required that each suggestion, which students came up with and discussed, was to be supported with modeling.

At the end of the lesson the students were to accomplish three tasks individually: the tasks were similar to the practice ones, but the hands-on trials were disabled. The students' performance was evaluated as the number of problems solved correctly. Table 1 presents the students' results.

The qualitative analysis of the students' solutions allowed us to split our participants into two groups according to their individual performance (correct and wrong solutions, modeling the "load" as required or ignoring this step):

— I group (10 students): these were the students, who failed in all tasks, or succeeded in only one task, which required to estimate the balance of a ready-made configuration of weights. While solving the control tasks they placed weights in random places and did not refer to the method of "load" calculation, which was provided by the teacher and was tried out in a collective work over training tasks throughout the lesson;

— II group (12 students): those students, who managed to succeed in two or three control tasks. They performed the "load" calculations for each side of the scales: their answer sheets contained drawings of "coins" configurations, which were used for calculations, or the appropriate "load"

values were inscribed, which both reflected their reasoning for each problem.

We have additionally conducted the "Transpositions" test, developed by Zak [4, 7], to compare the students' performance in the experimental quasi-learning situation with the level of cognitive meta-subject results they achieved, which are substantially related to the general approach to solving inquiry-based problems. "Transpositions" assess three components:

- analysis, i.e., search for actions, which determine the subsequent solution's design;
- reflection, which means the awareness of the general (conceptual) way of solving problems of this kind;
- planning, which determines the accuracy of the operations needed to solve the problem [7, p. 27].

The tasks of this test require rearranging shapes in a given grid in such a way that the location of similar shapes will correspond to the location of similar numbers in the pattern grid, provided alongside. Depending on the difficulty level, the task can be solved in two, three, or four transpositions. All tasks have more than one way to solve them. There are three blocks of tasks. The ability of students to determine the general way to solve the tasks of the first block correctly (where only two transpositions are needed) is the indicator for the students' reflection. The method, which they extract, can be applied eventually to solving the tasks of the other two blocks (the second block requires three transpositions and indicates the substantial analysis of the tasks' modifications; the third block requires four operations and assesses the ability to plan a sequence of transpositions).

The students' performance in the "Transpositions" test are presented in Table 2.

Table 1

**The Students' Performance in Control Tasks**

Solved correctly	0 tasks	1 task	2 tasks	3 tasks
Number of students (person)	4	6	8	4



Table 2

**The Students’ Performance in the “Transpositions” Test  
 (the average number of the tasks solved, %)**

	AI tasks	Components		
		Reflection	Analysis	Planning
All students	65,8	79,4	86,3	36,8
I group	47,7	65,6	70,8	12,5
II group	81,8	91,7	100,0	58,3

The significant correlation between the students’ success in balance-scale tasks and in “Transpositions” tasks (Spearman’s rank correlation coefficient  $r_s=0,633$ ,  $p < 0,01$ ) allows us to consider the differences between two groups of students as qualitative, not only quantitative ones.

An additional analysis of the results — defining the approach to problem-solving for each student as either “empirical” (rank=1) or “theoretical” (rank=2) — allows us to describe each group of students by the ways of problem-solving which prevail [11, с. 197—198]. The differences in the approach, which the students in the two groups displayed in regard to all three components, are significant according to Mann—Whitney U test ( $U_{refl}=20$ ,  $p < 0,01$ ,  $U_{analysis}=12$ ,  $p < 0,01$ ,  $U_{plan}=25$ ,  $p < 0,05$ ) — see Fig. 4.

Thus, the majority of students of the first group demonstrated an “empirical” approach to a problem solving, and students of the second group demonstrated a “theoretical” approach, which allowed them to succeed in a sequence of tasks on transpositions using the identified general method. Based on the results of the data comparison, we have pondered over the possible reasons behind the differences in the students’ actions in a quasi-learning situation of mastering the modeling means.

**Discussion**

The analysis of the data obtained with the “Transpositions” test, allows us to classify the students’ approach to problem-solving as “empirical” (a number of formal procedures aimed to “split” the situation of the problem into separate data pieces), and “theoretical”

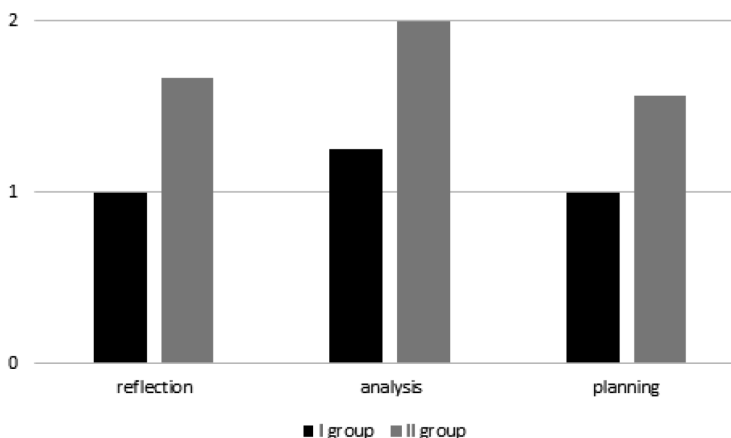


Fig. 4. The distribution of “empirical” and “theoretical” approach to problem-solving in the “Transpositions” test among the students of two groups with different performance in the balance-scale tasks

(substantial analysis of the situation and operations needed to solve the problem).

This classification helps us interpret the differences between the students' ways of solving the "inquiry-based" task within the quasi-learning situation, which we designed. Judging by the students' performance in the quasi-learning situation and their level of reflection, analysis and planning, the "empirical" and "theoretical" approaches, diagnosed by the "Transpositions" test, revealed themselves, when students solved balance scale problems using modeling means provided. An obvious, "practical" way of solving these problems usually relies on the consideration of the number of weights and their distance from the fulcrum, rather than on the analysis of the essential terms of balancing the scale. The result of a theoretical calculation of the "load", caused by all weights on each side, obviously differs from a simple sum of all the weights. To act "conceptually", each time they moved a weight, students were to lay down "coins" according to the model of the "load". This method of problem-solving makes the students abandon the usual "trials and errors" method, based on the "eye-catching" parameters of the matter.

Thus, the "empirical" approach may reveal itself in the balance-scale problem solving, as a disregard for the actions, which model the equilibrium with special means. Even though during the lesson, the students have constructed the models for each new task and observed the direct parallel between the calculated "total load" and the equilibrium achieved, in their point of view, these actions may have still seemed "irrelevant", as some formal accompaniment of a solution. Model building here did not work for them as a means of analysis of the "hidden" relationship between weights and the distance to the fulcrum, which defines the balance, though this analysis makes the relationship tangible and allows students to refer to it in other problems. The "empirical" approach was most likely to prevent some of the students from modeling

these implicit relations in their individual work. Students could think, that the "model's job" was to record the current state of a scale, as required by the teacher, rather than to guide their future actions — and thus, some students managed to solve the simplest task on the estimation of the ready-made configuration of weights, but failed in other control-tasks. Accordingly, these students focused on the partial "rules", also known as "empirical strategies" [18], which mostly implied the consideration of the "weight's" factor and the "distance" factor separately, or sometimes sequentially [6, 9, 17]. Within the "scattered" weights condition these "rules" were bound to fail students in their individual work over control-tasks.

The differences of the same kind, most likely, emerge in solving simple problems from the "Transpositions" test, where a general principle was to be extracted and then applied in subsequent tasks. Thus, we consider the characteristics of the students' performance in the quasi-learning situation, which we have set, as indicative towards the "empirical" or "theoretical" approach in other situations, when some means of conceptual analysis will be provided for the students to master them.

## Conclusion

The differences in students' adoption of the "equilibrium model" as an actual working tool, which were revealed in the quasi-learning situation, were then qualified as indicators of "formal" or "meaningful" attitude towards the preset general way of solving all problems of the kind. During the experimental lesson each balance estimation was done according to the method provided and accompanied with practical trials, nevertheless, almost half of the participants have not even tried to use the model of "balance" in their individual work with control-tasks, and among these students were those, who actively participated in the collective problem-solving. This discrepancy may be, however, understood

as we consider the real contradiction of the “visual-active” versus conceptual orientation behind the “hands-on” testing of the ways to achieve balance by moving weights. It is obvious, that the students, who failed in the individual tasks, regarded previous work as some formal “technique” to follow the “real” solution (manipulating weights), rather than a test of the general notion of balance.

The formal acquisition of school information is a common problem in the psychology of education. Bozhovich accurately described “formalism” among students: “These students’ attitude towards school knowledge is characterized by complete indifference to the essence of what they are studying. Often, they treat it as something alien to their life, imposed from the outside, rather than the result of generalization of phenomena and facts of reality”; it is difficult “to put them before a theoretical inquiry-based task” [1, p. 308—309]. The correct solution of problems, which demand conceptual action (i.e., mediated with the equilibrium model) despite visually presented terms (the opportunity to manipulate weights), may, to our mind, serve as an adequate indicator, that the special “theo-

retical” functions of the general way to act in such situations were assimilated by students.

The significant correlation between the students’ acceptance of the “equilibrium model” and the “theoretical” and “empirical” level of analysis, reflection and planning, diagnosed independently in similar individual tasks, poses a question about the origins of the related cognitive attitudes, which determine the students’ approach to the means of conceptual analysis of the matter, provided in school education. Will a new task be transformed by a student into a learning task, aimed at mastering the general way of handling the matter, or will it be treated separately, as a particular problem, which demands a “suitable” set of operations? Answering this question, we have to analyze the psychological and pedagogical conditions in which different approaches to the adoption of modeling means, provided by teachers, are formed and developed. The design of diagnostic tasks of a special kind, which allow to assess and predict the effectiveness of students’ promotion within a particular lesson, especially if it includes some opportunities for their personal experiments, is, to our mind, an increasingly urgent challenge for the research.

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# The Value Foundations of Pedagogical Activity: a Comparative Analysis of the Position of Teachers and Pedagogical Class Pupils

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The relevance of the research subject is determined by the tendency to implement the axiological approach in education to ensure the creation of a single space for the training of pedagogical personnel. This places a special importance on the issue of establishing a correlation between value expectations from the teaching profession. The aim of the study is to determine the value foundations of pedagogical activity as seen by teachers and learners. The sample of the study comprised 61 pedagogical class pupils and 425 teachers. The adopted methods involved the operationalization of the existing standards (educational and professional) and conceptual content analysis, which made it possible to develop an author's methodology of explicating and updating values laid down by the educational and professional standards and adapt the MUST-test for diagnosing values-goals. The results show that learners are mainly self-focused, while teachers give attention to creating conditions for their professional activity. The major values of the teachers include the ability to implement an individual approach to the child and knowledge of developmental technologies. The latter prioritizes knowledge of characteristics and technologies for creating a safe and comfortable educational environment. Teachers and learners attach an approximately equal significance to all values, but they set different personal meaning into them.

**Keywords:** pedagogical values, professional activity, value-semantic guidelines, teachers, values, axiology, students of pedagogical classes, schoolchildren.

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# Ценностно-смысловая основа педагогической деятельности: сравнительный анализ отношения педагогов и учащихся педагогических классов

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Результаты представленного в статье эмпирического исследования отвечают на вопрос о соотношении ценностно-смысловых ожиданий от педагогической профессии в контексте непрерывности и преемственности педагогического образования в связи с необходимостью конструирования единого пространства подготовки педагогических кадров. Определяются ценностно-смысловые основы педагогической деятельности с точки зрения педагогов и учеников педагогических классов. Выборка исследования: в онлайн-исследовании приняли участие 61 учащийся педагогических классов и 425 учителей общеобразовательных школ. Методы: операционализация действующих стандартов (образовательных и профессиональных) и концептуальный контент-анализ, позволившие разработать авторскую методику ценностей, заложенных образовательными и профессиональными стандартами, и адаптировать метод MUST-тест (для диагностики ценностей-целей). Показано, что школьники ориентированы преимущественно на себя, а педагоги — на создание условий для своей деятельности. Отмечается, что системообразующие ценности у первых — способность осуществлять индивидуальный подход к ребенку и знание развивающих технологий, а у вторых — знание характеристик и технологий создания безопасной и комфортной образовательной среды. Обращается внимание на то, что в сознании и педагогов, и учащихся все ценности выражены примерно в равной мере, но обе группы испытуемых вкладывают в них различный личностный смысл.

**Ключевые слова:** педагогические ценности, профессиональная деятельность, ценностно-смысловые ориентиры, педагоги, ценности, аксиология, обучающиеся педагогических классов, школьники.

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## Introduction

The system of pedagogical personnel training sees the promotion of principles of consistency and continuity among its major goals. Their implementation is based on the current trend of using the axiological approach in education which meaning and content are to be determined by value orientations. In Russia the training of the pedagogical personnel is provided at a few interrelated stages: a pedagogical class (pre-professional stage), teacher education college or pedagogical university (professional stage) and advanced training courses (postprofessional stage). At the same time, neither the uniform basis nor the vectors of teacher education continuity have been defined in normative regulations or scientific studies. The current research is based on the idea of ensuring the continuity and consistency of teacher training through the commonality of professional value orientations at all levels of pedagogical education.

The results of our previous research show that value orientations are formed through activity and are based on personal experience, world outlook, educational background, professional requirements, professional norms, and regulations. Regulatory provisions and requirements for teachers serve a crossing point for value formation structures developing in the system of pedagogical education and those evolving as part of a teacher's individual culture" [5, p. 18]. This leads us to conclude that educational and professional standards as well as curricula and training programs

should be developed with regard to the value framework of the teaching profession. Thus, a teacher's behavior [9] and their values become a part of the pedagogical practice passing on to the pupils and being determined by the correlation between value expectations from teaching [24]. To understand the mechanisms of pedagogical value formation as well as identify the presence of signs of their continuity, one should address the question of value expectations held by learners interested in the teaching career and see whether they are in line with reality, which in its turn requires research into the value orientations of practicing teachers.

Research results suggest that knowledge and experience gained at school are essential for accepting the value and motivational foundations of the teaching profession [15; 23]. It is notable that 5 to 30% of school learners become teachers later in life [17; 23]. Thus, the provision of the standard educational continuity at various stages of education is an indispensable condition for gradual professional development and establishment of the efficient pedagogical resource.

Literature review shows that teenage learners name personal qualities, specialized knowledge, and teaching skills among the fundamentals of the teaching profession [7; 11]. At the same time, there is a gap between the expectations [22] and appreciation of the importance of specialized knowledge for teachers: learners underestimate the significance of this value category for teaching [11].



The image of an ideal teacher built up by learners embraces the following personal, communicative and professional values [4; 13]: the teacher is patient, oriented towards learners' development, capable of demonstrating authority, intelligent, engaged in scientific research [13], friendly and considerate [6; 13], emotionally stable, flexible, penetrating, scrupulous, etc. [6]. The values of achievement, hedonism, independence and stimulation, security and agreeableness are more significant for teenagers at the level of behavior rather than normative ideals. Traditions and power are more important in terms of convictions and beliefs [3]. Furthermore, today's schoolchildren consider education and learning to be basically defined by such value categories as knowledge, complexity, and prospective viability. Notably, teachers share this vision complementing the list with the value of "interest" [8].

The major values of pedagogical activity indicated by teachers are time management, work and life balance, searching for the professional aims and meanings, keeping training records and documents, prestige and standing for the teaching profession [18], responsibility, justice and impartiality, understanding of learners, awareness of the learners' individual and sociocultural differences [14; 25], career aspirations, social contribution [21].

Researchers also observe that the sphere of values is exposed to the impact of the sociocultural situation, which means that the educational environment as well as learners' psychological security takes center stage in value formation [3].

Current psychological and pedagogical studies pinpoint the need for moving away from the particularistic and superficial approach to value analysis in the context of teacher-learner interaction [25]. Thus, we have implemented the system-genetic approach [10] as adapted to the research of the problem under discussion [2] and axiological approach seeing values as the key

orientations of teaching. These outline the methodological framework of the research in hand.

### Sample and Research Methods

The methods adopted within the given methodological framework involved:

the operationalization of the existing standards (educational and professional) regulating teacher qualification and job description requirements;

conceptual content analysis.

The data obtained enabled us to develop an author's tool intended to identify the values promoted by the standards in test subjects. It involved three value lists (values-relations, -qualities and -knowledge) of 18 items. Each list contained value orientations related to the following target objects: "the *child* as the central priority and value of teaching activity, the *environment* as a space where the teacher fulfills their tasks, and the *teaching profession* as a type of activity targeted at performing certain pedagogical functions" [9, p.12]. The diagnostic procedure implied ranking the values in descending order. The control sample comprised 75 people — all university professors and lecturers. In statistical verification of a ranking-based methodology, the question of its psychometric indicators cannot be tackled effectively by using statistical techniques only. It all comes down to the issue of the concept adequacy — that of the theory of values in this case. In other words, the concept validity and conceptual validity of the methodology (i.e., its consistency with the original concept) becomes crucial [1]. Based on the research findings, the test-retest reliability, i.e., the ability of the test to produce similar results over time, equaled  $r_t=0,54$  where  $p \leq 0,01$ . The statistical difference between the test-retest scores was  $t=0,332$  where  $p > 0,05$ . The survey questionnaire reliability calculated by applying the Spearman-Brown prediction formula for two halves was

$r_t = -0,51$  in April and  $r_t = -0,64$  in May. The test internal consistency was measured by calculating Cronbach's alpha coefficient and equaled  $\alpha = -1,250$ . The conceptual validity was tested by the experts of the Curricula Department of Yaroslavl State Pedagogical University (I.G. Kharisova et al.). The comparative analysis showed complete consistency of the survey questionnaire content with the main normative legal documents for the Science Education group of academic programs.

We adapted P.N. Ivanov and E.F. Kolo-bova's MUST-test (N.P. Ansimova, T.V. Ledovskaya, N.E. Solynin, I.Y. Tarkhanova, I.G. Kharisova et al.) aimed at identifying an individual set of commitments and obligations (values-goals). The results allow one to compare the objectives-expectations the test subjects have stated about teaching and the "irrational beliefs". Ours is a more flexible method similar to a projective one in terms of the form and content: the test subjects were entitled to use free verbal expression when describing their values, while the approach to the result processing was similar to the content analysis algorithm used for processing a structured interview.

The mathematical analysis was conducted by using the SPSS 22.0 software. Methods of primary descriptive statistics, Mann-Whitney U test, Spearman rank correlation coefficient, and structural analysis were used for the research.

The research was conducted in online environments between March and May 2021. The invitation to take part in the survey was extended via the administrative bodies of the educational institutions informing the prospective participants of the research objective as well as voluntariness and anonymity of participation. Two groups of subjects took part in the survey: 1) 61 pedagogical class pupils from comprehensive schools, the age range being 13 to 18 ( $M=16,49$ ;  $SD=1,7$ ); and 2) 425 school teachers, the age ranging from 19 to 70 ( $M=42,2$ ;  $SD=12,7$ ).

## Research Results

The research allowed us to define and compare the most significant values by pedagogical class pupils and teachers.

Pupils and teachers participating in the survey have shown clear agreement on choosing the three most important values (in bold type). However, the analysis of value intercorrelation matrices allowed us to conclude that the two groups of survey participants do not stand in full solidarity when articulating the meanings of the chosen values. Thus, teachers reveal a negative association of "development of rules for school / class life through negotiation with learners" with "tolerance of diversity of the educational process participants" ( $r=-0,165$ ;  $p\leq 0,01$ ) and "cooperation, professional mentoring and mutual support" ( $r=-0,123$ ;  $p\leq 0,05$ ), however, it is positively associated with "development of learners' self-regulation skills" ( $r=0,118$ ;  $p\leq 0,05$ ) and knowledge of the ways to achieve such a development ( $r=0,101$ ;  $p\leq 0,05$ ), i.e., it implies the introduction of uniform rules and the necessity to follow the standard pattern established by the teacher. At the same time, for pupils the above value is negatively associated with teachers' professional solidarity ( $r=-0,292$ ;  $p\leq 0,05$ ) and positively associated with the awareness of the ways to develop behavioral skills relevant in the modern sociocultural milieu ( $r=0,277$ ;  $p\leq 0,05$ ), so learners find it crucial that teachers are oriented towards their (learners') problems and needs.

The values ranked the lowest and thus classified as deficit type are also different for the two groups of respondents. They are respect for every learner and professional cooperation in the teacher respondent group and encouragement of learners' initiatives and creation of conditions for developing a learner's personality potential in the group of pedagogical class pupils.

Thus, teachers and pupils attach an approximately equal significance to values focused on the educational environment and

Table 1

**Medium Rank of Value Orientations of the "Relations" Group**

Values-Relations	Pupils		Teachers	
	Mean rank	Rating position	Mean rank	Rating position
<b>Leading by example***</b>	<b>1,7</b>	<b>3</b>	<b>1,5</b>	<b>2</b>
<b>Development of rules for school / class life through negotiation with learners**</b>	<b>1</b>	<b>1</b>	<b>1,4</b>	<b>1</b>
Readiness for interaction with other specialists to help learners overcome difficulties**	2,8	8	3	9
<b>Social significance of a teacher's professional activity ***</b>	<b>1</b>	<b>2</b>	<b>1,7</b>	<b>3</b>
Providing learners with individual assistance in mastering educational material*	2,4	5	2,7	6
Feedback in the process of education***	3,2	11	3,4	12
Enrichment of learners' life experience*	2,9	9	2,2	5
Responsibility for educational outcomes***	2,5	6	2,9	8
Support of parents' (legal representatives') pedagogical effort*	2,5	7	2,8	7
Support of learners' independent, conscious and responsible choice of life values**	3,8	13	3,1	10
Encouragement of learners' initiatives and development of their self-regulation skills**	4,6	17,5	3,2	11
Professional solidarity***	2,2	4	2	4
Lifelong learning and self-improvement, professional and personal development***	4,6	15,5	4,4	16
Creation of a safe and comfortable educational environment**	3,4	12	3,6	13
Creation of conditions for developing a learner's personality potential*	4,6	17,5	4	15
Cooperation, professional mentoring and mutual support in the teaching community***	4,6	15,5	5	18
Tolerance of diversity of the educational process participants**	4,2	14	3,7	14
Respect for every learner*	3,2	10	4,4	17

**Note:** \* — "child" value-goal, \*\* — "environment" value-goal, \*\*\* — "profession" value-goal

professional activity. However, it is discouraging to note that values aimed at the child take lower places in the subjective rankings.

The situation repeats for the second group of values (see table 2).

Values related to professional development prospects and methodological expertise gain the lead in the pupils' and teachers' rankings. However, as it was with the first value cluster, the ideas associated with them are different for the two groups of

respondents. The correlation analysis indicated the presence in pupils of a conviction that professional growth aspirations provide for the development in a teacher of the ability to implement an individual approach to each child ( $r=0,378$ ;  $p \leq 0,05$ ), while teachers believe that they help find a personal meaning in their professional activity ( $r=0,193$ ;  $p \leq 0,01$ ). From the pupils' standpoint, the implementation of various training and education techniques is a condition for teachers'

Table 2

**Medium Rank of Value Orientations of the "Qualities" Group**

Values-qualities	Pupils		Teachers	
	Mean rank	Rating position	Mean rank	Rating position
<b>Implementation of various training and education techniques ***</b>	<b>1,9</b>	<b>2</b>	<b>1,3</b>	<b>2</b>
<b>Willingness to devise a career strategy based on the recognition of prospects for a teacher's professional growth ***</b>	<b>0,8</b>	<b>1</b>	<b>0,6</b>	<b>1</b>
Provision of an individual approach to each child*	2	4	2,1	6
Ability to help learners in self-determination, self-fulfillment and self-affirmation*	3,1	8	2,4	8
Commitment to take responsibility for their activity***	2,3	7	2,2	7
<b>Aptitude for professional creativity***</b>	<b>2</b>	<b>3</b>	<b>2,9</b>	<b>9</b>
<b>Determination to perceive their professional activity as having a personal meaning***</b>	<b>2,1</b>	<b>6</b>	<b>1,7</b>	<b>3</b>
Ability to interact with other specialists on a child education issues**	2,9	10	3,4	11
Ability to interact with parents (legal representatives) on a child education and upbringing issues**	3,7	14	4,8	17
Ability to control their psychoemotional state***	3,4	13	3,9	13
Ability to motivate learners, engage them in different activities*	4,7	16	4,7	15
Ability to objectively assess learners' achievements*	3,3	9	4,7	14
Ability to assist learners in organizing self-regulation**	2,9	11	2,0	5
Ability to organize the educational process according to the requirements of the Federal State Educational Standards ***	2,1	5	2,9	10
Ability to devise and implement the program of the educational institution development**	3,3	12	2	4
Ability to design lessons, devise educational activities and programs tailored to the needs of learners and their parents***	5,2	18	3,7	12
Ability to create success situations for learners*	4,3	15	4,8	16
Ability to combine rigor and respect for learners*	5,1	17	4,9	18

better understanding of their pupils ( $r=0,356$ ;  $p\leq 0,05$ ), while teachers consider them as a mean to overcome difficulties in various pedagogical situations ( $r=0,131$ ;  $p\leq 0,01$ ).

The third place is given to the aptitude for professional creativity by the pedagogical class pupils, while teachers here prioritize their determination to perceive professional activity as having a personal meaning. The respondents' attitude to pedagogical creativity

differs significantly ( $p\leq 0,01$ ): the pupils see it as an essential quality of a good teacher not bound to the framework of the mandatory standards (notably, they consider the ability to organize the educational process according to the requirements of the educational standards no less important). The teachers in their turn are somewhat skeptical about the necessity of being particularly creative when teaching since it can interfere with the implementation of the

development program single and uniform for the educational institution ( $r=-0,133$ ;  $p\leq 0,01$ ) as well as intervene with the scheduled classes and other activities ( $r=-0,272$ ;  $p\leq 0,001$ ).

Teachers and learners proved to be more unanimous in respect to the ranking

of knowledge-values: greater significance is attached to the knowledge needed for devising a teacher's career strategy as well as knowledge on the legal and ethical framework for teaching and teaching methods (see table 3).

Table 3

**Medium Rank of Value Orientations of the "Knowledge" Group**

Knowledge-values	Pupils		Teachers	
	Rating position	Mean rank	Rating position	Mean rank
Knowledge on the legal and ethical framework for teaching***	1,2	2	0,8	2
Knowledge of teaching methods and awareness of their impact on the learning process***	1,4	3	1,2	3
Knowledge and understanding of their subject ***	2,1	6	1,6	4
Awareness of learners' individual differences*	2	5	2,7	8
Knowledge-based approach to devising a teacher's career strategy***	1	1	0,7	1
Knowledge-based application of diagnostic and remedial technologies*	1,6	4	2,5	7
Knowledge-based approach to learners' engagement into different activities (project, research, reflection, etc.)*	3,4	11	3,5	6
Knowledge-based approach to parents (legal representatives) engagement into their children's education and upbringing process**	3,3	10	3,8	12
Awareness of ways and means to analyze their professional performance in terms of results and efficiency***	3,2	9	2,8	9
Awareness of ways and means of productive collaboration with all participants of the pedagogical process**	3,6	13	4	14
Knowledge of ways to prevent and correct deviating juvenile behavior **	3,1	8	3,6	11
Knowledge-based approach to the development of teaching skills and professional capacities***	2,8	7	3,2	10
Knowledge-based approach to the development of learners' self-regulation skills**	4,2	15	1,8	5
Knowledge-based approach to the formation and assessment of educational outcomes*	3,5	12	3,9	13
Knowledge-based approach to the development in learners of behavioral skills relevant in the modern sociocultural milieu*	5,7	18	4,5	16
Knowledge of methods provided for learners' effective goal-setting, planning and organization of independent activity*	4,3	16	4,5	15
Knowledge of developmental education technologies*	3,8	14	5,3	18
Knowledge of characteristics and technologies to create a safe and comfortable educational environment**	4,8	17	4,6	17

Value interpretation is diverse here as well. The pupils perceive the importance of knowledge on the ways to devise a successful career strategy as an established truth based on the assumption that it is good to build a career (this value does not correlate with any other values in the value structure). For teachers, it is directly related to finding a personal meaning in their professional activity as well as their commitment to take responsibility for their actions ( $r=0,114$ ;  $p\leq 0,05$ ).

Pupils associate knowledge of the legal framework for teaching with the effective organization of learners' self-regulation ( $r=0,32$ ;  $p\leq 0,05$ ), ability to implement an individual approach ( $r=0,252$ ;  $p\leq 0,05$ ), assistance in learners' self-determination and self-fulfillment ( $r=0,26$ ;  $p\leq 0,05$ ) and objective assessment ( $r=0,268$ ;  $p\leq 0,05$ ). From the teachers' perspective, it can provide for

a proper implementation of training and education techniques ( $r =0,142$ ;  $p\leq 0,01$ ), carving out an effective career ( $r=0,133$ ;  $p\leq 0,01$ ) and strengthening the learners' motivation ( $r=0,136$ ;  $p\leq 0,01$ ).

The following phase of the empirical study involved estimating the statistical significance of variance in the degree of expression of the values in question (see table 4).

Table 4 demonstrates that pupils have a greater appreciation of the social significance of teaching than teachers themselves ( $p\leq 0,05$ ), although this value ranks high in the ratings of both groups of respondents. Moreover, pupils believe that social recognition of teachers' professional activity will create proper conditions for the encouragement of learners' initiatives and treating every learner with respect. Teachers associate this value with the enhancement of

Table 4

**Statistical Significance of Variance between Pupils' and Teachers' Values**

Values	Mann-Whitney U test	P-level
Social significance of a teachers' professional activity	9409	0,000
Encouragement of learners' initiatives and development of their self-regulation skills	10355,5	0,006
Ability to help learners in self-determination, self-fulfillment and self-affirmation	10654,5	0,021
Aptitude for professional creativity	10060	0,003
Ability to interact with parents' (legal representatives) on child education and upbringing issues	10611	0,020
Ability to assist learners in organizing self-regulation	11298	0,038
Ability to devise and implement the program of the educational institution development	10847	0,009
Ability to design lessons, devise educational activities and programs tailored to the needs of learners and their parents	10669,5	0,017
Awareness of learners' individual differences	10661	0,022
Knowledge-based application of diagnostic and remedial technologies	9732	0,001
Knowledge-based approach to the development of learners' self-regulation skills	8840,5	0,000
Knowledge-based approach to the development in learners of behavioral skills relevant in the modern sociocultural milieu	10513,5	0,013
Knowledge of developmental education technologies	10624	0,018



responsibility for the educational outcomes and objectivity of their assessment as well as tolerance of diversity of the participants in the educational process.

Significant variance is noted for values related to assisting learners in the organization of self-regulation ( $p \leq 0.05$ ), devising and implementing the program of the educational institution development, and preparing lessons and educational activities ( $p \leq 0.01$ ), to which teachers attach far more importance than pupils. This brings us to the conclusion that from the pupils' perspective, values-qualities are more of expectations held regarding the skills and capacities every good teacher must have rather than objective requirements to a teacher's professional excellence.

Significant variance observed in respect to a teacher-parent interaction ( $p \leq 0.05$ ) is quite alarming as well. Both teachers and pupils attach little importance to this aspect; however, the situation is understandable if not natural only for teenage respondents notable for their profound sense of maturity. The value being ranked the second lowest in the teachers' list only emphasizes that teachers do not see working with parents as their first priority despite the fact that it is deemed one of the most pressing problems of the educational process organization.

From the pupils' perspective, capacities and skills related to lesson preparation and activity development are the least relevant, which is not surprising since pupils have no teaching experience. Teachers consider the ability to combine rigor and respect for learners as the least important.

Significant variance noted for such values as the awareness of learners' individual differences ( $p \leq 0.05$ ) and the knowledge-based application of diagnostic and remedial technologies ( $p \leq 0.01$ ) cannot be neglected either. The pupils clearly recognize the important role these values play in the educational process, thereby highlighting their discontent with the current situation in education.

Pupils do not regard the knowledge on behavioral skills required by the modern socio-cultural milieu as particularly important, which should be taken as an indication of their having no expectations from teachers being able to give them any relevant or useful knowledge in this sphere. Teachers consider knowledge of developmental education technologies as having little significance. We tend to link it to the lack of appreciation for the value of a child's personality development rather than associate it with the excellent command of such technologies teachers generally have.

The final phase of the statistical processing involved conducting the structure-function analysis of the results following the method developed by V.N. Druzhinin, A.V. Karpov and repeatedly tested in researches done within the framework of the systemogenesis of activity (V.D. Shadrikov, V.N. Druzhinin, A.V. Karpov, V.A. Mazilov, G.A. Suvorova, A.A. Karpov, N.V. Nizhegorodtseva, N.P. Ansimova, M.M. Kashapov et al.) [2]. The calculation of the structural weight of the components was made by using figures obtained from counting the number of links each value has with the other values of the structure modified by the correction factor (links significant at  $p \leq 0.001$  were estimated as having the weighting factor of 3 (points), links significant at  $p \leq 0.01$  were estimated as having the weighting factor of 2, links significant at  $p \leq 0.05$  were estimated as having the weighting factor of 1). Values with the greatest weight form the internal frame of the structure serving the basis for the development and compensation of other values. The structural analysis thus allowed us to define the system-forming values for each group of respondents. For pupils it is the ability to implement an individual approach to the child (structural weight 14) and the knowledge of developmental technologies (structural weight 14). For teachers it is the knowledge of characteristics and technologies for creating a safe and comfortable educational environment (structural weight 38), which



indicates that pupils are mainly self-focused, while teachers channel their attention to creating conditions for their professional activity.

## Discussion

The results obtained by our research group correlate with those published by other authors, including international teams. They claim that there is a discrepancy in the perception of teaching outcomes held by teachers and learners [20]. Values centered around the child rank the lowest as far as the teachers' opinion is concerned.

It is worth noting that teachers reveal a tendency to replace actual values with those declared. Thus, stressing the importance of values related to the enrichment of learners' life experience, provision of an individual approach and individual assistance in mastering the educational material and support of the pedagogical effort of learners' parents (legal representatives), teachers tend to underestimate the knowledge of developmental education technologies and methods of effective goal-setting, independent activity planning and organization provided for learners. Such values as respect for all learners, the ability to create success situations for them, awareness of the ways and means of productive collaboration with all participants of the pedagogical process, including parents as well as ability to motivate learners in their activities are held in low esteem too. The MUST-test results show that teachers are primarily concerned about low (under their estimates) salaries, uncomfortable working conditions, reluctance of parents to participate in the child upbringing process, low social evaluation of the teaching profession and other problems that have no direct connection with the learners' development.

These results strongly correlate with those obtained by J.H.E. Assen, F. Meijers, H. Otting and R.F. Poell who point at the discrepancy of the teachers' beliefs and their actual behavior when teaching. According to their study, "tutors prefer learner-oriented be-

liefs, but in their teacher behavior they show a more traditional approach to teaching" [12]. Discrepancies between the declared values, necessary pedagogical actions, and their actual performance were discovered [16].

## Conclusion

The research in hand showed that despite the formal similarity of the pedagogical values acclaimed by teachers and pedagogical class pupils the respondents put a different meaning into them. This brings to the forefront the need for consolidating the views of practicing teachers and learners who would like to choose a teaching career in future to acquire mutual understanding. It also emphasizes the relevance of the focused analysis, formation and development of pedagogical values at all stages of teacher professionalization, including the reorganization of pedagogical class work.

Thus, teachers and pupils attach an approximately equal significance to values focused on the educational environment and professional activity. However, values aimed at the child take lower places in the subjective rankings. From the pupils' perspective, values-qualities are more of expectations for the skills and capacities every good teacher must have rather than objective requirements to a teacher's professional excellence. Values related to professional development prospects and methodological expertise gain the lead in teachers' rankings. Teachers and learners prove to be more unanimous in respect to the ranking of knowledge-values: greater importance is related to the knowledge needed for devising a teacher's career strategy as well as knowledge on the legal and ethical framework for teaching and teaching methods.

In connection with the above, contradiction between the actual values and those declared remains relevant. Therefore, it questions the feasibility of achieving the educational goals established by the State standards and exacerbates the problem of providing teachers' professional and personal growth.

The comparative analysis enabled to make an updated list of orientations that can serve the basis for defining the indicators of pedagogical competences and developing a value model of consistent result formation at different stages of pedagogical education. With regard to the previously identified orientations deemed essential for teachers and educators, pedagogical competences were divided into three groups: those focused on (1) a child's harmonious development, (2) a positive environment, and (3) a teacher's professional self-fulfillment [9]. The results to be achieved at each stage of pedagogical training are defined through indicators specified with reference to the phasing of the pedagogical competence development and reflecting gradual formation in a prospective educator of certain qualities, attitudes, relations and knowledge. The assessment of the competence formation maturity is planned to be carried out in the near future using diagnostic test materials based on the principle of formative evaluation (dialogue simulators, a pool of cases etc.). The assessment will not only enable to identify the deficiencies developed at the previous stages of a teacher's training and chart ways to correct them but also to create the necessary conditions for strengthening the teacher's motivation for lifelong professional and personal growth.

Thus, the detection of the most significant values as well as those of the deficit type at

each stage of a teacher's professionalization may become the key factor for providing education consistency and continuity at various stages of teacher training. Reliance on the actual values of prospective and practicing teachers will enable to attain a higher level of pedagogical education efficacy taking into account that motivation and values are among the major constituents of any competence. Further empirical study of value deficits in teaching is needed to redress the imbalance between the requirements set for the teacher training system and structure of teachers' personal meanings. This will also contribute to the verification of the above hypothesis. The empirical study conducted did not allow the achievement of all the objectives since certain limitations were detected in terms of the analyzed sample. As an example, there were reasons for not taking into account the teaching experience and its possible influence on the teachers' meaning and value structures. To tackle these limitations, a new psychodiagnostic series is planned. Mechanism for the provision of continuity and improvement of educational outcomes through the formation of value orientations has not been fully assessed either, which makes a longitudinal study based at the institutions of secondary vocational training and higher pedagogical education extremely viable since it will allow us to reveal the essence of the phenomenon under study.

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# Drama as an Educational Technology and a Tool for Achieving Personal Educational Results

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The article focuses on the results of the research project “Adolescent Theater as an Activity Technology for Education and Formation of Personal Educational Results”, implemented in 2021—2022 by the Center for Interdisciplinary Research on Contemporary Childhood of the Moscow State University of Psychology and Education. The main goal of the project was to substantiate the efficiency of school theater as a means of education and a tool for developing meta-subject competences and improving personal educational results in adolescents. For achieving this goal, a unique educational program of drama activities (30 sessions of 45 minutes each) was elaborated and trialed in “Starogorodkovskaya School” in Moscow Region. 10 teenagers aged from 13 to 14 years took part in the project. The research methods included: observation, video recording of drama sessions and subsequent analysis of the videos; analysis of the products of the activity (scripts, short videos, poems); regular interviews with teenagers and teachers, who participated in the project. Several case studies are discussed, demonstrating that drama can become an effective technology for education and development of personal educational results in adolescence.

**Keywords:** theater, drama, “vospitanije”, moral (value) education, Federal State Educational Standard, meta-subject competences, personal educational results, adolescence, role experimenting.

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# Театр как деятельностная технология воспитания и формирования личностных образовательных результатов

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Представлены результаты проекта «Подростковый театр как деятельностная технология воспитания и формирования личностных образовательных результатов», реализованного Центром междисциплинарных исследований современного детства МГППУ в 2021—2022 гг. Авторы отмечают, что основная цель проекта — обоснование эффективности школьного театра как средства воспитания, а также развития метапредметных компетенций и личностных образовательных результатов у обучающихся подросткового возраста. Для реализации поставленной цели была разработана и апробирована уникальная программа занятий театральной деятельностью (30 уроков по 45 минут). Исследование проводилось на базе МБОУ «Старогородковская школа» Московской области. В проекте приняли участие 10 подростков в возрасте 13—14 лет. Методы исследования включали: наблюдение, видеofиксацию и последующий анализ видеоматериалов занятий; анализ продуктов деятельности; регулярные интервью с подростками и учителями, участвовавшими в проекте. На примере нескольких кейсов показано, что театр может стать эффективной технологией воспитания и формирования личностных образовательных результатов у подростков.

**Ключевые слова:** театральная деятельность, воспитание, ФГОС, метапредметные компетенции, личностные образовательные результаты, ролевое экспериментирование.

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### **“Vospitanije” in the Light of the New Amendments to Educational Standards**

One of the key amendments to the Federal State Educational Standard from May 31st, 2021 was elaboration and detailing of the concept of “vospitanije”<sup>1</sup> (moral education), its distinction from that of “obucheniye” (education), and the rationale for its implementation in secondary school. Before the revision of the Standards, the requirements for organizing “vospitanije” in school settings were formulated in the “Concept of Spiritual and Moral Education of Russian Schoolchildren”<sup>2</sup>, adopted since 2009. In the previous versions of the Standard the term “vospitanije” was not used. Since 2020 the concept of “vospitanije” in the Standards is interpreted as *“activity aimed at the development of personality, creating conditions for students’ self-identification and socialization based on the socio-cultural, spiritual and moral values, as well as on accepted in the Russian society rules and norms of behavior, ensuring the interests of human, family, society and State, formation in students of the sense of patriotism, citizenship, respect for the memory of the Defenders of Fatherland and for the feats of its Heroes, for law and order, for the Working Man and for the elder generations”* [14]. The amendments of 2021 specify the following kinds of “vospitanije” [8, p.3]: *spiritual and moral, civic, patriotic, aesthetic, physical, labor, ecological as well as value of scientific cognition*. Thus, the final version of the Standard enshrines in law different directions of “vospitanije” (educational work), which, in their turn, are reflected in the requirements for the “Work Program of Education (“Vospitanije”)”.

According to I.N. Fuzejnikova, the emphasis on various aspects of “vospitanije” in the amendments is partly due to the fact that at the beginning of 2000s too much attention in school practice was paid to the cognitive aspect of the educational process. The humanities, which lay the foundations for artistic and aesthetic sensibility, moral attitudes and values, seemed rather neglected. Lack of sufficient attention for different aspects of “vospitanije” led to the fact that “the educational process does not become for school students an activity that shapes personality” [15, p. 4], and is regarded exclusively as a process of acquiring skills and knowledge.

The revised version of the Standards focuses firstly on personal educational results and on the importance of “vospitanije” for their formation. “Vospitanije” is thus interpreted as a system of measures and activities with specific aims, methods, forms, and tools of their implementation. This systemic approach contributes to comprehensive development of schoolchildren, enables to plan the trajectories of their personal development and to assess *“both the efficiency of the educational process and the new formations, which emerge in the student’s personality”* [2, p. 140].

At the same time, it is necessary to highlight that this systemic view on education is quite rarely found in the practice of contemporary Russian schools. Educational methods applied today are often formal and declarative since schools tend to [3]:

- organize one-time rather than systemic activities;
- set unrealistic ideals and patterns, which are not based on students’ interests and preferences;

<sup>1</sup> In Russian the word “vospitanije” is different from that of “education”. While the latter primarily implies transfer of knowledge, “vospitanije” presupposes transfer of moral values and norms, spiritual, civic, and patriotic education.

<sup>2</sup> “Concept of Spiritual and Moral Education (“Vospitanije”) of Russian Schoolchildren” adopted in 2009. The Concept is based on the Education Law of the Russian Federation, and the President’s Messages to the RF Federal Assembly on April, 26, 2007 and November, 5, 2008.

- offer such educational forms and methods that often contradict the students' real-life experience;
- declare aims and values without providing tools for their acquisition;
- apply tests for assessing moral values (the results of educational work) without considering the fact that tests help detect values, declared by students, while their real acceptance and application can only be assessed in the process of interaction (activity).

The above circumstances often devalue the efforts to organize "vospitanije" in the framework of the educational process.

G.B. Golub attributes this situation to the tradition of organizing "vospitanije", which is rooted in the Soviet pedagogy, and seems out-of-date in the digital era. The researcher also emphasizes that nowadays, while organizing "vospitanije" in school practice it is meaningful to talk not just about "a clear set of acquired social roles and norms, but rather about the individual's potential, their readiness to acquire new social roles and participate in the formation of new norms" [3, p. 39].

The idea that acquiring social roles is the result of the process of "vospitanije" is reflected in the Federal Standards: in the framework of the "Work Program of Education ("Vospitanije") "the school must ensure *"the possibility of social experimenting"* [8, p. 20]. It is important to highlight that creating conditions for solving this task is directly connected with the issue of development in adolescence, when the need for "trying on" various patterns of role interactions come to the fore. According to O.V. Rubtsova, "As pre-school children are willing to join a play and simulate scenarios from their everyday life, adolescents also eagerly emerge into a play or play-like situations, however, in contrast with pre-school children, they are not interested in simulating social relations, but in modelling them. *This kind of experimenting helps them construct their self-image*" [10]. A.M. Prikhogan argues that "role ex-

*perimenting literally permeates adolescents' lives — from identifying the boundaries of allowed behavior to setting and virtually resolving life challenges"* [9, p. 40].

At the same time, despite the exceptional importance of role experimenting for adolescents' development, the need for experiments with roles remains almost completely neglected in contemporary Russian schools. Neglecting this specific age task contributes to adolescents' low learning motivation and reduces their engagement in the educational process. Moreover, in school students are often imposed with certain role patterns, which does not only decrease interest for learning, but also can result in intrapersonal contradictions and conflicts. The lack of the possibility to experiment with roles during the educational process results in adolescents' searching for the ways of resolving this age task outside of school. This search for platforms for role experimenting often underlies adolescents' risky behavior, interest for subcultures or escaping to virtual reality [10; 11; 12].

Considering all the mentioned above, one of the actual challenges of contemporary Russian school relates to the elaboration and application of such forms and means of organizing learning activity that could allow adolescents to experiment with roles [5; 10; 12]. In school practice this kind of experimenting could take the form of drama (drama-based activities).

### **Applying Drama for Educational Purposes: the Experience of Russia**

Despite some existing practices of applying drama and theater for students' development and education [1; 4; 6; 16], application of drama-based activities in Russian educational practice is not systemic. In most cases school theaters are initiated by devoted teachers, while theatrical activities take the form of extra classes and have no connection to the general curriculum.

In contemporary Russian pedagogy, theater is considered primarily in the context of

introducing students to the cultural heritage [7]. Theatrical practices are also used as a tool for “vospitanije”, which is, however, still interpreted in an outdated pedagogical paradigm and is in no way associated with the formation of personal educational results or specific competences required by the Educational Standards.

It is also important to highlight that Russian school theater focuses on the final product — the performance, rather than on the process of its creation, and the prerogative of what to stage and how to stage (including role distribution, costumes, and scenery) is reserved for the teacher only. Such approach significantly narrows the developmental and educational potential of applying theater for educational purposes, reducing it to a reproductive technology. Thus, the existing approaches to applying drama in Russian education require reconsideration and further integration into the learning process in relation to the requirements of the new Standards.

An attempt of elaborating a comprehensive approach to drama as a means of developing meta-subject competences and achieving personal educational results in adolescents was made by a group of researchers from Moscow State University of Psychology and Education in 2019—2021. For two years the research team of the Center for Interdisciplinary Research on Contemporary Childhood (CIRCC) led by Olga Rubtsova conducted a series of studies, which resulted in the development of an original model of organizing theatrical activity with adolescents. In the framework of the model, *theater is perceived as a special form of experimenting with social and psychological objects (roles, positions and relationships)* [11; 13]. In such kind of theater, adolescents do not just play out roles based on a given plot, but engage in a wide range of activities, related to the production of a performance (including plot writing and staging). An important component

of the theater relates to the implementation of digital technologies, including shooting short videos used in the performance. The elaborated model of theatrical activity is aimed at building adolescents' *zone of proximal development* (L.S. Vygotsky) through experimenting with roles and modeling joint (group) activity. Thus, not only do adolescents gain subject knowledge and skills, but also acquire meta-subject competences and achieve personal educational results in accordance with the Federal State Educational Standard.

During approbation of the elaborated model, the research group formulated the basic principles for the organization of school theater as an activity technology of education and “vospitanije” [11; 13]. In particular, for becoming a tool for constructing the ZPD in adolescence, it is essential that:

- the teacher should take on the role of a “co-participant” in activities, and engage adolescents in new forms of interaction;
- the focus of the attention is shifted from the final product (a staged performance) to the process of its creation;
  - while working on the play, adolescents have the opportunity to exchange roles and positions, as well as to switch from one type of activity to another;
  - theatrical activities are perceived by teenagers as a “safe” space where they can feel free, able to experiment and try themselves at something new;
  - as part of theatrical activities, reflection sessions should regularly be held, where adolescents could discuss their own emotions and impressions, talk about difficulties in their joint work, and evaluate their own achievements.

The listed above principles of organizing theatrical activity underlie the project “Adolescents’ Theater as an Activity Technology for Educating and Achieving Personal Educational Results”, implemented by CIRCC in 2021—2022.

## Experimental Study of Applying School Theater as an Activity Technology of “Vospitanije” and Formation of Personal Educational Results

The study was conducted from October, 2021 to January, 2022 on the basis of the Starogorodkovskaya School, Moscow Region. 10 students in the 8<sup>th</sup> school grade (5 girls and 5 boys) aged from 13 to 14 years voluntarily engaged in the project. During the project, 30 lessons of 45 minutes each (10 complex sessions) were conducted by the members of the project team.

The main tasks set by the school administration included:

- Development of civic, spiritual and moral values (active rejection of antisocial actions; readiness to evaluate one’s own behavior and actions, as well as behavior and actions of other people from the standpoint of moral and legal norms and being aware of the consequences of actions; readiness to take part in various joint activities; showing interest for learning Russian language, history and culture of the Russian Federation, etc.).

- Development of communicative skills, strengthening of interpersonal interactions and group cohesion.

To achieve the goals, the project team developed a program of 10 sessions, with each of the sessions aimed at the formation of certain meta-subject competences and personal educational results by means of participation in various activities, connected to the staging of the performance. The play was based on the drama “The Government Inspector” (“Revizor”) by Nikolai Gogol. In the framework of the project adolescents were challenged to write epigrams denouncing the vices of the main characters of the play; 6 animated episodes (cartoons) were also created by the participants, condemning bribery, hypocrisy, laziness, vanity and self-centeredness. Based on both the original text of the play by N. Gogol and fragments written by adolescents, a script of the play was created, which included an animated interpretation of N. Gogol’s narrative. The objectives and the content of each session are presented in more detail in Table 1.

Table 1

**Brief description of the activities of each drama session**

Data of the session	Goals of the session	Activities in the framework of the session	Meta-subject competences and personal educational achievements
18.11. 2021.	To engage the participants into the project. To boost learning motivation and spark the interest for cognitive activity.	1. Analysis of the videorecording of the play “Letters from the Past”, staged with the participating adolescents in May, 2021. Group reflection. 2. Creative training aimed at the development of storytelling skills.	<ul style="list-style-type: none"> <li>• development of aesthetic consciousness;</li> <li>• development of susceptibility to different types of art, awareness of the importance of artistic culture as a means of communication and self-expression;</li> <li>• development of reflexive skills.</li> </ul>
25.11. 2021.	Development of civic values. Formation of readiness to evaluate behavior and actions through the prism of moral and legal norms.	1. Working in groups (introduction to the biography of N. Gogol and to the history of him creating the play “The Government Inspector”, acquaintance with the “world” of his characters, their vices, and personal traits; joint reading of the original play). 2. Discussion around the topic of “misbehavior” and “anti-social behavior” at school and generally in everyday life.	<ul style="list-style-type: none"> <li>• development of social behavior skills in accordance with ethical standards;</li> <li>• development of understanding of the role of various social institutions in human life (on the example of N. Gogol's fictional citizens, oppressed by bureaucracy and corruption).</li> </ul>

Data of the session	Goals of the session	Activities in the framework of the session	Meta-subject competences and personal educational achievements
08.11. 2021.	Role-play and role-experimenting activities.	1. Theatrical games and exercises aimed at training attention, communication and interaction. 2. Exercises on improvisation and play reading. 3. Acquaintance with the "stand-up" genre, discussion and tasks on creating jokes and puns.	<ul style="list-style-type: none"> <li>• development of emotion management skills;</li> <li>• development of reading competence;</li> <li>• formation of the intention of self-expression in different types of art.</li> </ul>
22.11. 2021.	Boosting of interest for learning the Russian language, history and culture of the Russian Federation. Development of civic values.	1. Assessment tasks (intellectual game "What, Where, When"). 2. Work in groups. Analysis of N. Gogol's literary style (based on the text of the play "The Government Inspector"). 3. Discussion around social problems and challenges: corruption, bribery etc.	<ul style="list-style-type: none"> <li>• development of reading and research competences;</li> <li>• formation of the position of active rejection of antisocial behavior;</li> <li>• knowledge about the ways of combatting corruption (about anticorruption measures).</li> </ul>
29.11., 06.12., 13.12. 2021. (similar structure of the sessions)	Development of skills of joint work (activity) in groups with age-mates and adults. Artistic education. Elements of professional education.	1. Acquaintance with cartoon animation as a form of creative self-expression. Training on creating cartoons. 2. Groupwork on producing instructive cartoons on acute topics (development and discussion of the plot, selection of means and artistic forms to express the idea of a cartoon, creating sketches of characters, drawing, cutting, laying out characters on sheets for filming, choosing a sound track etc.). 3. Group reflection (assessment of the quality of the footage with possible reshooting of shots, discussion of the created materials and editing of the final versions of the cartoons).	<ul style="list-style-type: none"> <li>• formation of the intention of self-expression in different types of art;</li> <li>• gaining experience in morally significant activities;</li> <li>• development of independence and self-organization skills;</li> <li>• development of positive self-esteem.</li> </ul>
20.12.2021.	Experimenting with roles. Development of skills of joint work (activity) with age-mates and adults.	1. Discussion about the relevance of the play "The Government Inspector". 2. Work on the script of the play: intertwining fragments of the original text by N. Gogol with the products of adolescents' creative activity (epigrams, stand-up sketches, cartoons), searching for logical errors and correction of inconsistencies. 3. Rehearsals with follow-up discussions without teachers' participation. 4. Trainings on verbal and non-verbal interaction, development of positive self-esteem and positive perception of others. 5. General rehearsal.	<ul style="list-style-type: none"> <li>• development of aesthetic consciousness;</li> <li>• development of reflexive skills;</li> <li>• formation of the intention of self-expression in different types of art.</li> <li>• formation of skills, necessary for joint activities, development of mutual understanding and mutual assistance.</li> </ul>

Data of the session	Goals of the session	Activities in the framework of the session	Meta-subject competences and personal educational achievements
27.12., 29.12.2021. (similar structure of the sessions)	Development of skills of joint work (activity) in child-adult communities. Artistic education. Elements of professional education.	1. Discussion of the script, created by adolescents, with an invited expert in the field of dramatic arts. 2. Final editing of the script for the performance.	<ul style="list-style-type: none"> <li>• development of skills and competences, required for interaction and communication with the adult, abilities to defend one's own opinion, skills of working in a team with adults and being able to find compromises;</li> <li>• development of reflexive skills;</li> <li>• formation of the ability to manage one's own emotions;</li> <li>• formation of the ability to accept oneself and others without judging.</li> </ul>

**Research methods included:**

- participant observation of theatrical activities;
- video recording and subsequent analysis of the videos shot at the drama sessions;
- analysis of the participants' products of activity (script of the play, cartoons, epigrams, etc.);
- regular interviews with adolescents and teachers involved in the project;
- filling in reflexive diaries, where adolescents were asked to analyze their contribution to the activities at the sessions, assess their emotional state during the sessions and after them, record changes both in their own behavior and in the behavior of the other participants of the project.

To substantiate the efficiency of theatrical activities as a technology for educating and developing personal educational results, the research group analyzed:

- more than 24 hours of video recordings;
- more than 30 interviews with adolescents and teachers;
- over 56 reflexive diaries.

The analysis of the empirical data indicates that theatrical activities aroused interest and enthusiasm in most of the project's participants (96% of girls and 88% of boys). The majority of adolescents engaged in the

project rated their experience at the sessions as extremely positive (Fig. 1). At the same time, girls more often than boys were in high spirits at the end of the theater sessions (36% and 13%, respectively).

The analysis of the interviews and of the content of reflexive diaries that the participants filled in regularly shows that theatrical activities can become an efficient means of developing civic competences as well as spiritual and moral values. For example, after the sessions, the participants of the project highlighted: *“People will not be able to interact in efficient ways if their communication contains such “dirty” qualities [mercenary, rudeness, immorality, deceit, stupidity etc.]. They will destroy our society from the inside, and subsequently there will be no place left for positive qualities” (A); “A bribe is the destruction of society, the loss of real values” (K.); “Hypocrisy means stratification, separation of people. Irresponsibility is the stop to modernization and prosperity” (N.).*

Besides the formation of moral values and civic competences, adolescents also noted a number of achievements in personal educational results and the development of meta-subject competences, including communication and reflexive skills, as well as



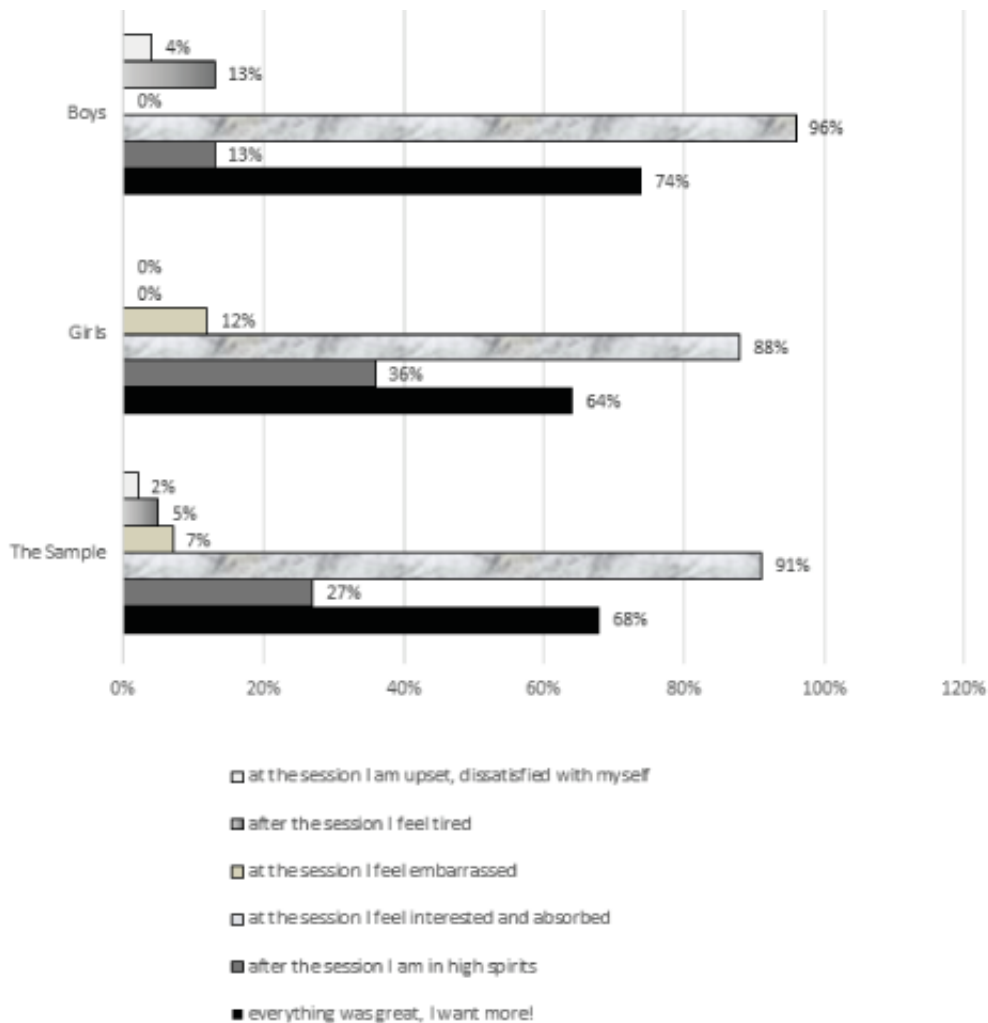


Fig. 1. Adolescents' emotional perception of the activities at the drama sessions

the ability to work in various child-adult communities: "I've become more realistic and down to earth, I've learned to make friends" (S.); "The drama experience brought to my life the understanding of how to interact with others, how to work well in a team, how to reflect upon things and bring to life characters from a book, a play, etc." (D.), "I began to speak in a clearer way. I can now much

better express my thoughts. I write/create more. I've become more attentive" (N.); "I've learned to understand people, at least I do my best trying to understand them. I've also learned to express my thoughts and wishes without being embarrassed about it" (K.).

The most significant changes were achieved in the cases of T., M. and R., which are described in more detail below.

### The Case of Student T.

According to the interviews with teachers and classmates, student T. is a gifted adolescent, with developed speech skills. He is brought up by a single mother with whom he has “*difficult relationships*” (quoted from the interview with T.). The difficulties that he experiences in relationship with his mother might be indicated by a phrase from his essay on the topic “Vices denounced by Gogol in the context of the 21st century”, in which T. notes that “*There are parents who are so preoccupied with their work, that the upbringing of their children is reduced to giving them a mobile phone or other gadgets to keep children out of the way*”.

T. has a rather tense relationship with the classmates (“*My classmates do not value the work of other people and behave like children*”, “*I have no friends, only acquaintances*”). According to the teachers, the boy is rather “*isolated, detached, focused on his own thoughts and demonstrates certain cruelty in relation to classmates*”.

Shortly before the start of the project, T. was aggressively attacked by the boy P., with whom he seemed friendly for many years. According to P., T. was repeatedly provoking him by displaying physical aggression, and P., unable to stand it, after one more attack by T., hit on T.'s head with a chair. As a result, T. was taken to hospital. After the incident, P. was suspended from school for three weeks and then transferred to another class. After T. returned from hospital, both teenagers began to attend drama sessions in the framework of the project.

At the first sessions, T. kept to himself and demonstrated detachment, trying to seem sort of “mysterious”. He took little part in the activities, mostly observing what was going on. At the trainings on compiling a collective narrative, the teenager demonstrated disinterest and deliberately “dropped out” of the context of the story, suggesting, for example, irrelevant plot twists. Once it was necessary to “boost” the plot (continue the narrative adding more details and story-

lines), T. suggested that the main character of the story “*commit a suicide*”, “*be betrayed by a friend*”, “*lose his business due to the mistakes of other people*”, etc. It was obvious that these events did not fall into the place in the context of the narrative, collectively made up by adolescents.

It is important to note that at the beginning of the project T. did not show any interest in teamwork and he did not mention any intentions to establish contacts or develop relationships with his classmates. When asked why he decided to partake in the project, T. answered that he wanted to acquire practical skills (“*I like to get my voice developed*”, “*I want to learn how to draw cartoons*”, “*I like the idea of writing a diary with goals and plans — I always do it that way for myself*”).

The analysis of T.'s interactions with the other participants indicates that, undoubtedly, he has difficulties in communication with peers. During the sessions, T. provoked the participants of the project several times. At one of the sessions, for example, T. tried to provoke student R. into physical aggression (as it was in the case with P.). Another day, T. spoke in an insulting manner to student S., who, in T's words, “*was inattentive to his theatrical sketch*”. The incident was limited to verbal aggression.

In addition, in the beginning of the project, T. did not accept criticism from the adults at all. In particular, after the sessions with an invited cartoon expert, T. noted in his reflexive diaries that he did not want to “*discuss anything with O.*” and listen to her “*remarks/criticism/advice*”. After one of the sessions, the teenager wrote: “*Everything worked out, but I would like O. [the cartoonist] not to distract me from work*”.

As the project continued and new child-adult communities emerged at the sessions, there were clear positive trends in the way how T. was interacting with the other participants. For example, in T.'s reflexive diaries, positive reviews of the other participants' abilities and achievements began to appear (“*Many [of the classmates] are embarrassed to express*

*themselves, although they can do a lot*”, “*everyone can draw well*”). In addition, T.’s become more sociable and began to show more initiative, which was emphasized by the other adolescents (in the reflexive diaries at the last session). Student S., for example, with whom T. had had a conflict situation at the beginning of the project, noted that “*T. learned to speak loudly*”, that he “*began to express his opinion*”. At the last session, several teenagers noted that in one of the team building exercises, T. took the initiative with the ball and came up with his own rules for the game, in which he engaged all the participants.

It is also noteworthy that T. resumed relations with P., with whom he had had a serious conflict. By the end of the project, both teenagers worked as a team and communicated at ease, it seemed that they have completely forgotten about the incident.

In general, positive dynamics in T.’s interactions with peers and adults can be traced both in his reflexive diaries and in the diaries of the other participants. Positive changes were also repeatedly noted by teachers and adolescents in the interviews.

### **The Case of Student M. and Student R.**

According to the teachers, M. is strongly influenced by T.: not only do they often sit together at the lessons, but also support each other and even team up against classmates. Copying T., at the beginning of the project M. denied having friends, saying that he had only “acquaintances” at school. At the first sessions, just like T. did, M. “dropped out” of the activity and demonstrated detachment. At the same time, in the classroom, M. never provoked obvious conflicts and behaved correctly.

As the project continued, the research group noticed, that when T. was absent at sessions, M. would become more actively involved in teamwork, and would behave more friendly to the other participants. In particular, S. noted in her reflexive diary that during cartoon classes “*M. was very passionate about the activity*”. M. himself wrote in his reflexive diary: “*Today*

*I learned to work in a team. I learned to listen to others*”. He also noted that he “*discovered the phenomenon of collective thinking*”. In the final questionnaire at the end of the project, M. noted that he became able to “*work in a team*”, also he outlined that “*Now I communicate more openly with people. This was not the case at the beginning of the program*”. Interestingly, two girls participating in the project (I. and S.) noted in an interview that due to the project “*M. has become more friendly, began to offer his help and say “hello” at school*”. Besides that, M. made friends with R. while working on the production of the cartoons. Thus, after one of the sessions, M. wrote in his reflexive diary: “*I communicated well with R., together we made a cartoon*”. R. also wrote about the positive experience of interaction with M. in his diary: “*M. knows how to work well*”. In the final questionnaire, M. noted that, in general, theatrical activities “*help to reveal oneself. It becomes easier to communicate*”.

The dynamics of student R. is also remarkable. At the beginning of the project, he noted that he was upset by “*disagreements with some classmates*”, and that he “*does not always manage to recognize the emotions of other people*”. However, during the project, his assessment of himself and of others have significantly improved: “*I can find common language with the guys whom I didn’t use to get along with*” or “*we must support each other in any situation*”. As for the theater sessions, R. wrote that they “*help to work in a team, interact with each other*”.

In general, the empirical data obtained during the project, testifies that theatrical activities, implemented in school practice, contribute to:

- team building, resolution of interpersonal conflicts, formation of willingness to participate in the lives of other people and society in general;
- formation of moral values, and active civic attitudes;
- development of communicative and reflexive skills, ability to work in child-adult groups (communities).

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# Quality Management in Pedagogical Education based on the Diagnostics of Teachers' Professional Deficits: Theoretical and Methodological Aspect

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The paper presents the methodology of education quality management based on the identification of teachers' professional deficits. The methodology for evaluating the formation of the subject and methodological competencies is described. Assessment materials are developed in accordance with the requirements of the professional standard of the teacher and the Federal state educational standards of basic, primary and secondary education. It is supposed to implement an automated identification of professional deficits within teaching staff. The article presents empirical data on the results of the approbation of this technique. 624 teachers from rural and urban educational organizations of the Republic of Bashkortostan and 90 students of pedagogical specialties of the university participated in the testing. The analysis of the approbation results of the methodology and assessment materials showed that the developed methodology is applicable to identify professional deficits of teachers and students of teacher-training institutions for further construction of individual educational trajectories of the approbation participants.

**Keywords:** assessment of competencies, assessment materials, pedagogical education, teacher, quality of education, subject and methodological competencies, management, diagnostics, professional deficit, professional development, individual educational trajectories.

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## Управление качеством педагогического образования на основе диагностики профессиональных дефицитов учителя: теоретико-методический аспект

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Представлена методология управления качеством образования на основе выявления профессиональных дефицитов учителя. Описана методика оценки сформированности предметных и методических компетенций, которая предполагает автоматизированное выявление профессиональных дефицитов у педагогических работников посредством оценочных материалов, разработанных в соответствии с требованиями профессионального стандарта педагога и федеральных государственных образовательных стандартов основного общего и среднего общего образования. Приводятся результаты апробации данной методики, включающие в себя в том числе и эмпирические данные. В апробации участвовали 624 учителя из сельских и городских образовательных организаций Республики Башкортостан и 90 студентов педагогических специальностей университета, при этом выявлено, что уровень сформированности предметных компетенций у всех участников выше уровня сформированности методических компетенций. Проведенный авторами анализ полученных результатов показал, что разработанная методика и оценочные материалы применимы для выявления

профессиональных дефицитов учителей и будущих педагогов, а также последующего построения индивидуальных образовательных траекторий участников апробации.

**Ключевые слова:** оценка компетенций, оценочные материалы, педагогическое образование, учитель, качество образования, предметные и методические компетенции, управление, диагностика, профессиональный дефицит, профессиональное развитие, индивидуальные образовательные траектории.

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## Introduction

Modernization of the Russian education system is carried out in the development of a nationwide system of professional growth of a teacher. Professional competencies of teachers are a key resource for updating a modern school since the achievement of educational results directly depends on the level of their formation. The integral indicator «quality of education» expresses the measure of compliance with the topical ideas in society about the goals the educational process should serve. Quality management in education is associated with the problem of its measurement — compliance with educational and professional standards. When solving the problem of quality measurement, it should be taken in account that different «stakeholders» include different characteristics into the content of the concept.

The employer associates the quality of an employee's education with his/her ability to solve professional tasks quickly and effectively. For an employee, professional growth and self-realization are of great importance. The main component of the quality of education from the position of the founder of the

educational organization is the compliance of the results with the requirements of Federal state educational standards. From the teacher's point of view, quality is measured by the educational results of students and is often expressed by assessments based on the results of control activities, exams and tests. To one degree or another, all these indicators reflect certain areas of the definition of «quality of education» — multidimensional in its content [2; 17; 20].

Several approaches to the disclosure of the concept of «quality of education» have been formed [11]. The first approach is based on the methods of pedagogy, considering the quality of education as a multidimensional phenomenon. Therefore, its disclosure involves a theoretical description and complex scientific equipment. A.V. Tomiltsev and A.V. Maltsev point to the complexity and multidimensionality of the problem of developing methodological foundations for assessing the professional competence of a university graduate [19].

The second approach is associated with adapting the quality management methodology implemented in business/production to

the education system. The forms and methods of education quality management are developed based on of the universal quality management concept (TOTAL quality management-TQM) or the international quality standard of the ISO9000 series. However, such forms and methods in the conditions of the educational process may not be as effective as in production.

The third approach is based on the inclusion of the theoretical ideas of the previous two and involves the development of algorithms for assessing and managing the quality of education. As a result, we get a multi-level structure, with the upper level — general scientific theories and provisions of philosophy and systematics, and the middle-scientific theories and provisions of pedagogy. Due to our rationality, we will adhere to the following approach: on the one hand, assessment methods and algorithms for managing the quality of education should be based on general philosophical principles, management theory, quality science, and psychology; on the other hand, they should take into account the peculiarities of the educational process.

The implementation of the concept of quality management in education actualizes the problem: how should the autonomy of the education subjects be considered within the framework of external plan-oriented management? It is impossible to manage the quality of the educational process like industrial production since participants in the educational process are equal and active subjects with their values, beliefs, and will and characteristics. A significant role in education is given to introspection and self-assessment, self-realization, and self-management. Accordingly, along with teachers and students, the central place in quality management should be given to the educational organization as a social system.

Although there are different approaches to defining methods, identifying indicators and standards of education quality,

the interpretation of the word «quality» in two aspects remains indisputable. On the one hand, it is compliance with standards (specifications); on the other — compliance with consumer requirements. Accordingly, education is considered as the result of systematic assimilation of knowledge and the development of skills and intellectual qualities of a person, i.e., from the position of necessary conditions for his/her preparation for life and work.

Let us note the methodologically important provisions for understanding the phenomenon of the quality of education [2; 4; 11; 17; 19]:

— the quality of education is a set of characteristics that allows solving the problems of comprehensive education and harmonious development of students' personality;

— it is legitimate to consider the quality of education both as a whole and in terms of diagnostic procedures and results;

— the quality of education depends on its content and is determined by the basic system of human activity;

— the quality of education as a process is the quality of interrelated teaching and learning activities that take place within the framework of an organized educational process;

— the quality of training is associated with the possibility of forming such attributes of knowledge in the learner's system as completeness, depth, efficiency, flexibility, concretization, generalization, convolution, expansion, systematization, consistency, awareness, and strength;

— the quality of education should be considered based on system-structural positions, highlighting the defining properties in the context of the most significant external and internal links.

It can be concluded that the quality of education is directly related to the teacher training and retraining [14]. Accordingly, it is relevant to develop mechanisms for scientific and methodological support of teach-

ers to improve regional systems of general education.

### **Mechanisms of Education Quality Management**

In Russian and foreign practice, there is sufficient experience in developing effective mechanisms for managing the quality of education. One of the directions of such work is identifying the conditions for the professional formation of a teacher in a digital educational environment. This, in its turn, implies an assessment of the quality of education as a multidimensional phenomenon, taking into account the contexts of the educational environment and the functions of the teacher himself, who implements the processes of learning, upbringing, and development.

International and Russian practices in evaluating the activities of teachers are systematized in the work of L.E. Kurneshova and D.V. Dydzinskaya [8]. The authors, based on the analysis of various tools for diagnosing teachers' competencies, note that "within the framework of international and all-Russian studies, two methods of evaluating teachers are mainly used: external formalized assessment in the testing format and self-assessment in the questionnaire format" [8, p. 76]. Moreover, standardization of the procedure based on these methods allows automated processing of diagnostic results for a large sample of respondents.

The international comparative study TALIS (Teaching and Learning International Survey), conducted by the Organization for Economic Cooperation and Development, is devoted to the issues of teaching and learning in secondary schools in different countries [7]. Along with the issues of teacher training and professional development, effective teaching methods and the level of professional abilities are being investigated. Thus, the priority direction of the research is to identify the competencies of teachers as a basis for designing their professional

development. In conclusion, we consider it necessary to note that conducting "spot" work with teachers to identify their reserves and problem areas will not only regulate the process of their professional growth, but also improve the quality of education.

The quality of training of future primary and secondary school mathematics teachers is assessed within the framework of TEDS-M (Teacher Education Study in Mathematics) on representative samples of graduate students of pedagogical specialties of the university. In addition, the level of mathematical training of future teachers was assessed based on the results of 'completing tasks from high school and higher mathematics courses in such sections as numbers and actions with them (arithmetic), algebra and functions, geometry and measurements, data and chances" [7]. The emphasis is on the continuity of teaching: teachers need to know the basic ideas and methods of the higher mathematics course, and subsequently prepare their students to study them.

The assessment of the methodological training of future teachers was carried out based on identifying knowledge of the content of the mathematics course, the ability to plan the learning process, and actively use teaching methods. An integrated approach to the design of tasks deserves special attention to evaluate the actual knowledge about the mathematical object and the ability to apply it in teaching. The methodology implemented in TEDS-M allows us to conclude that it is advisable to carry out the diagnostics of teachers' professional competencies through combined tasks where knowledge and methods on the subject are integrated with questions on the methodology of teaching it.

Methodological aspects of the organization of the procedure of independent assessment of professional competencies of future teachers and the results of its approbation are presented in work [10]. Diagnostics of

competencies was carried out by using tests on the profile of training with a choice of one out of four possible answers and pedagogical cases that implied a detailed answer to the professional situation. Since third-party experts are involved in evaluating the case tasks, there is some subjectivity in the evaluation process. This disadvantage can be eliminated by developing such techniques that would allow assessing the subject and methodological competencies of the teacher in an automated mode.

The issues of diagnostics of subject and methodological competencies of chemistry teachers are considered in research work [18]. By selecting methodological tasks of diagnostic work, the authors focused on "the components of the general methodological competencies of the teacher, regardless of methodological peculiarities of teaching the subject" [18, p.19]. Among the components of methodological competencies, the following are distinguished:

- knowledge of the regulatory framework for conducting General State Examination on the subject and understanding the features of available resources to achieve the planned learning outcomes;

- the ability to identify the main components of the methodology for the formation of subject learning outcomes;

- the ability to design a lesson and select the subject content depending on the learning objectives;

- the ability to plan the monitoring of the learning achievements for the academic year.

The assessment of professional competencies of teachers and graduates of pedagogical universities is based on the requirements of the professional standard of a teacher and Federal state educational standards of general education. When assessing professional competencies, one should take into account the teacher's abilities:

- to design a lesson and select material for its implementation,

- to search for mistakes in the students' works and be ready to explain them,

- to answer questions reasonably; and

- to evaluate students' fulfillment of tasks with a detailed answer according to the specified criteria.

In the context of the transformation of education, it is important to have objective information about the teacher's achievements and difficulties, which actualizes the problems of pedagogical diagnostics of his professional deficits in the educational process and the corresponding change in professional activity for its subsequent correction [15].

### **Assessment of Teachers' Professional Deficits**

Among the methods of identifying professional deficits, the leading role is given to tests and questionnaires in which different blocks are distinguished, taking into account the structure of the activity. I.Y. Gutnik notes that "this approach does not allow the teacher to fully realize his professional deficits, as evidenced by interviews with teachers who had an experience of passing such a monitoring" [3, p. 34]. The analysis of regional practices makes it possible to identify the specifics of professional difficulties faced by modern teachers. The difficulties are mainly related to the teacher's unwillingness to solve professional problems in the changed working conditions caused by the processes of personalization in the digital educational environment; with the inability to solve the problems of individualization of education based on effective communication; with the inability to reflect on solving problems related to the nonlinearity of the educational process [3; 6; 9].

The trajectories of professional and career development in the context of the implementation of the national system of professional growth of teaching staff, as noted by T.I. Pudenko, "should become not only motivationally attractive to the teacher

but also depend on the current level of qualifications confirmed by independent assessment procedures, including the certification procedure" [13, p. 6]. An independent assessment is not just a confirmation of compliance with certain qualification requirements that are unified throughout Russia, but also the identification of professional deficits of a teacher, the elimination of which is possible based on a personalized approach to professional development.

As part of the development of a unified system for assessing the quality of education and the national system of teacher growth in the Russian Federation, a model for the level assessment of subject and methodological competencies of teachers based on the use of unified federal assessment materials (UFAM) has been developed [1]. The model is based on the following approaches:

- taking into account the requirements for knowledge and skills necessary to perform labor functions and labor actions defined in the professional standard "Teacher (pedagogical activity in the field of preschool, primary, basic, secondary education) (educator, teacher)";

- unity of the diagnostic work structure for all subject areas;

- unification of the requirements for the level of competencies.

The analysis of the Russian and international experience of education quality management based on models and mechanisms of independent evaluation allows us to conclude that the quality of education mainly depends on the competencies of teachers — direct participants in the educational process. In particular, it depends on how teachers implement the educational process, how they choose educational technologies, teaching tools, and teaching materials. Therefore, one of the directions of education quality management is the development of mechanisms for identifying teachers' professional deficits and support-

ing their individual educational trajectories. At the same time, we are convinced that an actual increase in the quality of education is possible with the use of a subject-subject approach in establishing social interaction between its actors — those teaching and trained (teachers), taking into account the individual qualities and competencies of the latter [16].

### **Methodology for Identifying Teachers' Professional Deficits**

The methodology for identifying professional deficits in teaching staff (from now on the Methodology) was developed as part of the implementation of the research project «The development of a regional model of quality management in pedagogical education based on the identification of professional deficits and the construction of individual educational trajectories of teaching staff (including students — future teachers)» at Bashkir State Pedagogical University named after M. Akmulla. The project's main goal is to ensure the continuous development of teachers' professional competencies.

This Methodology makes it possible:

- to evaluate the subject and methodological competencies of teachers, providing the subject results of students mastering academic subjects / subject areas of the basic educational program of primary and/or secondary education;

- to determine the level of competence formation of teachers and students — future teachers;

- to identify professional deficits among teaching staff (including students) in the subject and methodological competencies.

The Methodology is developed based on the following approaches:

- the focus of the assessment materials on identifying the readiness of teachers to perform labor functions and labor actions defined in the professional standard "Teacher (pedagogical activity in the field of preschool,



primary (grades 1—4), basic (grades 5—9), secondary (grades 10—11) education) (educator, teacher)";

— assessment materials content compliance with the requirements of Federal state standards of primary and secondary education and exemplary educational programs;

— practical orientation of assessment materials;

— taking into account the best foreign and Russian practices for assessing the competencies of educational organizations employees;

— involvement of the expert community in the research;

— providing limited access to the personal results of the competence assessment participants and depersonalization of the results during generalization and analysis;

— uniformity of the structure of diagnostic materials for different academic subjects / subject areas;

— taking into account the specifics of the content of the educational subject;

— automated verification of results and identification of professional deficits.

According to the results of the diagnostic work, the participant scores a certain number of points, which allows to determine the level of formation of competencies necessary for the implementation of professional activities. Also, a list of professional deficits identified based on the unfulfilled tasks is formed for each participant. In the context of this study, professional deficits are understood as the absence or insufficient development of professional competencies of teaching staff, which causes typical difficulties in performing certain labor functions.

To assess the results of the diagnostic study, 5 levels of competence formation were identified according to the total number of points scored by the participant for completing part 1, 2 or the entire work as a whole. The level of competence is considered low if the participant received less than 30% of the possible number of points, sat-

isfactory from 30 to 59%, basic from 60 to 69%, elevated — from 70 to 79%, and high when the final score of the participant is 80% or more of the possible maximum score.

The tools for identifying professional deficits and forming individual educational trajectories of teaching staff (as well as students — future teachers) include:

— sets of assessment materials for academic subjects: Biology, Mathematics, Social Studies, the Russian language, Physics, and Chemistry;

— questionnaires that collect contextual data about test participants;

— instructional materials for participants and organizers of testing.

At the first stage of the project (January — October 2021), the approbation of the developed tools and methods for identifying professional deficits of teachers was carried out. In addition, 17 scientific seminars (including webinars) were organized to discuss the interim results of the research and to plan the work of the temporary creative team for the upcoming period. In the approbation, the following subjects took part:

— 624 teachers of educational organizations of the Republic of Bashkortostan (including 145 teachers of Mathematics, 199 teachers of Russian, 62 teachers of Biology, 59 teachers of Chemistry, 63 teachers of Physics, 103 teachers of Social Studies; 7 teachers performed diagnostic work in two subjects);

— 90 students enrolled in the main professional educational programs of the bachelor's and master's degree in the field of "Education and Pedagogical Sciences"

— 14 teachers of "BSPU named after M. Akmulla".

For testing, special diagnostic tools were developed. They provided an assessment of the subject and methodological competencies, and the identification of professional deficits. The diagnostic tools include sets of measuring materials for teachers in 6 subject areas. Each set consists of a specification,

a codifier and 5 diagnostic options (including a demo version). The diagnostic work was developed taking into account the requirements of the professional standard "Teacher (pedagogical activity in the field of preschool, primary, basic, secondary education) (educator, teacher)" [12] and is aimed at assessing the teachers' readiness to perform the generalized labor functions "Professional activity for training and education of students in educational programs of primary, basic and secondary education", and "Professional training activity", labor action "Planning and conducting training sessions" in terms of possession of subject and methodological competencies in accordance with the requirements of the Federal state standard of primary and secondary education and exemplary educational programs.

A demo version of the diagnostic work is posted on the university's official website ([https://bspu.ru/page/project\\_profdeficit](https://bspu.ru/page/project_profdeficit)) for preliminary acquaintance to all persons interested. Instructional materials have been developed for all categories of approbation participants. The approbation was carried out jointly with the Ministry of Education and Science of the Republic of Bashkortostan and BSPU n. a. M. Akmulla. Based on the results of the approbation, the following was presented: the analysis of the diagnostic work results in the context of subject areas, generalized indicators of the subject and methodological competencies of the teachers participating in the approbation, levels of the subject and methodological competencies, identified professional deficits, and recommendations for their elimination. To ensure the information openness of the project, a separate page was created on the official website of the BSPU n. a. M. Akmulla.

### **Description of Diagnostic Work**

Diagnostics of subject and methodological competencies of teachers working in basic and secondary schools was carried out in 6 academic subjects: Biology, Math-

ematics, Social Studies, Russian, Physics, and Chemistry. Evaluation materials make it possible to estimate teachers' proficiency in the subject and methodological competencies, identify professional deficits and determine the educational needs of the teacher.

The results of the diagnostic work can be used to build an individual educational trajectory of the teacher, which helps to increase the targeting of the professional development system. It is also possible to update the professional core educational programs of higher education in terms of content, technologies and tools for assessing competencies.

Due to the assessment of competencies for teachers in the region, relevant areas of interaction between public, expert, and analytical organizations, executive authorities of the subjects of the Russian Federation managing education are being formed to improve the quality of education in the region.

Each variant of diagnostic work consists of 18 tasks divided into two parts: 10 tasks of part 1 in the test form for the assessment of subject competencies and 8 tasks of part 2 for the assessment of methodological competencies of the teacher, presented in the form of methodological tasks. A test participant was randomly offered one of 4 diagnostic options. The number of participants who performed different variants varied. The general structure of the diagnostic work option is presented in Table 1.

Part 1 of the diagnostic work contains 10 test tasks of five types:

- a) 3 closed-type tasks with the choice of one correct answer out of four proposed;
- b) 2 closed-type tasks with a choice of several answer options from the proposed ones (2 out of 5 or 3 out of 5);
- c) 2 closed-type tasks to establish compliance when the number of positions in the first column (questions, statements, facts, concepts) is less than the number of positions in the second column (list of statements, properties of objects) by 1—2 units;

Table 1

**General Structure of the Diagnostic Work**

Diagnostic work section	Number of tasks	Maximum score
Part 1. Tasks in the test form for the assessment of subject competencies	10	26
Part 2. Tasks-cases in a test form for the assessment of methodological competencies	8	22
Total	18	48

d) 1 closed-type task to establish the sequence;

e) 2 open-type tasks for the addition of a word or number.

The tasks of Part 1 are aimed at assessing the teacher's competencies and identifying his professional deficits in the taught subject area.

Part 2 contains 8 methodological tasks presented in the form of test tasks of different types. Methodical tasks allow assessing the teachers' possession of the methodological competencies necessary to perform the labor function, defined by the professional standard [12]. Methodological tasks are distributed in 3 blocks, in accordance with the main components of the teaching process:

— the "Goal setting" block (definition of goals, objectives, educational results) contains 2 tasks;

— the "Training" block (forms, methods, techniques, technologies, means, individualization of training) includes 4 tasks (2 tasks are for the assessment of basic methodological competencies, 1 task is for

the assessment of ICT competencies, 1 task is for the assessment of competencies necessary for the organization of persons with disabilities training).

— the block of "Assessment and control" (criteria assessment, forms, and types of control) — 2 tasks.

Diagnostic tasks have different levels of complexity (see Table 2).

Tasks are evaluated with a different number of points depending on their difficulty level. The evaluation of the tasks is carried out by the testing system in an automated mode, taking into account the evaluation instructions proposed for each task of diagnostic work and evaluation criteria.

Each task is associated with certain controlled content elements and professional deficits identified when this task is not completed. The paper [5] describes the diagnostic work in mathematics and provides the results of its approbation among teachers.

135 minutes are allocated for performing diagnostic work, including 15 min. to study the instructions for completing the tasks of

Table 2

**Distribution of Diagnostic Work Tasks According to Levels of Complexity**

Level of complexity	Part 1		Part 2	
	Number of tasks	Maximum score for the task	Number of tasks	Maximum score for the task
Basic	6	2	3	2
Elevated	2	3	4	3
High	2	4	1	4
Total	10	26	8	22

the work; 60 min. to perform the first part of the work; 60 min. to perform the second part of the work.

### Generalized Results of Assessing Subject and Methodological Competencies of Teachers Participating in the Approbation

624 teachers took part in the diagnostic testing, among which 7 people performed 2 diagnostic works in different subjects. Thus, the results of 631 diagnostic work in six subject areas are analyzed: Russian (199 papers); Mathematics (145 papers); Social Studies (103 papers); Physics (63 papers); Biology (62 papers); Chemistry (59 papers).

90 students of M. Akmulla BSPU participated in the diagnostic testing, among them 23 students performed work in mathematics, 20 students — in Russian, 22 students — in Social Studies; 13 students — in Chemistry; 6 students — in Biology; 6 students — in Physics. Participation in the approbation of students was considered as a control group for comparison with the results of school teachers. The distribution of teachers and students by levels of competence is shown in Fig. 1 and 2.

The analysis of the results of performing diagnostic work tasks by teachers allows us to determine the proportion of teachers participating in the approbation who possess professional competencies (see Fig. 1): a low level is observed in 9.0% of participants; a satisfactory level — in 64.2% of participants; a basic level — in 19.0% of participants; an elevated level — in 6.7% of participants; a high level — 1.1% of participants.

At the same time, the level of proficiency in subject competencies is significantly higher than that in methodological ones. Thus, the share of teachers who have reached the basic (and higher) level of proficiency in subject competencies is 65%, while it is only 3.7% in methodical ones.

The analysis of the results of performing diagnostic tasks by students allows differentiating them by the level of professional competencies mastery (see Figure 2): a low level is observed in 12.2% of participants; satisfactory — in 62.2% of participants; basic — in 23.3% of participants; elevated — in 2.1% of participants; there are no high level results.

The students' level of proficiency in subject competencies is also significantly

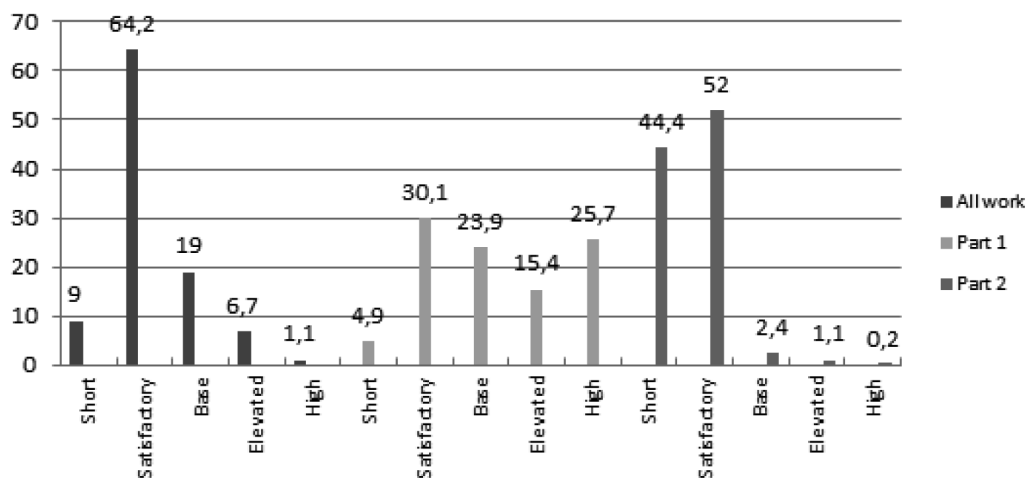


Fig. 1. Competence levels of teachers participating in the approbation

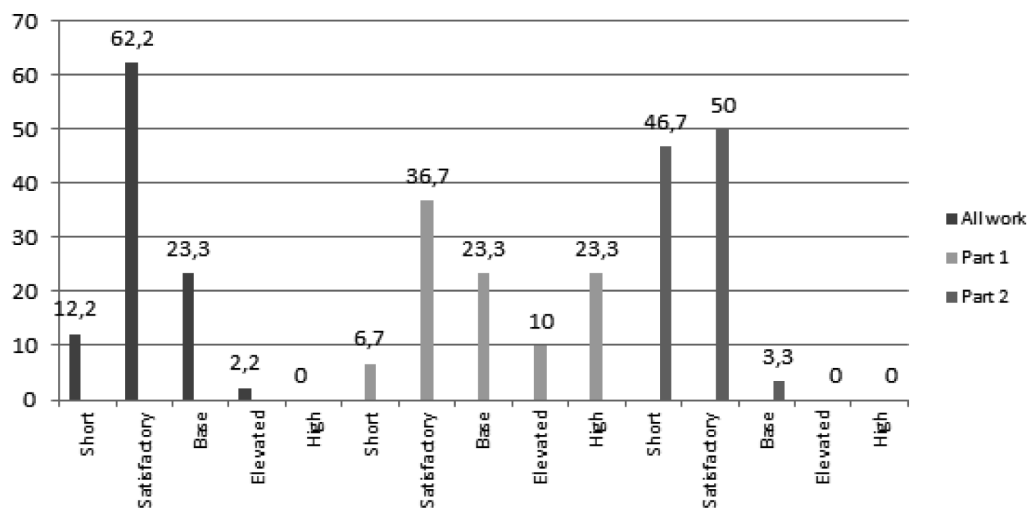


Fig. 2. Levels of competence of students participating in the probation

higher than in methodological ones. Thus, the share of students who have reached the basic (and higher) level of proficiency in subject competencies is 56.6%, while it is only 3.3% in methodical ones. Both indicators of students are slightly lower than similar indicators in the sample of teachers.

555 teachers from rural schools and 69 teachers from urban schools took part in the diagnostic testing. The results of the diagnostic work show that teachers of urban schools demonstrate a higher level of proficiency in subject competencies (see Fig. 3).

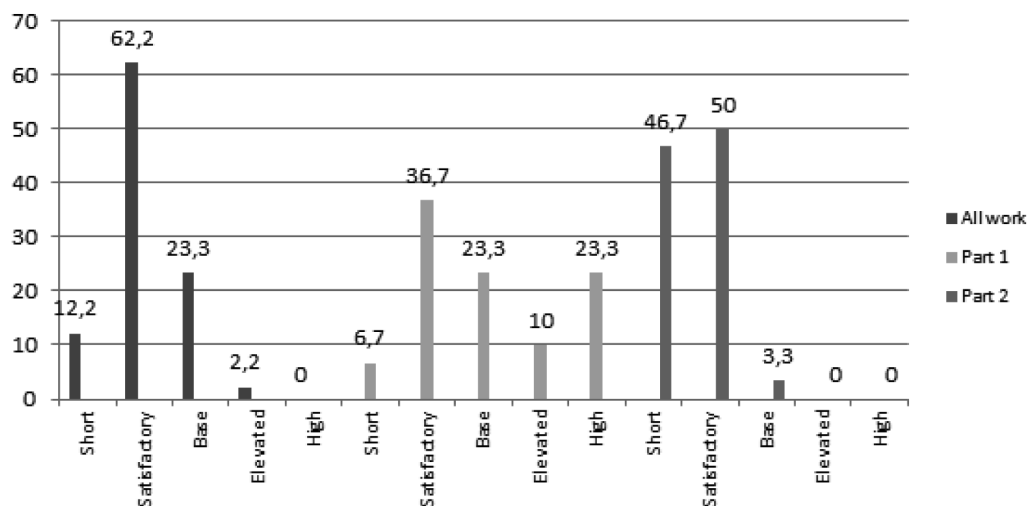


Fig. 3. Levels of subject competencies mastery by teachers from urban and rural schools

The results of the tasks of part 2 of the work indicate that the majority of participants have a satisfactory level of proficiency in methodological competencies: 62.5% of teachers of rural schools and 50.6% of teachers of urban schools (Fig. 4).

A small part of the approbation participants reached the basic level of competence development, and only 1.3% of participants from urban schools — advanced. It should be noted that a significant part of teachers demonstrated a low level of proficiency in methodological competencies (46% from rural and 31.9% from urban schools). This group of participants requires close attention to the identified professional deficits and the selection of

training activities set to improve the competence level.

The results obtained indicate the presence of professional deficits in both subject and methodological training for all participants in the diagnostics but to varying degrees (Fig. 5).

The diagnostic results make it possible to identify teachers who need help for the further development of their subject competencies. It is advisable to recommend such teachers to participate in advanced training programs aimed at expanding the general subject horizons, updating modern data on the sciences that are basic for the subject areas taught. The programs should be aimed at developing methodological competencies

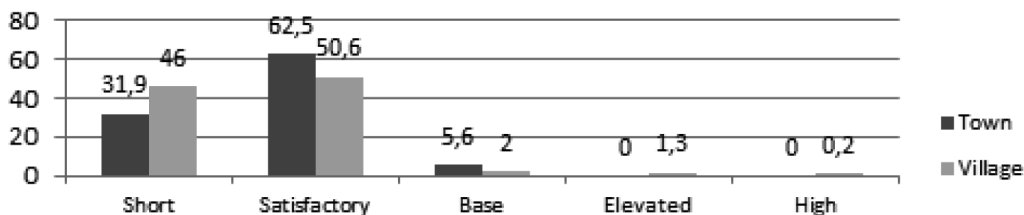


Fig. 4. Levels of proficiency in methodological competencies of teachers from urban and rural schools

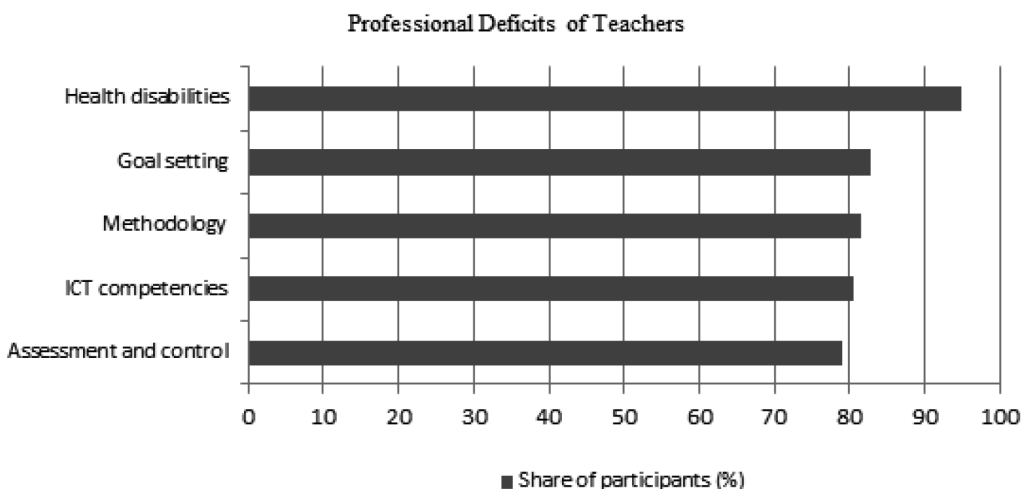


Fig. 5. Rating of identified professional deficits (methodological competencies) of teachers participating in the approbation



including basic issues related to teaching children with disabilities and the use of ICT in the educational process.

An integral part of the approbation is seminars with participants in each subject area, which are aimed at identifying self-assessment of the proficiency level in professional competencies.

### Conclusion

The first stage of the project involved the development, approbation, and pedagogical community's initial examination of diagnostic tools meant to identify the subject and methodological deficits of teachers and students enrolled in the main professional educational programs of the bachelor's and master's degree in the field of "Education and Pedagogical Sciences".

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# Child-Adult Interaction: Orientation of Children's Initiative

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The purpose of our work was to establish diagnostic criteria for assessing how the child interprets the proposed form of interaction in a situation where an adult sets an intellectual task and offers help. In this case study, we described two productive children's strategies for redefining the situation of interaction. Some children prefer to act independently of their partner putting forward and testing their own assumptions about the way to solve the task, whereas others consider the offer for help as an effective way to find out through questioning the missing conditions of action. Nevertheless, our diagnostics showed that in today's school, the proactive actions of children (targeted primarily at the content of the task and / or at the partner) are registered in less than a half of the 3—4 graders. We believe that one of the goals of activity-based education is to expand the proactive repertoire of each student in a situation of an intellectual task and to alleviate the tendency to discard his own initiative by lingering instead on ready-made answers and instructions by the adult and by yielding at the first failure. This goal will be met more successfully when the teacher takes into account that the children who come to school have already developed their favored attitudes for interaction when an adult sets a new task.

**Keywords:** child-adult interaction, children's initiative, orientation of the child's action on the content and on the partner, double stimulation method, junior schoolchildren.

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# Детско-взрослое взаимодействие: направленность детской инициативы

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Цель нашего исследования — выделить диагностические критерии, по которым можно судить о том, как ребенок интерпретирует предложенную взрослым форму взаимодействия в ситуации, когда взрослый ставит интеллектуальную задачу и предлагает любую помощь. Методом клинического анализа исследованы две продуктивные стратегии детского доопределения ситуации взаимодействия. Установлено, что одни дети предпочитают действовать независимо от партнера, выдвигая и проверяя собственные предположения о способе решения; другие же прочитывают предложение помощи как эффективный способ выяснить недостающие условия действия с помощью вопросов. Проведенная авторами диагностика показала, что инициативные действия детей (направленные преимущественно на содержание задачи и/или на партнера взаимодействия) встречаются менее чем у половины современных учеников 3—4 классов. Авторы полагают, что одна из целей деятельностной педагогики — расширение инициативного репертуара каждого ученика в ситуации недоопределенной задачи и ослабление тенденций к отказу от собственной инициативы (ожидание готовых ответов и инструкций, капитуляция при первой неудаче). Эта цель будет достигнута более успешно, если учитывать, что у ребенка, пришедшего в школу, уже есть предпочитаемые установки действия в ситуации, когда взрослый ставит новую задачу.

**Ключевые слова:** детско-взрослое взаимодействие, детская инициатива, ориентация детского действия на содержание и на партнера, методика двойной стимуляции, младшие школьники.

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## Introduction

An adult gives a child a task; if the child cannot cope with it on his own, the adult helps... The situation is ubiquitous, every day, but when thinking about it, many psychologists and educators address (in essence or in vain) the theoretical construct of the zone of proximal development, which

underlies countless research and educational practices. Today the query “zone of proximal development” returns more than nine million Google search results in Russian and twice as many in English. Any review of such an array of statements will be incomplete and partial, revealing, first of all, the professional and taste preferences of the author.



Without hiding our own partiality, we will rely only on those that do not reduce the joint action of a skilled adult and an inept child to mastering the subject matter, methods, and means of acting with the material of the particular problem under study [3; 9; 19]. We will discuss the interaction, wherein the form and content of the action are recognized as interconnected and mutually subordinate, like the content and form in poetry [2; 7]. The form of such interaction includes the emotional and semantic components compatible to the various extent [6], but does not come down to it.

More or less explicitly, these studies are based on the conjecture by D.B. Elkonin about the cumulative action, in which “the nature of the orientation changes. Orientation on the action of another is at the same time the orientation on one’s own action. Orientation on the content matter-oriented conditions is subordinated to orientation on the actions by another” [13, p. 518]. Expanding the concept of cumulative action to the idea of cumulative activity as a genetically initial unit of mental development, V.P. Zinchenko and B.G. Meshcheryakov compared it with “ontogenetic Pangea, from which all continents of human consciousness and activity derived” [4, p. 87]. The cumulative activity molds the form and content of the individual’s social and objective actions and further on becomes the basis for the subsequent birth and development of both diverse forms of object-oriented activity and diverse forms of social actions and communication” [5, p. 139].

Here, we will not distinguish between cumulative action and activity and decide whether they exist only at the nativity of human development or in each new situation “pregnant with development.” It is essential that the cumulative action is not sum of the separate actions by a child and an adult; it is one inseparable action, the situation when both participants may (or may not) become subjects of joint action [14]. By its nature, this

action is interpsychological: it is not carried out according to the plan and initiative of only one of the participants, and therefore its course is unpredictable, even when the purpose of the action is apparently unambiguous: for example, to solve a problem [10].

When offering a task to a child, an adult “packs” both the subject matter and possible methods of the child’s upcoming action into it; a sophisticated adult would even advance some assumptions as of the possible ways of the child’s object orientation in the content of the task and the diagnostic traits to assess the characteristics of the child’s action with this content. And what traits would disclose how the child perceives the proposed form of the interaction? To answer this question was the goal of our experiment. The study was aimed at revealing the position of the child faced with a new underdetermined task, to find out in what ways he would complete the task set by an adult, what role he would assign to himself and what role to an adult, what type of interaction he would consider optimal.

### **Microanalysis of Child-Adult Interaction in Solving an Underdetermined Task**

In order to reveal the dual orientation of the child’s action at both the content and the form of the interpsychological action when solving a new problem, we modified the method of double stimulation [8]. The classical method by Vygotsky-Sakharov makes it possible to study in detail the orientation of a child’s action toward the content of a task set by an adult [15]. In order to study the orientation of the child’s action on the form of interaction with the adult proposing the task, first of all, the instruction was changed [1]. The child was free to choose the type and amount of the adult’s help. In this way it was possible to see what form of interaction with the adult the child would build on his own initiative.

The experiment was carried out individually. In front of the child, there is a

table with 80 flat figures, which differed in color (red, green, yellow, blue, gray), shape (trapezia, rectangles, triangles), base width (narrow and wide) and height (low and high). The figures are divided into four groups: BAT — low figures with a narrow base; ROTS — low figures with a wide base; DEK — tall figures with a narrow base; MUP — tall figures with a wide base. The name of the group to which each figure belongs is written on its backside.

Instruction: "Now we will play the following game: I will show you a figure called BAT (turns over a low green trapezium with a narrow base to show that the word BAT is written on its backside). You will find here (among other figures) all the figures that are also called BAT without turning them over. I will answer any questions, you can ask for a hint and even for a ready-made answer.

Below we present the data from two experiments that reveal the diagnostic possibilities of the described technique to distinguish between the orientation of the child's action on the task content and on the form of interaction. Only the key episodes of solving the experimental problem are described. Quotes are from the video records. The names of the children have been changed.

### **1. Matvey, 8 years 9 months, 3rd grade. Solved the experimental problem completely in 12 minutes**

The boy looks at the experimenter with curiosity in anticipation of something interesting. After listening to the first part of the instruction (find all BATs), he immediately finds exactly the same figure as in the sample. Then he looks around the table, sees that there are no more exactly such figures, and wonders whether the problem is really solved. The experimenter checks the correctness of her understanding of the child's non-verbal statement: "Are you out of BATs?" Matvey once again looks around the table and states: "It seems so. No more here."

After making sure that the boy does not know whether he should proceed further, the experimenter delivers the second part of the instruction: "You can ask me any questions, ask for a hint, I can even show you the solution. And you can think for yourself as it suits you best". In response to this proposal, Matvey clarifies: "Are there any other BATs here?" And, having received confirmation, he immediately suggests: "Do they have to be so small?" The adult invites the child to check his guess on his own, and the boy willingly gets down to business.

Having selected all the trapezia, Matvey checks, step-by-step, all the remaining features: first, the changes in the width of the base, then color variations, and then finally compares them by the height. The words that accompany his actions reveal intellectual emotions and are practically devoid of a communicative orientation: "Oh, and here's another BAT!", "This is some kind of ... rectangular BAT", "Maybe these are BATs?"... The adult sees that for this child, intellectual independence is desirable and feasible and therefore tries to step aside in the cases where the child wants and can act on his own. Only once, when trying to better understand the child's choice, the adult asks: "What do they (figures) have in common?" In this case, the adult gives the feedback without waiting for a request: "Well, I'll tell you that this is not BAT." In response, Matvey immediately switches from an unsuccessful attempt to a new search, smiling.

The climax of the solution of the problem comes almost by accident: Matvey superimposes one figure on another and notices something that is not obvious in a formal comparison: one figure can be transformed into another.

Matvey (takes a BAT rectangle and covers it with a BAT trapezium, Fig. 1a). Look, this is a rectangle — see? — with cut corners. Experimenter (nods). Okay. Well, I'll tell you that the figures you chose are indeed called BAT. But here (among the remain-

ing figures) there are still figures, which are also called BAT. And you better find them.

Matvey. Or maybe it's BAT? (Joyfully pokes a finger at the blue triangle of BAT and looks at the experimenter in anticipation.)

Experimenter (smiles, rejoicing at a fresh thought). Maybe... Why?

Matvey (smiling). Because it's the same thing, with its corners cut off. True, triangular ...

Experimenter. Triangular.

Matvey. Look here: the same!?! (He imposes a small blue low triangle on the BAT trapezium, Fig. 1b). Just cutting corners off...

Experimenter (nods approvingly). OK, let's try...

Matvey (applies the BAT triangle to the BAT trapezium). Like this? O!..

Experimenter. Suitable, really? BAT?

Matvey. Yes!

Experimenter. Any more BAT figures?

Matvey. (Rises up, illumined by a new idea) Or maybe these things themselves? (Points to the BAT rectangle, compares it with the BAT trapezium — Fig. 1a, looks at the Experimenter as if checking.)

Experimenter (trying to remain impartial, but sharing the joy of discovery). These things themselves can be BAT too, right?

Matvey. Yes... (Picks up BAT rectangles. Examines remaining shapes.)

Experimenter. Have you collected all the BATs?

Matvey. (Continuing to look for BAT.) In my opinion, yes...



**A**



**Б**

Fig. 1. Matvey shows how, by “cutting off the corners”, you can transform (a) a rectangle into a trapezium and (b) a trapezium into a triangle

Thus, at the 4th minute of the experiment, Matvey invented a method for defining BATs: in order to turn one BAT figure into another, you need to “cut the corners”. The next three artificial concepts Matvey constructed in the same way, without fully verbalizing the invented method of the solution. The adult only confirmed his guesses (mostly non-verbally — a nod, a smile) or by repeating the successful remarks) and clarified the problem, prompting the child to a further search. The boy sometimes threw an inquiring glance at the experimenter, but did not ask for control

and evaluation. In other words, Matvey seeks to rely on himself not only in the subject-matter aspect of solving the problem, but also in the control and evaluation. “I am the main condition for solving a problem”<sup>1</sup> is the leading form of orientation of this child in a situation where the adult sets a new problem.

## **2. Masha, 9 years old, 3rd grade. Solved the experimental problem completely in 19 minutes**

Masha listens to the instructions attentively and with great interest. Seeing

<sup>1</sup> D.B. Elkonin's expression.

a BAT sample, she immediately states that it is a trapezium. Then she instantly finds a figure that completely matches the sample (in shape, color and size). Looking for more and having found none, she stops her efforts. As the experimenter starts to offer help, Masha immediately interrupts him with a sensible question: "Is it supposed to be exactly the same?" The experimenter replies that "it may not be exactly the same." Having received the necessary (albeit insufficient) information, Masha instantly tests her first (half-conscious) hypothesis: BATs are figures of the same shape, but may differ from each other in color (*Fig. 2*). She selects, however, only low trapezia, even as she looks only for a particular form. And considers the problem solved. The experimenter "restarts" the process of solving the problem by giving a short feedback: "Not all the figures that you have selected belong to BATs."

Encountered with the first difficulty, the girl, now without interrupting, listened to the instruction: now she seeks cooperation rather than focuses on the subject matter of the task "You can ask any questions, ask for a hint, I can even show you all these figures."

This episode is followed by several attempts to collect BATs and, despite her failures, the girl never ceases the active search. Each hypothesis (except one) is preceded by a question addressed to the adult. Through these questions, Masha seems to figure out whether it makes sense to test her particular hypothesis. And the adult invariably answers positively, encouragingly — but evasively: "Try", "Maybe", "Do you think so?" And Masha collects the next batch of BATs to find again that she is only partially right.

Then a new stage begins in the work: with the help of questions, Masha collects information about what BAT is and does NOT collect a new collection of figures. Here are the girl's questions:

- Does BAT have only 4 corners?
- Is BAT only green?
- BAT has only warm colors, has it?
- Maybe BAT...can be composed from these figures?
  - Can BAT be of all colors?
  - Maybe BAT has... a rectangle has a right angle, but BAT has only an obtuse one? And acute.

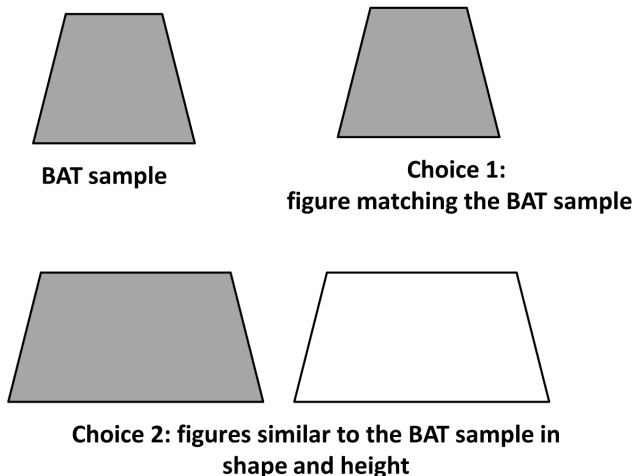


Fig. 2. The BAT group selected by Masha includes low trapezia with a wide base (ROTS)

- Maybe BATs are of all shapes?
  - Are all green /figures/ exactly BATs?
  - Are BATs — big or small?
  - BATs are only small, right? All colors ...
- So, these are all small, I guess.

Having found a new line of thinking, Masha quickly gathers a collection consisting of all BATs and all ROTS — low figures of all colors and shapes, but differing in the width of the base and, accordingly, in area.

The final (eighth) attempt made at the fourteenth minute of the work led the girl to success.

Masha (very intent, repeats the signs of BAT to herself). BAT — small, all colors, with any number of corners.  
Experimenter. Yes. Well, you already said that BAT is what kind of figures? The most...  
Masha (quickly and confidently). Small.  
Experimenter. Yes.  
Masha. So, it is necessary to select all the smallest ones from here?  
(At the suggestion of the adult, rapidly removes all low figures with a wide base (ROTS), turns the remaining figures over and smiles: all of them are marked BAT).

The problem is solved. Just once in 15 minutes of the work, the experimenter prompted the child: “You have already said that BATs are what kind of figures? The most ...” The word MOST helped the girl to distinguish figures with a larger and smaller area. The hint, even if not claimed, fell on the breeding ground of the child’s thoughts and instantly led Masha to a solution. This success was not accidental: it is confirmed by the speed of reasonable dividing the remaining figures into three groups: the concepts of ROTS, MUP and DEK were constructed in four minutes accurately and consciously. Gathering each next group of figures, the girl repeated to herself: “All colors, with any number of angles, but just a little larger.”

## The Discussion of the Results

Using the method of clinical analysis of the child-adult interaction, we studied the behavior of two children who successfully coped with an underdetermined task set by the adult. What do their behaviors have in common? Both are extremely proactive. However, the direction of their initiatives differed distinctly. Matvey was focused mainly on the subject matter of the task: he put forward hypotheses (about what BAT is), tested them in action (collected alleged BATs), cleverly used feedback voluntarily provided by the adult, put forward a new assumption and tried to test it again in the same way. Masha apparently started to act in the same manner: she made assumptions, checked them in action, but at the same time, from the very first attempt, she asked the adult questions that allowed her to test hypotheses in a different way: by turning to the information carrier for missing evidence. After several unsuccessful attempts to collect all BATs, the girl ceased to manipulate with the figures physically and asked the adult a series of questions that allowed her to mentally test new assumptions.

Both strategies for solving an underdetermined task are extremely effective, both are based on the children’s initiative. One child, on his own initiative, included the adult in the conditions of the action and, with the help of this “condition,” found the missing information; another one worked exclusively with the subject matter of the problem, manifested remarkable ingenuity in developing hypotheses, and eventually found an original way of solving the task.

Both patterns of the children’s activity in solving the task set by the adults are opposed to the passive expectation of help by the adult found by many children. Diagnostic screening of 52 schoolchildren in grades 3—4 of two Moscow schools using a modified double stimulation technique

showed that more than half of younger schoolchildren after two to three years of schooling are prone to passive behavior when presented with an intellectual task [1] (Fig. 3).

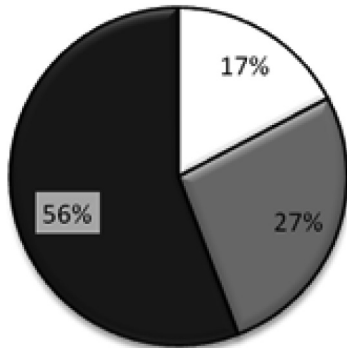


Fig. 3. Patterns of the child's behavior in a situation of an underdetermined task of constructing artificial concepts:

- subject matter orientation
- orientation on the partner
- abandoning one's own initiative

### Conclusions

The behavior patterns demonstrated by children in this experiment do not cover the whole of their individual behavior repertoires. Thus, one and the same child would show different trends depending on how significant the partner or the subjective assessment of the difficulty of the task is. We believe that one of the goals of primary education during

the transition from traditional to activity-based education is to expand the active behavioral repertoire of each student in a situation of an underdetermined task and alleviate the tendency to abandon his own initiative (waiting for ready-made answers and instructions, surrender at the first failure), to create the conditions that would orient the children's action both on the content and partner of the interaction. The solution to this problem has already been found and the necessary conditions have been established [16]: the methods and means for teaching the children to ask smart questions about the missing conditions of action [12; 17; 20] and to encourage the children's hypotheses about how to solve a new problem [11; 18].

We will reach this goal with more success and precision if we take into account the individual characteristics of the child who has come to school: the first-grader ALREADY HAS preferred settings for action in a situation where the adult sets a new task. Therefore, further work should be targeted at finding and designing means and methods for organizing such child-adult interaction in educational activities that can take into account the existing effective attitudes of the children's action (on the subject matter and / or partner of interaction) and expand the repertoire of these attitudes.

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# Subjective Predictors of Psychological Well-being of Gifted Adolescents

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The paper presents the results of empirical verification of the theoretical model of subjective predictors for the psychological well-being of gifted adolescents, including subjectivity, hardiness, self-efficacy, the general emotional background, represented by the level of personal anxiety, and characteristics of the self-concept of adolescents. It was assumed that the factors moderating the relationship of these variables are the attitude of adolescents to their own giftedness, as well as the specificity of the activity in which adolescents show signs of giftedness, and the level of their achievements in it. The sample consisted of 422 adolescents aged 15–17 years enrolled in specialized educational programs for adolescents who show academic, mathematical, leadership and sports talent. The collection of empirical data was carried out using questionnaires and testing (Scale of psychological well-being; Frankfurt scales of self-assessment; Questionnaire of subjectivity; Test of hardiness; The self-efficacy scale; Test for determining self-efficacy; Integrative test of anxiety). Structural equation modeling was done using the IBM SPSS Statistics ver. 23 software package and the AMOS module made it possible to recognize subjectiveness ( $p < 0.001$ ), the psychological well-being of gifted adolescents and the influence subjectivity and hardiness is mediated by the attitude of adolescents to their own giftedness ( $p < 0.01$ ), which, in turn, is determined by the level of their achievements ( $p < 0.01$ ). The characteristics of the self-concept, as well as such factors as "the type of activity in which the signs of giftedness are manifested" and "gender", were not included in the empirical model. The prognostic potential of the model and the possibility of solving on its basis the tasks associated with the psychological support of the personal development of gifted adolescents are discussed.

**Keywords:** giftedness, adolescents, psychological well-being, hardiness, subjectivity, self-efficacy, attitude to own giftedness.

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# Субъективные предпосылки психологического благополучия одаренных подростков

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Представлены результаты эмпирической верификации теоретической модели субъективных предпосылок психологического благополучия одаренных подростков, в числе которых рассматриваются субъектность, жизнестойкость, самооффективность, общий эмоциональный фон, представленный уровнем личностной тревожности, и характеристики Я-концепции подростков. Предполагалось, что факторами, модеризирующими взаимосвязи этих переменных, являются отношение подростков к собственной одаренности, а также специфика деятельности, в которой подростки проявляют признаки одаренности, и уровень их достижений в ней. Выборку составили 422 подростка 15—17 лет, обучающихся на специализированных образовательных программах для подростков, проявляющих академическую, математическую, лидерскую и спортивную одаренность. Сбор эмпирических данных осуществлялся с помощью анкетирования и тестирования (Шкала психологического благополучия; Франкфуртские шкалы самооценки; Опросник субъектности; Тест жизнестойкости; Тест определения самооффективности; Интегративный тест тревожности). Моделирование структурными уравнениями с помощью программного пакета IBM SPSS Statistics ver.23 и модуля AMOS позволило признать значимыми субъективными предпосылками психологического благополучия одаренных подростков субъектность ( $p < 0,001$ ), жизнестойкость ( $p < 0,001$ ) и самооффективность ( $p < 0,001$ ), причем влияние субъектности и жизнестойкости опосредуется отношением подростков к собственной одаренности ( $p < 0,01$ ), которое, в свою очередь, определяется уровнем их достижений ( $p < 0,01$ ). Характеристики Я-концепции, а также такие факторы, как «вид деятельности, в которой проявляются признаки одаренности» и «пол», в эмпирическую модель не вошли. Обсуждаются прогностический потенциал модели и возможности решения на ее основе задач, связанных с психологическим сопровождением личностного становления одаренных подростков.

**Ключевые слова:** одаренность, подростки, психологическое благополучие, жизнестойкость, субъектность, самооффективность, отношение к собственной одаренности.

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## Introduction

Studies of psychological wellbeing are both a highly demanded and widely discussed issue in psychology. Currently large amount of the data was accumulated to characterize the relationship between psychological wellbeing and giftedness, although research outcomes remain controversial. M.Neiart argues that there are two opposing points of view. According to the first one, gifted people are more adaptive, and due to a higher level of cognitive abilities and self-reflection, they more easily resolve conflicts, overcome struggles and developmental asynchrony, which in its turn contributes to their psychological wellbeing. Another point of view states that a higher level of ability in gifted people makes them more vulnerable to interpersonal conflicts, thus impeding their adaptation and wellbeing [29]. At the same time, cognitive and/or intellectual potential is most often considered to be the main predictor of psychological well — or ill-being in many studies.

Studies show that psychological wellbeing is influenced by factors of different levels and content. There are environmental factors such as the nature of interpersonal [1; 9; 11; 27; 31] and social [3; 21; 32] relationships; as well as intrapersonal resources necessary for successful development of adolescents in those fields in which their giftedness is manifested: resilience

[8; 17], self-efficacy [8; 24; 34], agency [5; 28], anxiety [4; 14; 25; 29; 37], perception of one's own life prospects [2; 29; 30]. The type of activity in which the giftedness is manifested also affects their psychological well-being [26; 29]. The relationship between the well-being of gifted adolescents and their achievements is also discussed [10; 18; 20; 22; 30].

Our study is focused on the subjective factors of the psychological well-being of gifted adolescents. Combining the conclusions from the review of the relevant literature with the results obtained in our previous studies, we developed a theoretical model of the subjective factors of the psychological well-being [13], which connects the well-being of gifted adolescents to their subjectivity, hardiness, self-efficacy, self-concept, and the emotional state, represented by the level of anxiety. The mediator between these characteristics and the psychological well-being of the adolescents was the attitude to their own giftedness. The attitude towards one's own giftedness expresses the attitude of a teenager towards themselves as a gifted person [7]. The proposed theoretical model clarifies the main hypothesis of our study: the attitude to one's own giftedness and, more generally, self-attitude, self-efficacy, subjectivity, and life perception contribute to the psychological well-being of gifted adolescents. However, the heterogeneous

influence of all factors is determined by the content of the activity in which the adolescent shows signs of giftedness, as well as the level of the achievements in this activity. This article presents the results of the empirical verification of the theoretical model and elaborates on the relationship between the psychological well-being of gifted adolescents and the subjective factors, the fields in which adolescents show signs of giftedness, and the level of achievements as potential predictors of the well-being.

### Materials and Methods

To test the proposed theoretical model and determine the subjective predictors of the psychological well-being of gifted adolescents, the method of structural equations modelling using path analysis (the method of asymptotically nonparametric estimation) was applied. Statistical processing was carried out using the IBM SPSS Statistics ver.23 software and the AMOS module.

The study sample consisted of 422 teenagers (191 girls and 231 boys) enrolled in specialized educational programs for adolescents with academic, mathematical, physical, and leadership talent. The participants are educated in institutions for gifted children of general and boarding types in St. Petersburg and Nizhny Novgorod, the age of the study participants ranged from 15 to 17 years. During preliminary data analysis, 37 cases containing statistical outliers (influential observations) were excluded from further analysis based on an estimate of the interquartile distance. The size of the sample included in the final analysis was 387.

To assess the psychological well-being of the adolescents, we used the "Scales of psychological wellbeing" by K. Riff, adapted by L.V. Zhukovskaya and E.G. Troshchikhina. The self-concept was assessed with the "Frankfurt self-concept scales" by I. Deus-

inger, adapted by O.E. Baitinger. The subjectivity and its attributes were measured with the "The subjectivity questionnaire" by E.N. Volkova and I.A. Seregina. The assessment of hardiness as a resource for coping with stress was carried out with the screening version of the "Hardiness test" by S. Muddy, adapted by E.N. Aspen. To assess self-efficacy as an opportunity to be aware of one's abilities and use them in the best possible way, we used "Self-efficacy scale" by D. Maddux and M. Scheer, modified by L. Boyarintseva, R. L. Krichevsky. Anxiety was measured with a scale of self-assessment of the individual anxiety from the "Integrative Anxiety Test (IAT)" developed by A.P. Bizyuk, L.I. Wasserman and B.V. Iovlev. The total scores of the psychological well-being, resilience, self-efficacy, subjectivity and anxiety were analyzed. As the "Frankfurt self-concept scales" does not provide the total scores, the model included individual scales of self-concept. The mediating variable between the psychological well-being and its potential predictors, the level of achievement, was assessed with the results of participation in Olympiads, competitions, contests of various levels from 0 to 5: 0 — no achievements; 1 — achievements at the level of the educational organization; 2 — achievements at the district level; 3 — achievements at the level of the city / region / region; 4 — achievements at the national level; 5 — achievements at the international level.

Attitudes towards one's own giftedness were studied through the survey developed by the authors. The survey included general self-assessment of giftedness, as well as the more detailed assessment of benefits and risks of being labeled as "a gifted person" on a scale from 1 to 10. To achieve the goal of the study, we calculated an integral score of the attitude to one's own giftedness as a sum of scores characterizing ideas



about benefits, direct and reflected self-assessment of giftedness (with a positive sign), as well as the risks of giftedness (with a negative sign).

The program and protocol of the study were reviewed and approved by the Ethics Committee of the Russian State Pedagogical University. A.I. Herzen (IRB00011060 Herzen State Pedagogical University of Russia IRB#1, Protocol No. 5 of 01/28/2019).

### Results and Discussion

Several models of the subjective factors of the well-being of gifted adolescents were tested. To refine the theoretical model and check its compliance, the following indexes were used: the  $\chi^2$  test statistic, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the goodness-of-fit index (GFI). The best fitted model has paths between the level of achievements and attitudes towards one’s own giftedness, and indicators of the self-concept. Gender and age were excluded from this model. There is no path between the personal anxiety and psychological well-being (Fig. 1). The fit indexes are acceptable, which allows us to consider the model as fitting the data

( $\chi^2=11.4$ ;  $df=8$ ;  $CFI=0.99$ ;  $GFI=0.99$ ;  $RMSEA=0.03$ ).

According to the obtained model, subjectivity ( $p<0.001$ ), resilience ( $p<0.001$ ), and self-efficacy ( $p<0.001$ ) have a direct effect on the psychological well-being of the adolescents. At the same time, the attitude towards one’s own giftedness ( $p<0.01$ ) mediates the relation between the level of achievements ( $p<0.01$ ), subjectivity ( $p<0.001$ ), and hardiness ( $p<0.01$ ) on the one hand, and the psychological wellbeing of gifted adolescents on the other. Resilience (1.26) and subjectivity (0.61) have the greatest impact on the psychological well-being of gifted adolescents. Anxiety does not directly affect the psychological well-being of adolescents, but covariates with subjectivity, resilience, and self-efficacy (the values of the coefficients are negative). The indicators of the “Frankfurt self-concept scales”, as well as the variables “fields in which giftedness is manifested” and “gender” were originally included in the analysis as independent variables, but were excluded from the final model ( $p> 0.05$ ).

Thus, the theoretical model illustrating the subjective factors of the psychological well-being of gifted adolescents was only

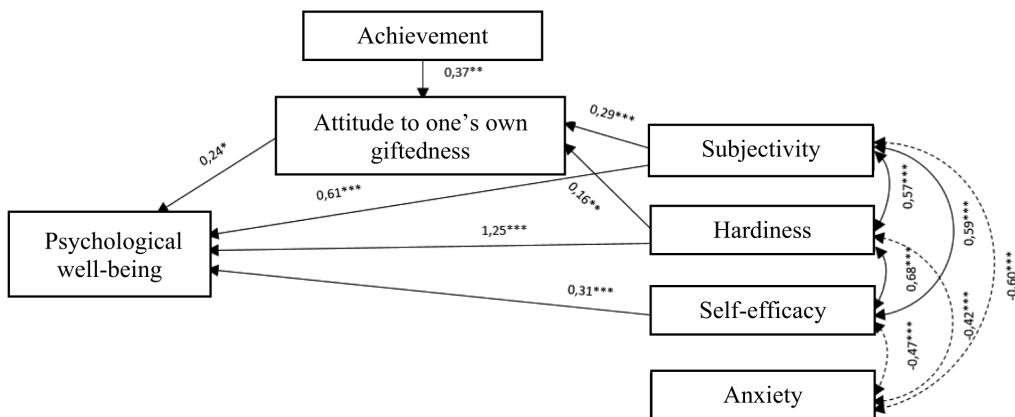


Fig. 1. The model of the subjective predictors of the psychological well-being of gifted adolescents

partially confirmed. The more intrapersonal resources gifted adolescents have that allow them to effectively cope with stressful situations (hardiness, self-efficacy, subjectivity), the more pronounced is the orientation towards active actions in difficult life situations, the openness to new experience, the orientation towards achieving high results, the more developed is the conscious and active attitude to the world and to oneself, the ability to set goals, the desire for self-development, the readiness to take responsibility for the life choices made, the higher is the confidence in oneself and one's success, the acceptance of one's own giftedness, the higher is their psychological well-being manifested in the orientation to positive interaction with others and the maximum implementation of personal resources. These relationships are present regardless of the type of activity in which adolescents show signs of giftedness, which was discussed in our previous studies [5;6] and corresponds to the described relationships between these variables in general [8; 12; 36; 37], and specifically in adolescence [33].

However, it should be noted that this study reveals the complex nature of the relationship between the psychological well-being and subjective variables in the sample of gifted adolescents. Hardiness and subjectivity have both direct and indirect (through attitudes towards one's own giftedness) effect on the psychological well-being of gifted adolescents. On the one hand, the revealed role of these variables can be explained by the age specifics of late adolescence, when the orientation towards a conscious, active approach to the development of the personality, success, and the transformation of the environment is actualized by the life choice associated with the graduation from school. Mediating the relationship between subjectivity, resil-

ience, and psychological well-being, the attitude towards one's own giftedness plays a special role: when it is positive, it enhances the described relationships, strengthening the psychological well-being of adolescents with a high level of resilience and self-efficacy. We consider the attitude towards one's own giftedness to be a particular phenomenon that characterizes the personality of gifted adolescents, which should be studied as a predictor of their well-being in more detail.

Anxiety plays an important role in understanding the interrelations between the psychological well-being, subjectivity, resilience, and self-efficacy of gifted adolescents. In anxiety structure, personal perceptions of one's own future hold a specific place. According to the estimated model, anxiety covariates with resilience, self-efficacy, and subjectivity: the less anxious is a person about his own prospects, the higher is his self-confidence, the readiness to persevere in solving the tasks and achieving goals, the orientation to active actions in difficult situations.

Our model suggests that the attitude towards one's own giftedness is determined by the achievements, which demonstrates the role of external assessment in shaping the self-attitude towards giftedness. In the presence of high achievements, supported by appropriate awards, adolescents focus on the positive aspects of giftedness, strengthen their self-confidence, and increase their motivation for achievements. While the level of achievement is not directly related to the psychological well-being of adolescents, as was confirmed by our previous results [7], it emphasizes the importance of psychological support for gifted adolescents, aimed at forming a constructive self-attitude as a gifted person.

At the same time, some components of the theoretical model were not verified

during its empirical testing. In particular, the absence of indicators that characterize the self-concept of gifted adolescents in the final model deserves special attention. Our previous studies [6], as well as the studies of other authors [15; 16; 19; 23; 27; 35] showed that the psychological well-being and self-concept of gifted adolescents are quite closely related to each other. However, the inclusion of these variables worsened the model fit to a model rejection level. This might be explained by the fact that the other variables included in the model were total scores, corresponding to the personal characteristics in general and having a larger range of possible values than specific scales characterizing individual aspects of the self-concept. In this regard, it seems promising to further develop the theoretical model proposed by us earlier with methods of psychodiagnostics to estimate the total indicators characterizing the self-concept of the adolescents. In addition, the independent variable 'field in which signs of giftedness are manifested' was also not included in the final model. This fact can be explained by the predominance of interrelations between the psychological well-being and its subjective factors common to all gifted adolescents, which do not depend on the specifics of the activity in which the adolescent is involved. At the same time, our previous studies [5; 7] indicate that the psychological well-being of adolescents who are gifted in various types of activities, and the characteristics of their personality, which are considered in our study as its subjective factors, demonstrate a qualitative difference in the values of individual scales while remaining close on the total scores. This issue is a challenge of constructing a model introducing the scores obtained on individual scales. Also, this variable was

not included in the final model due to the uneven size of subgroups of adolescents with giftedness in different fields. The absence of the "gender" factor in the final model is explained by the gender-specific issues of activities in which adolescents are gifted. The psychological well-being of gifted adolescents involved in gender-associated and non-associated activities remain a topic for future research.

As for the limitations of the presented model, the outlier cases excluded from the final analysis may constitute a special group where the correlations between the psychological well-being and other variables differ from those presented in the estimated model. In addition, when constructing the model, mainly total scores of the psychological well-being of adolescents and their subjective resources were introduced, without considering their content features. The level of achievement in a field of giftedness was estimated according to self-reports and was not confirmed by official documents. The uneven size of the subgroups of adolescents who are gifted in different fields, already mentioned above, as well as different organizational conditions for the education of adolescents who took part in the study, could also have influenced the final results.

## Conclusions

In conclusion, the estimated structural model, which describes the subjective factors of the psychological well-being in gifted adolescents, has an acceptable explanatory power and describes the relationship between the components included into it. It is important to consider the predictive capabilities of the model when organizing psychological and pedagogical work with gifted children and adolescents. The efforts of teachers and psychologists should be aimed at the building and developing

resilience, subjectivity, self-efficacy of gifted adolescents, forming positive attitude towards their own abilities, supporting adolescents who do not demonstrate high achievements for one reason or another. The results obtained in our study confirm

that subjective factors of supporting and strengthening the psychological well-being of gifted adolescents with consideration of the peculiarities of the social situation of their personal development is a topic for future research.

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# The Reflexive Aspect of the Perception of Each Other by the Subjects of the Conflict

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The reflexive aspect of the perception of the subjects of the conflict became the main issue of the presented work. In the framework of the experimental study, the level of reflexivity (A.V. Karpov), the styles of leading behavior (the Thomas-Kilmann Method), as well as the assessment of the personality image (the Petrovsky-Uvarina Scaling Method) were diagnosed. The experiment was carried out using the created installation "Experiment for the Study of Negotiations" (the idea by V.A. Lefebvre, modification by B.I. Khasan). It was shown that the opponent's image significantly changes for respondents with a "low" level of reflexivity. Respondents with a "high" level of reflection are more differentiated in their assessment of the opponent in the conflict interaction. The change in the opponent's image is carried out to a greater extent by the respondents who end the conflict interaction with a compromise. It was revealed that a change in the leading behavior in a conflict is more typical for respondents with "medium" and "high" levels of reflection. A statistically significant positive relationship was determined between the level of reflexivity and a change in the style of behavior in the conflict interaction. The results obtained in the future will make it possible to simulate the process of getting out of the conflict and use the potential of virtual reality to work with conflict situations.

**Keywords:** reflexivity, interpersonal conflict, perception by the subjects of the conflict, virtual reality.

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# Рефлексивный аспект восприятия друг друга субъектами конфликта

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Представлены материалы исследования рефлексивного аспекта проблемы восприятия субъектов конфликта. В рамках экспериментального исследования диагностировались уровень рефлексивности (А.В. Карпов), стили ведущего поведения (методика Томаса—Килманна), а также оценка образа личности (метод шкалирования Петровского—Увариной). Эксперимент проводился с помощью созданной установки «Эксперимент для изучения переговоров» (идея В.А. Лефевра, модификация Б.И. Хасана). Было показано, что достоверно изменяется образ оппонента у респондентов с «низким» уровнем рефлексивности. Установлено, что респонденты с «высоким» уровнем рефлексии более дифференцированно подходят к оцениванию оппонента в конфликтном взаимодействии. Изменение образа оппонента в большей степени осуществляют респонденты, которые завершают конфликтное взаимодействие компромиссом. Выявлено, что изменение ведущего поведения в конфликте более характерно для респондентов со «средним» и «высоким» уровнями рефлексии. Определена статистически достоверная положительная связь между уровнем рефлексивности и сменой стиля поведения в конфликтном взаимодействии. Делается вывод о том, что полученные результаты в дальнейшем позволят осуществить моделирование процесса выхода из конфликта и использовать потенциал виртуальной реальности для работы с конфликтными ситуациями.

**Ключевые слова:** рефлексивность, межличностный конфликт, восприятие субъектами конфликта, виртуальная реальность.

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## Introduction

Conflict as one of the forms of social interaction for decades has been the object of close attention of scientists in various scien-

tific fields. The versatility and complexity of this phenomenon has become the source of the formation of a separate science — conflictology [6]. Within the framework of con-

flictology, a wide range of conflict classifications is presented, which sets the specifics of the involvement of a particular scientific branch in their study. It can be said that specific for psychology are the following: intergroup [1], interpersonal [11], intrapersonal conflicts [32], since in the framework of their study the emphasis is placed on the study of various aspects of the psychological determinants of the occurrence, features of the functioning and manifestation of psychological processes and mechanisms of conflict [6, 25], a description of the psychic phenomena and phenomena inherent in this kind of relationship, etc.

Actual directions of the conflict interaction research are related to the study of the perception of each other by the subjects of the conflict and the mechanisms that ensure the formation of images of opponents; correction of conflict interaction, including the use of the potential of virtual reality (VR) [3, 27].

In the noted areas, recently, a number of studies has been carried out [6, 9, 14, 26, 30, 33], but they have mainly been carried out within the framework of the subject-object approach, the view through the prism which "turns" the conflict into a static object that loses its "nature". The transition to the subject-subject position in the understanding of the conflict is the return to the conflict interaction of the genuine relations of its participants in all their diversity of manifestations in the situation "here and now". Such a research position requires close attention to the study of the role of reflection in the perception of a conflict situation: the construction of images of the opponents of the conflict and the dynamics of these images, the impact of these changes on the choice of strategy to get out of a conflict situation, etc.

It should be noted that reflection manifests itself as a multifunctional mechanism, since it not only forms ideas about the parties of the conflict [2,15,18], builds a model of conflict interaction taking into account

its dynamics and resources [28, 31], but, in general, is included in the development of the ways to transform the conflict into a search for an optimal solution to the way out of it [34, 29, 22]. Reflection is the leading mechanism in organizing both personal and collective actions within the conflict [35].

Speaking about the reflexive aspect of perception in the interpersonal conflict, it is necessary to note its leading role in this process [4]. Thus, Tatishcheva A.I. identifies in addition to the subjective space of conflict situational and suprasituative reflection, which determines the four most important variables: causes, frequency, time of course and duration of the consequences of the conflict [33].

Analysis of the studies on the reflexive aspect of the perception of the conflict subjects leads to the conclusion that this vector of study requires both the development of new methodological foundations, taking into account the subject-subject approach of conflict understanding, and new research designs, including the application of a wide range of new technical achievements. In this aspect, VR has a great potential. VR can be used to develop reflexive actions and the formation of skills of constructive exit from conflict situations as a chronotope of reflection [3].

### **The Reflexive Aspect of Human Perception by a Person within the Framework of a Communicative Approach**

In Russian psychology, the communicative approach developed by B.F. Lomov [18,19] is the basis for studying the problem of perception of each other by participants in interpersonal conflict, the specifics of their interaction. Using such theoretical and methodological provisions as the principle of systematization, ideas about the reflective essence of the psyche, the general psychological plan of the category of communication in Russian psychology, the activity and communication

began to be considered as systematically organized phenomena [8]. The peculiarity of communication as a system involves the consideration of communicants — subjects perceiving each other — holistically, and this is what allows you to form and implement qualitatively different relations between the participants in communication [7]. The development of the communicative approach by V.A. Barabanschikov is presented with the ideas of establishing the patterns of effective functioning of cognitive processes during interaction of subjects.

In general, the school of V.A. Barabanschikov is characterized by the study of phenomena, processes, and mechanisms of perception of the personality, its psychological characteristics in various contexts of communication and interaction. The scientist notes that during the counter process of subjective cognition, communicants “penetrate” into the inner world of each other, and relying on the constructed picture of the personality, build their actions.

Psychological regularities identified in the framework of the communicative and cognitive approach of V.A. Barabanschikov were described, among other things, using the scientific term developed by him — “HE”-concept. The concept reflects a conceptual construct in which the personal certainty of the “other” is reflected. There is a coherent representation of the personality of the partner included in communication (including the vicarious), his assessment and attitude to him [8].

Meaningfully, this concept can reflect both real and small personality traits of the “other”. The formation of this image depends on the subject’s idea of himself and previous social experience. A component of the “HE”-concept is the “HE”-image, which is formed in the participants of the interaction and is a set of information about the opponent, which the subject reads during non-verbal (psychological characteristics of the personality, traceable in external activity, appearance of

a person and, above all, the face) and verbal communication. How much the “HE”-image will affect the perception of a person by a person will depend on a number of factors: on the subject’s idea of himself, communicative experience, models of behavior in the social system, the formation and development of communication mechanisms, etc. It should be noted that in this conceptual construct, there is an important aspect that allows you to understand the mechanism of formation of the “HE”-concept. The “other” can be not only the “interlocutor, the communicator”, but also the “I am like the other”, that is, the psychologically *distanced in the personality* itself is the idea of oneself as different [3,4].

This allows us to say that in the process of communication, a person can work **with images of himself and another as objects of cognition**. The formation of this type of images (meaningful, conscious) is due to the functioning of the reflexive mechanism. Therefore, reflection, in addition to the mechanisms of projection, categorization, identification, is also included in the process of forming the “HE”-image of the personality [3].

In general, we can conclude about the involvement of the mechanism of reflection in the process of formation of the “HE”-concept [3], and hence about the possibility of studying the reflexive aspect of the perception of each other by the participants in the conflict interaction, including the context of the communicative approach.

The aim of the study was to analyze the reflexive aspect of the perception of the interpersonal conflict by the subjects. We suggested, firstly, that the reflection of the participants in the interpersonal conflict determines the formation of images about the components of the conflict interaction. Secondly, the reflection “constructs” conflict interaction, that causes a change in the strategy, style of behavior of the parties of the conflict.



## Organization, Methods and Research Procedure. Experimental Installation

The study involved 52 participants ( $M=20$  years), of which 8 males and 44 females. All participants are students of Moscow universities. Before the research procedure, each of the respondents gave written consent to participate in the experiment and permission to process the data.

To conduct the experiment, the equipment “Experiment for the Study of Negotiations” was designed (the idea of V.A. Lefebvre, modified by B.I. Hasan), which allows to simulate a conflict situation in the laboratory [34]. The installation is a playing field consisting of movable strips, on which the applied special elements — “smiling emoticons” (further in text, “emoticon”) (four at the opposite edges of the field, each “emoticon” is located on three independent strips). Participants are located on their half of the playing field. The playing field is divided by an opaque screen, to deprive participants from the opportunity to observe the position of “emoticons” on the side of the opponent. The location of the “emoticons” is not accidental — it is impossible to build all the faces

of two participants at the same time. When building a whole “smiley” by one participant, the picture of the other one is distorted. The goal of the participants in the experiment is to build as many whole “emoticons” as possible. The experimental setup is presented in Fig. 1 and Fig. 2.

Psychodiagnostic methods:

1. Diagnostics of the level of development of reflexivity (A.V. Karpov) [13].

2. Thomas-Kilmann methodology for identifying the leading behavior in a conflict situation (modification by N.V. Grishina) aimed at studying personal predisposition to conflict behavior, identifying certain styles of conflict resolution [12].

3. The Petrovsky-Uvarina scaling method is aimed at determining the perception of each other. In the instructions for working with this technique, it is proposed to evaluate the characteristics of the personality according to a set of graduated scales arranged fan-like rays running from the center (Fig. 3). The point of the beginning of the rays indicates the absence of severity of this quality — 0 points, the point on the circle — the maximum severity of the specified quality — 5 points [21].



Fig. 1. “Equipment to Study Negotiations” (top view)



Fig. 2. "Equipment to Study Negotiations" (frontal view)

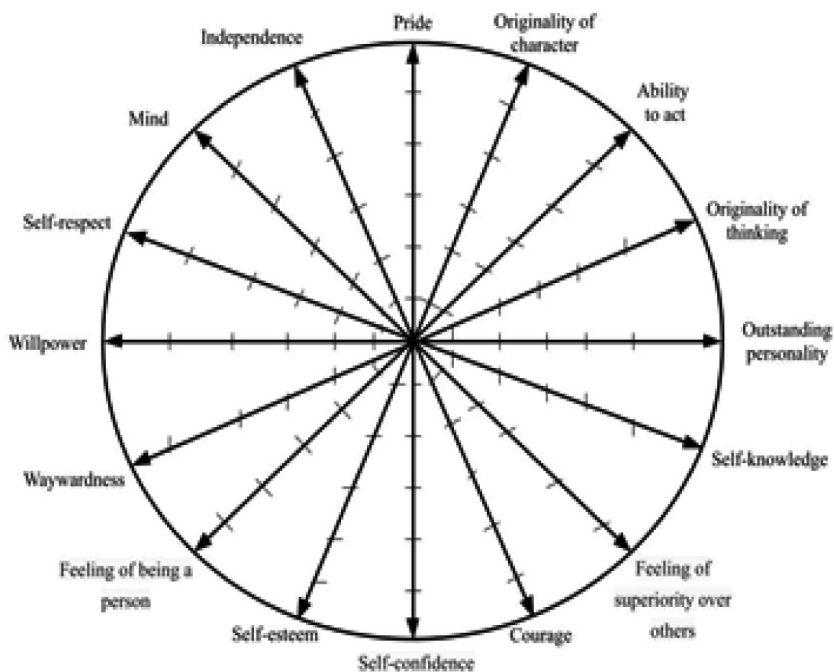


Fig. 3. Stimulating Material of the Petrovsky—Uvarina Scaling

The learned empirical material was processed using the statistical program SPSS.21. The following statistical criteria

were applied: T-Wilcoxon,  $\varphi^*$  — Fisher angular transformation, Pearson correlation coefficient.

## Study Procedure

A feature of any psychological experiment, having the conflict interaction the subject of modeling and research, is primarily the difficulty of obtaining artificially a “living” psychological picture of the conflict. We provided the experimental plan which brought the participants of the interaction closer to the natural experiment, but at the same time helped avoid the appearance of additional variables, such as a strong emotional experience. To do this, an experimental installation was used — work in pairs — which involved the participants playing the role of the opponents striving to achieve personal goals.

At the first stage of the experiment, the diagnosis of the level of reflexivity was carried out using the method “Diagnosis of the Level of Development of Reflexivity” (A.V. Karpov); leading behavior in the conflict using the Thomas-Kilman Method (modification by N.V. Grishina).

The immediate experimental procedure began with the diagnosis of the participants’ perception of each other using the Petrovsky-Uvarina Scale. Each episode involved two people of the same sex — forming pairs that were created randomly. The total number of pairs is twenty-six. Participants who were positioned opposite each other were asked to rate each other using a personality traits scale.

After carrying out this procedure, the couples began to work with the installation. Separately, each of the participants was offered the following instruction: “You are asked to perform the following task: by alternately moving the strips, collect the maximum number of “emoticons” on your half. At the moment, they are shifted in an arbitrary order. The stripes are consistent, so moving them on your side of the playing field will cause moving them on the side of the second test subject. When working with the installation, we ask you, first, to try to perform the tasks without using the verbal means of

communication, however, if you realize that this is impossible, you can immediately enter into a dialogue with the second subject. If necessary, you can ask questions.”

After the instruction clearance was confirmed, the participants in the experiment began, by alternately moving the strips (one per turn), to try to perform the task assigned to them, thereby creating interference in the performance of the task to their opponent. According to the conditions of the experiment, the subjects can (as stipulated in the instructions) discuss the progress of the task with each other, however, only if they feel the need for it. This clause is arranged to be able to establish the moment of formation of the HE-image in the participants of the experiment more clearly.

After finishing the installation work, the participants again filled out the Petrovsky-Uvarina Scale, which diagnoses the perception of each other by the opponents. Then a post-experimental survey was proposed, arranged to determine the degree of involvement of the subjects, their individual interpretation of the proposed task, as well as their own assessment of how much they coped with it. At the end of the study, the leading behavior in the conflict was diagnosed (Thomas-Kilman Method modified by N.V. Grishina).

The independent variables in the experiment were the level of reflexivity, while the dependent ones — the image of the opponent in the conflict interaction, the leading behavior in the conflict.

## Study Results

The level of reflexivity of the participants in the experiment was diagnosed using the A.V. Karpov Method (Fig. 4).

Fig. 4 reflects the results of diagnosing the levels of reflexivity of the participants: 31% of respondents had a “low level” of reflexivity, 54% — “middle level”, and 15% — “high level”. In general, the sample data  $M=4,3$ ;  $SD=1,84$ , slightly deviated towards

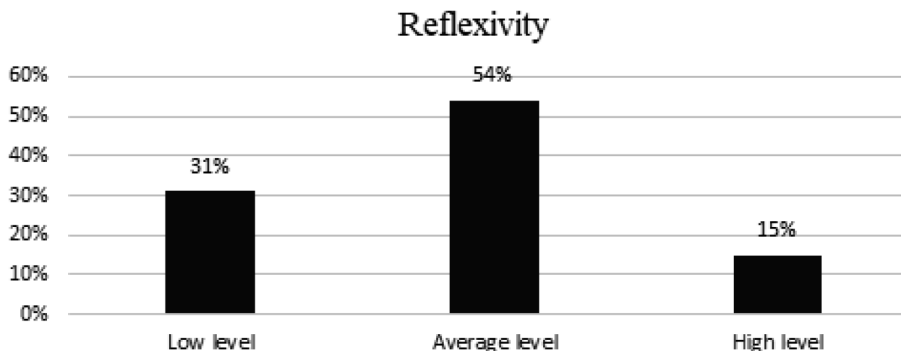


Fig. 4. Level of reflexivity (% of participants) in the experimental group N=52

low reflexivity values, but there were no significant differences between the percentages of “low level” and “high level”. In the future, we will consider such features of the sample while interpreting the obtained results.

Fig. 5 presents the results of assessing the perception of each other by the opponents before and after the experiment (the entire sample).

The study determined a statistically significant increase in the assessment of the personality traits of the opponents in the ex-

periment participants  $T_{emp}=13,5$ , at  $p \leq 0,003$  (T-Wilcoxon). Maximum shifts in the indicators of the values were observed in the assessment of such qualities as individuality (from 3.5 to 3.9), a sense of superiority over the others (from 2.7 to 3.1). The obtained data prove the involvement of the subjects in a direct opposition within the framework. This causes a change in the opponents' ideas about each other: the image of the opponent becomes more pronounced and differentiated.

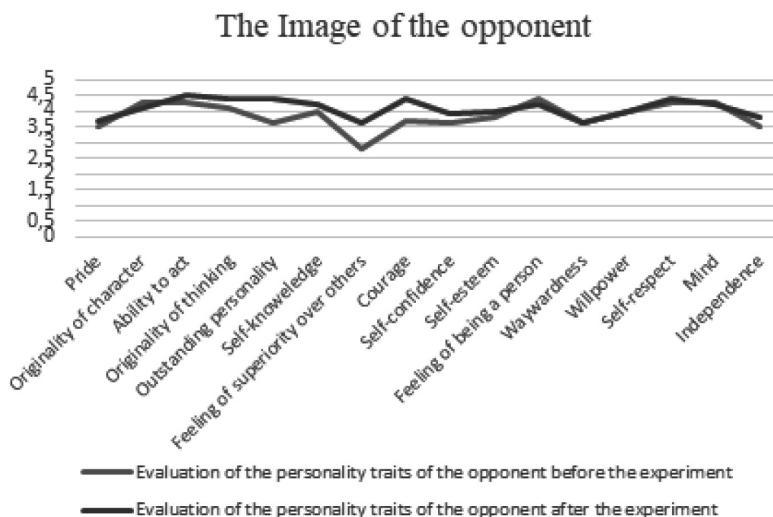


Fig. 5. Perception of each other by opponents the (average value) before and after the experiment N=52 (26 pairs)

Changes in the indicators of perception of each participant of the survey in three groups are shown as follows: with “low”, “middle” and “high” levels of reflexivity indicators presented in Fig. 6—8.

In subjects with a low level of reflexivity, a significant shift in the assessment of the opponent’s personality qualities  $T_{emp}=14$  at  $p<0,015$  was revealed. The obtained data show that the respondents with a low level of reflexivity, the change in the assessment of the opponent’s personality in the process of conflict interaction significantly changes towards an increase in the values of the assessment of indicators. That is, among the respondents of a low level of reflexivity depicts an adjustment of the image of the opponent. The maximum changes occur in the assessment of such parameters as “knowledge of oneself”, “the accumulation of superiority over another”, “mind”, “courage”, “pride”, “ability to commit an act”, “extraordinariness of thinking”. Researchers note that

after the experimental interaction, the opponent is perceived as more strong-willed, thinking, understanding himself, etc.

In subjects with a middle level of reflexivity and a change in the perception of the opponent in the process of experimental influence, the  $T_{emp}=31.5$  did not change significantly, at  $p\leq 0.057$  (T-Wilcoxon), regardless of who won in the experiment. However, the obtained empirical value of the Wilcoxon is close enough to the critical values, which shows that there is some trend in the indicators for estimating the shift. For this group of the respondents, the most pronounced shifts in a larger range of assessments of such personality qualities as “knowledge of oneself”, “feeling superiority over one’s friend”, “originality of thinking” are most pronounced from high to mid-range. However, in general, we can still talk about adjusting the image of the opponent to the area of higher values, but it is not

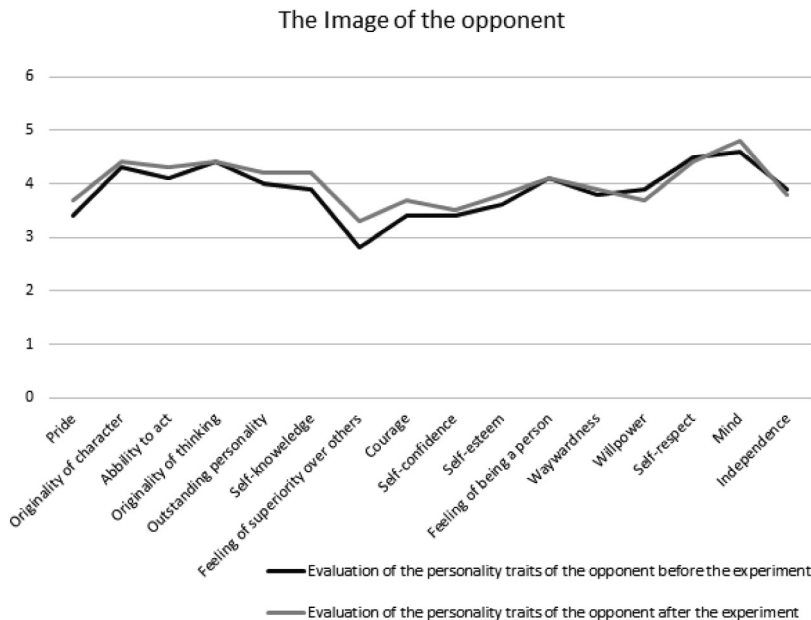


Fig. 6. Assessment of the opponents' personality traits (average value) with a “low level” of reflexivity before and after the experiment, N=16 (8 pairs)

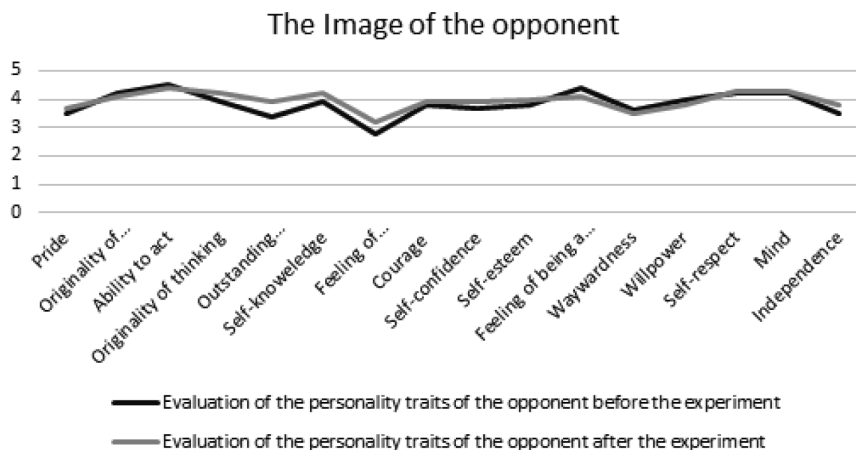


Fig. 7. Assessment of the opponents' personality traits (average value) with a "middle level" of reflexivity before and after the experiment, N=28 (14 pairs)

so pronounced in the respondents of this group, in contrast to the respondents with a low level of reflexivity.

In the course of the study, it was found that in subjects with a high level of reflexivity, the change in the perception of another in the process of experimental exposure did not change significantly  $T_{emp}=38.5$ , at  $p \leq 0.375$  (T-Wilcoxon). Unlike the previous groups, in the group with a high level of reflexivity, one can observe multidirectional trends in assessing the personality of the opponent. For example, there is a decrease in

the scores of the indicator "self-knowledge", "contrariness", "self-esteem" to the average range, and an increase in scores on the parameters "sense of personality", "courage", "independence from others", "mind". The data obtained show that reflection is included in the adjustment of the opponent's image, functionally manifesting itself as a mechanism that carries out multidirectional changes in the perception of the personality, which, as we believe, to a greater extent, considers the originality, individual characteristics of the opponent.

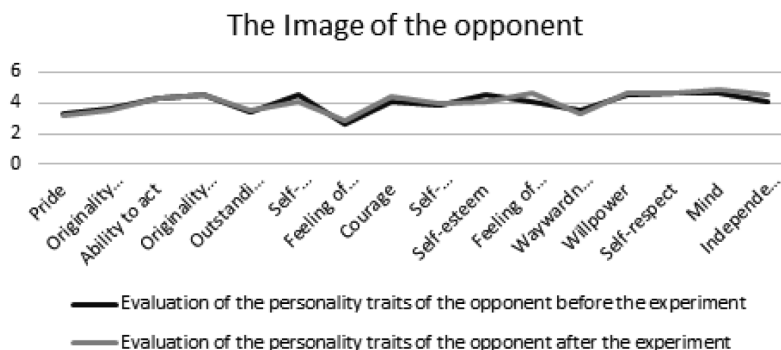


Fig. 8. Assessment of the opponents' personality traits (average value) with a "high level" of reflexivity before and after the experiment, N=28 (14 pairs)



The results of the diagnosis of the leading behavior in a conflict situation (Thomas-Kilman Method) are presented in Fig. 9.

In general, the sample is characterized by a greater severity of such styles of behavior in the conflict: avoidance (26%) and competition (23%), less pronounced cooperation (19%) and accommodation (17%), the minimum indicators are represented by the indicator — compromise (13%). It shall be noted that the compromise as a style of behavior was diagnosed as the least pronounced style in this sample, but most of the conflict situations recreated by us, with the help of an experimental setup, were resolved within the framework of this style.

The correlation of indicators of the behavior style in a conflict situation and the levels of reflexivity in the study participants are presented in Fig. 10.

In general, comparing the styles according to “reflexivity” parameter, it can be noted that the “high-level” of reflexivity reaches its maximal expression in the style of “cooperation”, and minimal — in the style of “adaptation” and “competition”. The “middle level” of reflexivity is more inherent in such styles as “avoidance” and “compromise”, while the “low level” of reflexivity is mostly pronounced in the styles of “accommodation” and “competition”, and least pronounced in the styles of “avoidance” and “compromise”.

As part of the study, an assessment of the shift (T-Wilcoxon criterion) in the ideas about

the opponent in participants who ended the experiment mental interaction with the styles of “compromise” and “competition” was carried out. The results are represented in Table 1.

It was revealed that in the subjects for whom a compromising style of behavior is leading in a conflict interaction, the change in the perception of another is more reliably expressed ( $T_{emp} = 12,5$ , at  $p \leq 0,01$ ), than in the ones whose interaction was characterized as competitive.

Below are the results of assessing the personality qualities of the opponents in the respondents who ended the experiment with a “compromise” (Fig. 11).

The minimum changes (increase in values) in the assessment of the personal qualities of the opponent before and after the experiment are the characteristic of the following range of qualities: “feeling superiority over others”, “originality of thinking”, “courage”. It can be said that the opponent is perceived as more strong-willed, dominant, and creative in the process of interaction.

There was no decrease in the assessment of the personal qualities of opponents.

As noted, reflection is included in the conflict interaction not only as a mechanism for constructing images of the participants and adjusting them, but also as a mechanism for changing the behavior in a conflict interaction. Data on the change in the leading style of behavior of the participants in the experiment and indicators of their reflexivity are presented in Table 2.

### The Leading Behavior in Conflict

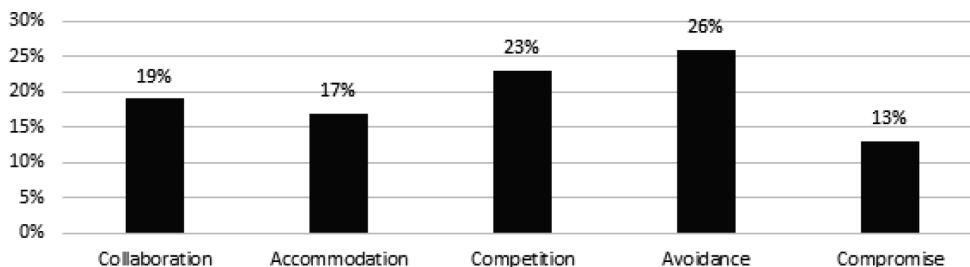


Fig. 9. Styles of behavior (% participants) in a conflict situation N=52

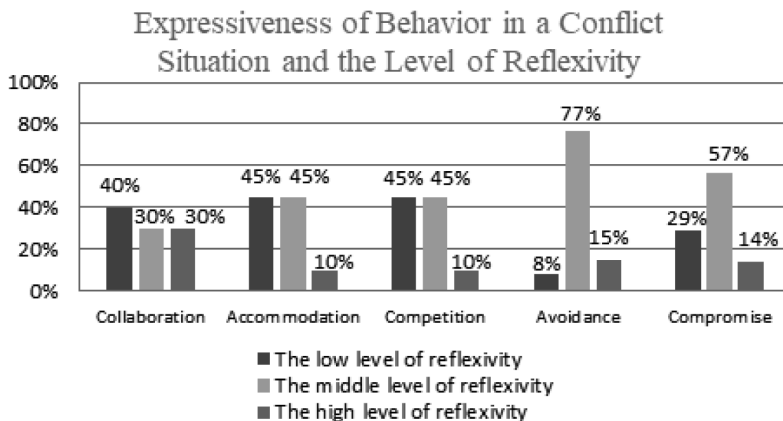


Fig. 10. Correlation of the behavior style in a conflict situation (% of participants) and the level of reflexivity, N=52

Table 1

### Results of the Calculation of the T-Wilcoxon Criterion for Respondents Demonstrating the Style of “Compromise” and “Competition” when Assessing the Image of the Opponent Before and After the Experiment

N <sub>o</sub>	Style of behavior in a conflict situation	T-Wilcoxon
1	Compromise (10 pairs)	T <sub>emp</sub> = 12,5, at p ≤ 0,011
2	Competition (16 pairs)	T <sub>emp</sub> = 38,5, at p ≤ 0,968

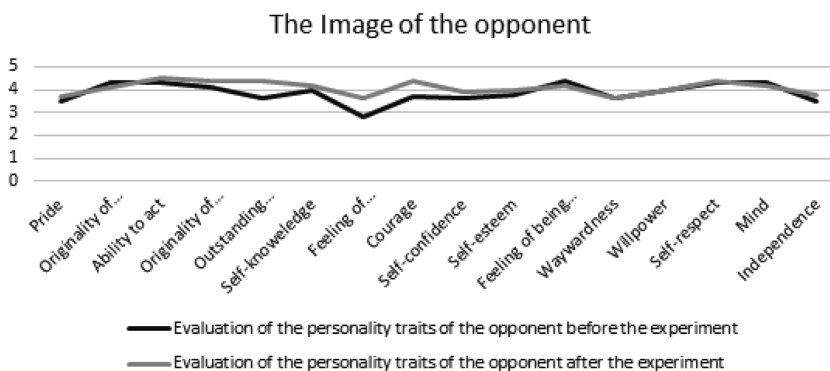


Fig. 11. Assessments of the personal qualities of the opponents before and after the experiment in respondents who completed the experiment with a compromise

The data of Table 2 are presented in Fig. 12.

The maximum number of changes in the style of behavior in the conflict interaction during the experiment was revealed in respondents with a “middle” level of reflex-

ivity — 75%. For respondents with a “high” level, this indicator is — 17%, and with a “low” level — 8%. Comparison of the share of respondents with the “middle” level of reflexivity that changed and did not change the style of their behavior in the experimen-

Table 2

**Change in the Leading Style of Behavior and the Level of Reflexivity in the Participants of the Experiment After the End of the Conflict Interaction N=52**

Dynamics of behavior strategy / Level of reflexivity	The leading strategy of behavior has changed		The leading strategy of behavior has not changed	
	Number	%	Number	%
High level	4	17%	4	14%
Middle level	18	75%	10	36%
Low level	2	8%	14	87,5%
Altogether	24	46%	28	54%

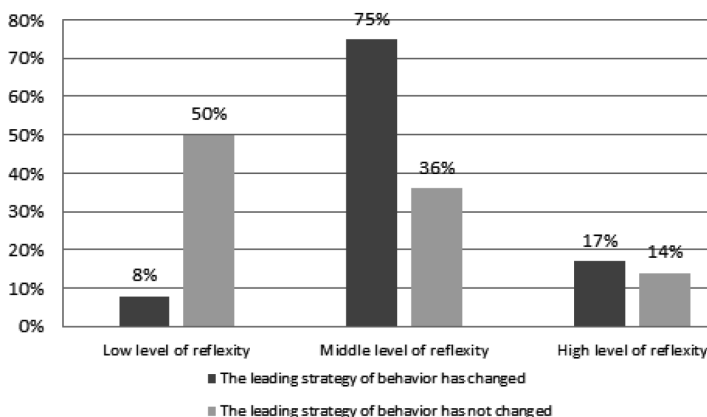


Fig. 12. Change in the leading style of behavior (%) in the participants of the experiment and the level of reflexivity after the end of the conflict interaction N=52

tal interaction showed significant differences ( $\phi^*_{\text{emps}} = 2,17$ , at  $p \leq 0,05$ ).

If we turn to the parameter “the style of behavior has not changed”, then it is most pronounced for the respondents with a “low level” and minimally with a “high level” of reflexivity.

We identified the relationship between the indicators of the level of development of reflexivity and the change of the leading style of behavior during the conflict interaction. A reliable positive correlation  $r=0.372$  was obtained, at  $p < 0,007$  (Pearson correlation coefficient), which reflects the tendency to unidirectional conjugation between the selected parameters: an increase in reflexivity values is associated with a change in behavioral strategy in conflict resolution.

**Conclusions**

The aim of the research was to study the reflexive aspect of the perception of each other by the subjects of interpersonal conflict. It was assumed that the reflection is included in the formation and correction of images of the opponents of conflict interaction, and also determines the strategy resolving the conflict situation. The results of the experiment showed that in the study a significant change in the images of the opponents in conflict interaction has taken place. It was revealed that for respondents with a “low” level of reflexivity the changes in the assessment of the personal qualities of the opponents at the end of the con-

lict interaction are reliably expressed to a greater extent than with a “middle” one. It is important to talk about the tendency to change the image of the opponent — it becomes more positive and brighter. For respondents with a “high” level of reflex inactivity in the process of conflict interaction, a differentiated approach is characterized when assessing the opponent’s personality. This way, the adjustment of the image, to a greater extent, is determined by an understanding of the individual characteristics of the opponent.

In the subjects of the conflict interaction, reliable changes in the assessment of such personal qualities as “outstanding personality” (individuality), “feeling superiority over others”, “originality of thinking”, “knowledge of oneself”, “courage” were revealed. In the very aspect of changes in the assessment of personal qualities is the emergence of greater confidence in the correctness of actions, a greater understanding of the situation.

Quantitative and qualitative evaluation of the data obtained showed that those respondents who end the conflict interaction with a compromise, change the image of the opponent more intensively than those who end the interaction with the “victory” of one of the participants. No less interesting result of the study was the data that for the respondents with high and medium levels of reflexivity, there is a greater change in the leading style of behavior in a conflict situation than for the ones with a low level.

Our research laid the foundations for further study of the reflexive aspect of the perception of each other by the subjects of the conflict, which can be aimed at:

1. The study of the role of self-assessment of the personal qualities of the opponents in the process of perceiving each other in the conflict interaction.

2. The study of verbal and non-verbal means of communication in the process of reflexive construction of images of the opponents.

3. Research of personal determinants associated with the construction of the image of the opponent, which cause a change in the leading behavior in the conflict, considering the level of reflexivity.

4. The study of objective indicators (time, speed, etc.) of the reflexive construction of the image of the personality and its changes in the process of interaction of communicants.

5. The study of the age features the reflexive aspect of the perception of interaction by the subjects and the factors that determine the formation of reflection as an effective mechanism of interpersonal communication.

6. Using the potential of VR to create conditions for conflict resolution skills, considering VR as a “chronotope of reflection” (the space-time continuum of the presence of the self “outside” of the situation, relative to which the reflective process is meaningfully carried out), we noted that functionally VR can be included in the implementation of the reflection process. This is exactly what will effectively use its potential to solve a wide range of practical problems, and above all, to resolve conflicts [3].

7. Using the potential of the reflexive mechanism to for effective conflict resolution skills in the educational process. It is necessary to pay attention to the need to develop techniques for the development of reflection aimed at the formation of constructive styles for resolving conflict situations in students.

In general, the study of the reflexive aspect in the perception of the subjects of the interaction and determinants that prove its effectiveness is one of the relevant areas for the psychology of reflection, conflictology and the psychology of perception. In complex, constantly changing social processes, the identification of patterns of this process is the basis for the effective organization and management of interpersonal communication, a condition for the prevention and constructive resolution of conflicts, primarily in the educational environment.

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# Students' Mindset and Subjective Well-being during the Period of “Emerging Adulthood”

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In the current paper the interrelation between students' mindset and subjective well-being during the period of “emerging adulthood” is investigated. The relevance of the research is determined by high intellectual and psycho-emotional loads to the referent group, especially in the context of distance learning, which threatens the students' well-being. A sample of the study includes college students, bachelors, masters, and postgraduates. We assumed that a growth in mindset is correlated with a high level of students' well-being. We also tested the hypothesis about age differences in the level of students' well-being in the period of emerging adulthood. The sample consisted of 317 respondents aged from 16 to 30 years ( $M=22.6$ ,  $SD=4.97$ ), 232 are female and 85 are male. We used “The Satisfaction with Life Scale”, “The Personal Well-being Index-Adult”, “The Warwick-Edinburgh Mental Well-being Scale”, and “The Mindset Questionnaire”. The results of the study demonstrate significant correlations between mindset and all types of well-being. At the same time, the lowest indicators of the well-being are in the bachelors' group, and the highest are in the college students' group. The results of the study may be used in training programs to improve the level of students' subjective well-being.

**Keywords:** subjective well-being, mindset, emerging adulthood, students.

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## Образ мышления и субъективное благополучие обучающихся в период «становящейся взрослости»

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Представлены материалы исследования вопроса о связи образа мышления и субъективного благополучия обучающихся в период «становящейся взрослости». Отмечается, что высокие интеллектуальные и психоэмоциональные нагрузки, особенно в условиях перехода на дистанционный формат обучения, заключают в себе угрозу благополучию обучающейся молодежи, что обуславливает актуальность темы. В эмпирическом исследовании, полученном на выборке студентов колледжа, бакалавриата, магистратуры и аспирантуры, проверялись следующие гипотезы: 1) мышление, ориентированное на рост, связано с высоким уровнем благополучия обучающихся; 2) существуют возрастные различия в уровне благополучия обучающихся в период становящейся взрослости. Выборку составили 317 респондентов в возрасте от 16 до 30 лет ( $M=22,6$ ,  $SD=4,97$ ), из которых 85 мужчин и 232 женщины. Использовались методики: «Шкала удовлетворенности жизнью» Э. Динера, опросник «Индекс личного благополучия взрослых», «Спектр психического здоровья», «Шкала психологического благополучия Варвик-Эдинбург» и опросник «Образ мышления». Полученные результаты показали значимые связи между образом мышления и всеми видами благополучия. При этом наиболее низкие показатели благополучия приходятся на уровень студентов бакалавриата, а самые высокие — на группу студентов колледжа. Результаты исследования могут быть использованы в тренингах и программах по повышению уровня субъективного благополучия обучающихся.

**Ключевые слова:** субъективное благополучие, образ мышления, «становящаяся взрослость», обучающиеся.

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## Introduction

The problem of students' subjective well-being has a high relevance for psychologists. Physical, intellectual, and psycho-emotional stress, high learning rate, especially in the context of the COVID-19 pandemic, and the transition to distance learning, can threaten young students' well-being [1]. The issue of subjective well-being in relation to several stages of education in youth has received little attention although, recent studies and theories keep on the idea of schoolchildren and students' subjective well-being [2; 3; 5; 7; 22; 26; 33]. Considering the students' well-being within the framework of age periodization, it is worth studying it during the period of "emerging adulthood".

### Learning in the Period of "Emerging Adulthood" as a Challenge for Students' Subjective Well-being

"Emerging adulthood" is the period between adolescence and youth, during which the process of identity formation continues [10]. At this time young people learn to take on responsibility, choose a profession, start a family and take on new social roles [26]. Education is one of the reasons why the period of "emerging adulthood" has appeared. Young people marry and have children later, study in colleges and universities longer. The changes usually occur at the age of 18 and end by the age of 30 [11].

The way young people live the stage of "emerging adulthood" influences the next stages of their lives. Studying at a university is positively correlated with life satisfaction, emotional well-being, hope, physical health, income, and is negatively associated with regret in the following periods of life [11; 26]. However, despite the opportunities, subjective well-being is significantly reduced dur-

ing the learning period. Students change their place of residence, are separated from their families, feel an increasing personal responsibility, look for friends and adapt to new requirements in colleges and universities [15; 21].

At the same time, the question of whether the students' subjective well-being is correlated with age characteristics and the period of "emerging adulthood", or whether the socio-psychological features of various levels of education make a greater contribution is rather controversial. This issue led us to the first hypothesis.

In addition, a high level of subjective well-being is one of the factors that help cope with emerging difficulties in the learning process [22].

### Approaches to Well-being of a Personality in Psychology

The first major review of research on subjective well-being is E.Diener's article, which outlines three criteria for determining well-being. The first criterion is the standard or ideal that a person should strive for, the second one is a person's subjective assessment of their life, satisfaction with it, and the third one is the predominance of positive emotions over negative ones. For measuring hedonistic well-being "The Positive and Negative Affect Scale" (PANAS) and "The Satisfaction with Life Scale" (SWLS) were created [17].

The eudaemonic orientation arose in opposition to the hedonistic approach. C.Ryff singled out six personal characteristics of a prosperous person who is satisfied with life — personal growth, autonomy, goals in life, self-acceptance, positive relationships with others, and the person's ability to create an environment for themselves. Based

on this theory, the “Psychological Well-being Scale” was created [30].

C. Keyes developed Ryff’s ideas and introduced the concept of “social well-being”, which means the person’s ability to fully live and function in society. This concept consists of five factors — social integration, social contribution, social coherence, social actualization, and social recognition [24]. Later he created a short form of “The Mental Health Continuum” measuring positive feelings and positive functioning [24; 34].

Another approach in studying subjective well-being is the research of quality of life. One of the scales in the quality of life is “The Australian Adult Personal Well-being Index”, which includes questions about subjective satisfaction with the standard of living, health, achievements, relationships, connections with society, confidence in future and security, spirituality, and one’s life in general [16].

Subjective well-being is also studied within the framework of a mixed approach, in which it is synonymous with “mental health”. This approach originated in the United Kingdom. “The Warwick-Edinburgh Mental Well-being Scale” measures positive psychological functioning [31].

In foreign psychology, the connections between personality traits and indicators of well-being have received much attention. The largest number of works is associated with the study of temperamental characteristics and personality factors included in the “Big Five”. In addition, research results demonstrate a positive correlation between psychological well-being and positive relationships with friends and parents [2], a “friendly home environment” [7], and a negative correlation with various forms of deviant and addictive behavior [1; 30].

Learning during the period of “emerging adulthood” is associated with a high risk of mental instabilities due to the emergence of new requirements. Students do not feel like adults and cannot cope with new difficulties

[10; 25]. One of the personality traits that help solve occurring problems and increase the level of well-being is “mindset” [18].

### **Mindset and Students’ Subjective Well-being in the Period of “Emerging Adulthood”**

The concept of mindset was suggested by C. Dweck after observing the people’s reaction to failures: some perceived them as a challenge, while others gave up and abandoned the chosen goal. C. Dweck concluded that the reason was in the way of thinking and people’s ideas about the nature of their personal human qualities and intelligence. She singled out fixed and growth mindsets.

People with a fixed mindset are sure that their intelligence and personality traits are simply “given” and do not change, they are more focused on their external activities and feel helpless in the face of failure. People with a growth mindset believe that their intelligence and personality traits are malleable and due to effort, perseverance, practice, and education, they can achieve higher results [33].

Several studies have demonstrated the correlation between a growth mindset with constructive behavior, academic achievements, and students’ well-being [18; 23]. B. Huffman and colleagues showed that students with a fixed mindset reacted to criticism defensively, while students with a growth mindset are oriented to eliminate the cause of their poor performance [20].

A fixed mindset is associated with the perception of problems as a risk situation and possibility to be negatively affected [33]. In contrast, a growth mindset allows a person to see problems and failures as opportunities for learning. A growth mindset is associated with more adaptive coping strategies, which help a person live a less stressful and more successful life, which can gradually affect academic success and well-being [14; 18].

However, some authors believe that the importance of a growth mindset for academic achievement and students' well-being can be overestimated. For instance, the effect of a growth mindset may be insignificant in improving the students' performance who are already high achievers. Moreover, although a growth mindset can improve academic performance in the short future, these effects are eliminated for bachelors and postgraduates [11]. The second hypothesis is based on this contradiction.

Our study is aimed at investigating the connection between students' mindset and well-being in the period of "emerging adulthood". Achieving this aim involved solving the following research problems: 1) identifying differences in mindset among students of four levels of education; 2) establishing differences in their level of well-being.

Thus, based on the results of the theoretical review, we hypothesize:

A growth mindset is correlated with a high level of students' well-being in the period of "emerging adulthood".

The level of students' well-being in the period of "emerging adulthood" has age differences: college students have the highest level of well-being, which is gradually decreasing to higher levels of education.

### Research Participants, Material, and Procedure

To achieve the aim of the research and test these hypotheses, we have conducted an empirical study using five questionnaires.

### Participants

The sample included 317 participants (232 females and 85 males). The participants were students of four levels of education — college students, bachelors, masters, and postgraduates. Thus, the respondents were divided into four groups. They were aged between 16 and 30 (the median age was 22.6, SD = 4.97).

According to J. Arnett, the age criteria for the period of "emerging adulthood" are flexible. This is the time that is characterized by the search for identity, as well as instability, self-centeredness, "feeling in-between" and opportunities. J. Arnett noted that many participants aged 12—17 in his research did not feel like adults yet, but already felt their transition to another age stage. Thus, though the period of "emerging adulthood" refers to the age from 18 to 30 years old, participants aged 16—17 years old were also included in the sample of our study.

The first level of education considered in our study was represented by international college students (N=82). The other part of the sample consisted of 235 respondents studying at Russian universities as bachelors, masters, and postgraduates. The students included in the sample are equalized in terms of learning conditions. They study in a competitive environment at international and prestigious colleges and universities that place high demands on their students. The characteristics of the sample are presented in Table 1.

Table 1

Age and Gender of Participants (N=317)

Level of Education	Total Number of Participants	Men	Women	Mean Age
College Students	82	29	53	17.5
Bachelors	43	7	36	21.1
Masters	126	32	94	23.7
Postgraduates	66	17	49	27.9



## Procedure

Participants of the study got a battery of questionnaires in the official mailing list from the organization in which the respondents study. International college students completed the original questionnaires in the language of learning, in this case — English. The other part of the sample filled out the Russian-language versions of the questionnaires. The survey was conducted in an online form, the link was posted on the “1ka.si” platform. All respondents or their representatives gave informed consent to participate in the study, which was anonymous and confidential. Participation was not rewarded, but respondents were allowed to receive feedback with brief recommendations.

## Materials

To study the main variables and collect data we have used the following questionnaires:

1. E. Diener’s “The Satisfaction with Life Scale (SWLS)”, adapted by E. Osin and D. Leontiev [9]. The questionnaire consists of five statements about life satisfaction. Responses on these scales were scored on a seven-point scale Likert scale (Cronbach’s  $\alpha$  is 0.83).

2. Questionnaire “The Personal Well-being Index-Adult (PWI-A)”, which was adapted by E. Uglanova [9]. The questionnaire consists of nine statements that require a response on a ten-point scale Likert scale (Cronbach’s  $\alpha$  is 0.94).

3. A short version of “The Mental Health Continuum (MHC)” Questionnaire in the adaptation by E. Osin [9; 34]. The questionnaire is based on C.Keyes’s model of the psychological health continuum and includes 14 statements grouped into three scales: emotional (MHC — Emotional Well-being) and social eudaimonic well-being (MHC — Social Well-being), as well as psychological eudaimonic well-being (MHC — Psychological Well-being). Cronbach’s  $\alpha$  is 0.94.

4. “The Warwick-Edinburgh Mental Well-being Scale (WEMWBS)” in the adaptation by S. Nartova-Bochaver. The questionnaire consists of 14 statements. Responses on this scale were scored on a five-point scale Likert scale [8]. Cronbach’s  $\alpha$  is 0.96.

5. “The Mindset Questionnaire” is based on C. Dweck’s model of motivation [18]. The questionnaire included 10 statements that require a response on a five-point scale Likert scale. The questionnaire has not previously been adapted in Russian. Before data analysis, we have estimated the internal consistency of statements. The internal correlation of points demonstrated the average strength of the correlation ( $r_{\text{avg}}=0.26$  (-0.08; 0.64)). Cronbach’s  $\alpha$  is 0.78. Thus, the obtained results indicate a good consistency between the statements of the questionnaire in Russian and the possibility of its further use for diagnostic purposes.

## Results

We used SPSS Statistics 26.0 for statistical data processing and testing our hypothesis. An analysis of normality of distribution using the Shapiro-Wilk test showed a high probability of the type II error. Thus, non-parametric methods of statistical analysis were chosen. We used Spearman’s rank correlation coefficient. To analyze differences between groups, the Kruskal-Wallis H test was used. The G\*Power 3.1 calculator was used to calculate the effect size and statistical power.

The correlations between the well-being indicators and a mindset in the research sample are presented in Table 2.

According to our results, the mindset is negatively correlated with all indicators of psychological well-being. The mindset demonstrates the closest correlation with the scales “The mental health continuum”, and “The personal well-being index” with its subscales. The negative direction of the

Table 2

**Correlations between Well-being Indicators and Mindset  
 (Spearman's Rank Correlation Coefficient)**

Indicators	Mindset	Statistical Power (1-b)*
The Mental Well-being (WEMWBS)	-.267*	.989
The Satisfaction with Life (SWLS)	-.196*	.828
The Personal Well-being Index (PWI)	-.278*	.994
The Mental Health Continuum (MHC)	-.341*	.999
The Mental Health Continuum (MHC), emotional well-being	-.310*	.999
The Mental Health Continuum (MHC), social well-being	-.306*	.999
The Mental Health Continuum (MHC), psychological well-being	-.305*	.999

Note: \*  $p \leq 0.01$ .

correlation may indicate that the high scores on well-being scales correlate with a growth mindset, while the low scores correlate with a fixed mindset. Thus, the first hypothesis of the study was confirmed.

To test the second hypothesis of our study, we conducted the analysis of the differences between groups in mindset and well-being depending on the level of education. Table 3 contains the results of the analysis.

Statistically significant differences in groups were obtained for all indicators of subjective well-being, and a mindset. The post-hoc analysis also demonstrated high statistical power and moderate effect size. We received the only exception in the indicators of "The Mental Well-being" with a small effect size and moderate statistical power.

It is worth visually comparing the median of the indicators of well-being and mindset depending on the level of education (Figure 1). The results show that a fixed mindset is most common among college students, while masters and post-graduates, and especially bachelors are more likely to have a growth mindset. At the same time, all indicators of psychological well-being are at their lowest in the bachelor group, and their highest in the college students' group.

Thus, all indicators of psychological well-being and mindset have statistically significant differences depending on the levels of education. However, we can assume that these differences may be associated not with the level of education, but with the age criterion. An additional correlation analysis was carried out to test age differences (Table 4).

The analysis showed weak correlations of age with a mindset and "The Mental Health Continuum". At the same time, it should be noted that both indicators have multidirectional correlations: "The mental health continuum" has an inverse correlation with age, while the indicator of mindset has a direct correlation. In addition, all obtained values have a moderate statistical power.

Thus, the second hypothesis of our study was partially confirmed.

### Discussion

We found significant correlations between mindset and all indicators of well-being. The correlation between mindset and well-being has been confirmed in previous studies. Students with a growth mindset perform better and have a higher level of well-being than students with a fixed mindset [19; 27].

At the same time, our results demonstrated that a fixed mindset is most

Table 3

**Students' Mindset and Well-being Depending on the Level of Education  
 (the Kruskal-Wallis H Test)**

Indicators	Level of Education	Mean	Kruskal-Wallis H Test	Statistical Power (1-b)*	Effect Size f-Cohen
Mindset	College Students	7.0	18.590*	.863	.33
	Bachelors	10.1			
	Masters	8.8			
	Postgraduates	8.5			
Mental Well-being (WEMWBS)	College Students	50.6	12.499*	.642	.19
	Bachelors	45.8			
	Masters	49.8			
	Postgraduates	51.4			
Satisfaction with Life (SWLS)	College Students	24.4	28.952*	.996	.31
	Bachelors	17.8			
	Masters	20.8			
	Postgraduates	22.1			
Personal Well-being Index (PWI)	College Students	76.8	27.556*	.989	.31
	Bachelors	62.4			
	Masters	72.5			
	Postgraduates	70.7			
Mental Health Continuum (MHC)	College Students	45.7	29.612*	.995	.32
	Bachelors	31.5			
	Masters	37.9			
	Postgraduates	39.4			
Mental Health Continuum (MHC), emotional well-being	College Students	10.8	25.449*	.987	.30
	Bachelors	7.4			
	Masters	9.2			
	Postgraduates	9.2			
Mental Health Continuum (MHC), social well-being	College Students	14.1	20.311*	.936	.26
	Bachelors	9.5			
	Masters	11.3			
	Postgraduates	11.7			
Mental Health Continuum (MHC), psychological well-being	College Students	20.7	28.427*	.983	.30
	Bachelors	14.6			
	Masters	17.5			
	Postgraduates	18.5			

Note: \* p ≤ 0.01

typical for college students, while masters and postgraduates, and especially bachelors are more likely to have a growth mindset. Our results for college

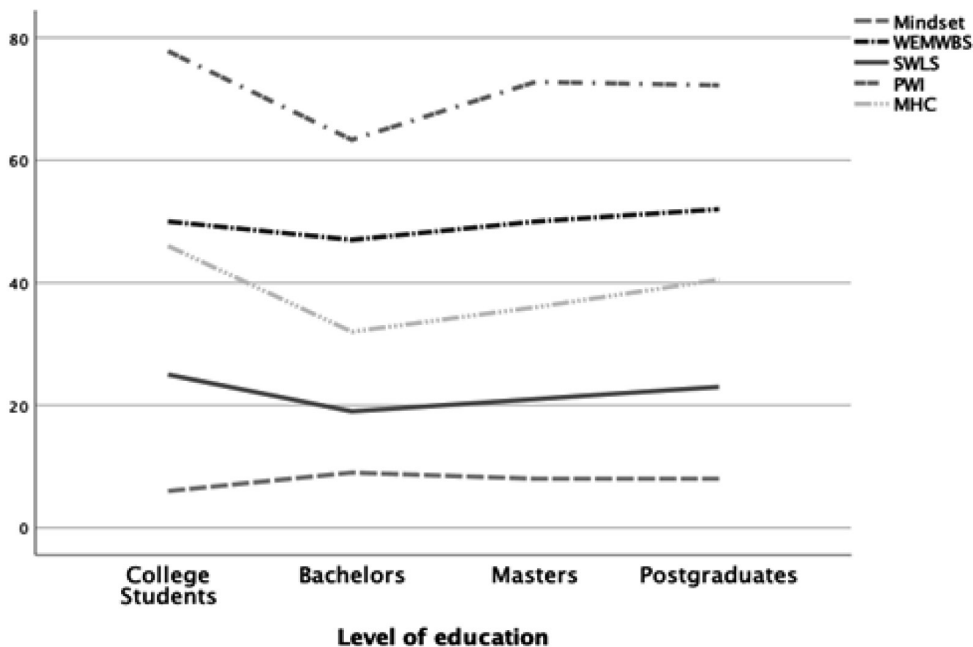


Fig. 1. Indicators of Students' Well-being and Mindset Depending on the Level of Education (Median)

Table 4

**Correlation of Well-being and Mindset with Age  
 (Spearman's Rank Correlation Coefficient)**

Indicators	Age	Level of Significance (p)	Statistical Power (1-b)*
Mindset	.11	.03≤0.01	.416
Mental Well-being (WEMWBS)	.06	.263	.493
Satisfaction with Life (SWLS)	-.10	.076	.503
Personal Well-being Index (PWI)	-.05	.335	.502
Mental Health Continuum (MHC)	.12	.028≤.01	.477

students are consistent with several prior studies. N. Ortiz Alvarado and her colleagues showed that a growth mindset is more typical for school children than for college students. They note that when students move to the next level of education, academic stress forces them to adapt to a new academic environment and take greater responsibility for their

learning, without mentoring from teachers and parents [27].

It is particularly worth mentioning our result regarding the bachelors' growth mindset. We assumed that bachelors, as well as college students, due to the high level of academic stress associated with changing the level of education, may have a fixed mindset. Indeed, many students

perceive moving to a new level of education as an acute stressor, associated with negative events, such as a low level of social support and a decline in physical and mental well-being [28]. However, the results of some research showed that the same objective stressor may not be perceived in the same way by different people. Perception of stressors depends on their personal and social identity [29]. Compared to students with a fixed mindset, students with a growth mindset are more resilient when moving to the next level of education and, therefore, are more academically successful [30; 15]. This fact means that a growth mindset can be a protective factor that allows students to deal with moving to a new level of education and adapt to a highly competitive and stressful learning environment [35]. However, this conclusion needs further verification.

Postgraduates in our study also have a growth mindset. We would like to underline that postgraduates' relationships with their supervisor, whose support and feedback they can receive, play a key role in the postgraduate training program. The results of some studies also indicate that constructive criticism and feedback, a collaborative relationship between students and teachers, positively influences the development of a growth mindset, resilience, and psychological well-being [20; 32].

According to our results, mindset is mostly correlated with well-being defined as "The Personal Well-being index" and as a part of "The Mental Health Continuum". We explain this result by the fact that mindset in the period of "emerging adulthood" plays a special role for students in overcoming educational stress, adapting to new environments, and striving for high academic achievements. Academic success, in turn, can lead to satisfaction with one's social relations and status, as well

as hedonistic and eudaimonic well-being. A person's satisfaction with their social relations and status are common for these two approaches of well-being in the period of "emerging adulthood" [11].

After testing the second hypothesis, we found that the lowest levels of well-being were at the level of bachelors and the highest — at the level of college students.

Our results are consistent with the results of research studying the period of "emerging adulthood". According to them, at first, students are optimistic about their future, thinking little about failures, because they usually have high expectations. But if they are not justified, young people are very disappointed in life [11]. Situations of failure and the fear of not realizing the plans after graduation reduce the level of well-being [4; 13].

V.Vodyakha notes that the most academically successful students study in the senior classes, so the level of their subjective well-being is quite high [2]. Thus, we can explain the highest level of well-being in the group of college students which we have obtained in the research.

We revealed that the level of well-being, being the lowest in the bachelors' and masters' groups, increases in the postgraduates. We explain this result by the means of the fact that young people make a balanced decision about studying at the postgraduate training program as the third stage of education and often deliberately postponing marriage, starting a family, and moving up the career ladder, which is especially important in the period of "emerging adulthood". The results of the study by E. Matyushkina also showed that students choosing a new level of education have less emotional burnout and have a higher level of well-being since their professional choice is more conscious compared to the first-year students [6].

Thus, differences in the level of education were found for all indicators of well-be-

ing, but it is disputable whether the level of education is a separate criterion, or whether these differences are explained by age. Several studies have shown that the level of happiness decreases with age, including considering gender and level of education [3; 5; 11; 33]. In addition, it is obvious that in the vast majority of cases, age and level of education are related, since there are certain age and institutional restrictions for admission, for instance, to the postgraduate training program. Thus, this issue is quite debatable and requires conducting further research.

### Conclusion

Our research was devoted to the correlation between mindset and subjective well-being of students during the period of "emerging adulthood". The obtained results allow us to make the following conclusions.

1. High scores on well-being scales correlate with a growth mindset, while low scores correlate with a fixed mindset.

2. A fixed mindset is most typical for college students, while masters, postgraduates, and especially bachelors are more likely to have a growth mindset.

3. All indicators of psychological well-being are the lowest in the postgraduate group and the highest in the college students' group.

The present study had several limitations. Firstly, we used the "The Mindset Questionnaire" which has not been adapted to the Russian sample. Although the results of our psychometric analysis mentioned previously are very encouraging, replication should be a prospect for future research. Secondly, international college students who participated in the study were surveyed in English. Thus, cultural factors may have influenced the obtained results. In addition, it seems relevant to study the relationship between mindset and other psychological constructs, for instance, resilience, optimism, and self-efficacy in future research.

The results of the study can be helpful in training and programs to improve the level of students' subjective well-being. The correlation between mindset with the students' well-being can help parents, mentors, and teachers develop a growth mindset in students from an early age, encouraging their desire to learn and the ability to perceive failure as an opportunity for growth.

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# The Relationship between the Students' Attitude toward Distance Learning, Alienation from Studying and Emotional Burnout

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This article describes the study of the link between the students' preference for distance or traditional education and alienation from studying and emotional burnout. Additional variables such as the subjective evaluation of the success of studies, self-control, and academic control were also analysed. An empirical study was conducted on a sample of 359 students using the questionnaire to evaluate 1) preferred forms of education, 2) subjective alienation and burnout for students by E.N. Osin, 3) the scale of academic control by R. Perry and 4) the short scale of self-control by J. Tangney. Data analysis showed that a cautious, rather negative attitude toward distance learning prevailed among students, combined with a preference for traditional and mixed forms of education. Positive correlations were found between the preference for distance learning and alienation and burnout, as well as negative correlations with academic performance, self-control, and academic control. Structural equation modelling confirmed the assumption that the preference for distance learning is directly related to alienation and burnout, as well as indirectly (through burnout and alienation) and inversely related to self-control and academic control. It is concluded that under the conditions of forced distance learning at a university caused by the COVID-19 pandemic, the preference for distance learning is more typical for less successful students experiencing alienation from study and emotional burnout, combined with a lower level of academic control and self-control.

**Keywords:** distance learning, university students, emotional burnout, alienation from studying, academic control, self-control.

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## Связь отношения к дистанционному обучению студентов с отчуждением от учебы и эмоциональным выгоранием

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Представлены результаты исследования характера связи между предпочтениями студентами дистанционного или традиционного обучения с отчуждением от учебы и эмоциональным выгоранием с учетом субъективной оценки успешности учебы, самоконтроля и академического контроля. Эмпирическое исследование проводилось на выборке 359 студентов с использованием следующего инструментария: специально разработанного авторами опросника для установления предпочитаемых студентами форм обучения, методик, измеряющих особенности субъективного отчуждения и выгорания у обучающихся, предложенных Е.Н. Осиным, шкалы академического контроля Р. Перри и краткой шкалы самоконтроля Дж. Тангни. Полученные в опросе результаты показали, что в предпочтениях дистанционного или традиционного обучения у студентов преобладала осторожная, скорее негативная оценка первого, сочетающаяся с выбором традиционной и смешанной форм обучения. В ходе корреляционного анализа были выявлены прямые связи предпочтения дистанционного обучения с отчуждением и выгоранием, а также обратные — с успеваемостью, самоконтролем и академическим контролем. Структурное линейное моделирование подтвердило предположение о том, что предпочтение дистанционного обучения непосредственно связано с отчуждением и выгоранием, а также опосредованно (через выгорание и отчуждение) и обратно — с самоконтролем и академическим контролем. Делается вывод о том, что предпочтения в выборе между дистанционной или традиционной формой обучения отражают мотивационно-смысловые и регуляторные особенности учебной деятельности студентов в период пандемии COVID-19. Дальнейшие исследования характера связи между особенностями личности и учебной деятельностью студентов, предпочтений ими разных форм обучения могут иметь большое значение для эффективной индивидуализации обучения в процессе подготовки специалистов.

**Ключевые слова:** дистанционное обучение, студенты, эмоциональное выгорание, отчуждение от учебы, академический контроль, самоконтроль.



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## Introduction

The period of distance learning during the COVID-19 pandemic provided an important experience for all participants in this process that requires reflection and scientific analysis. In its most general form, the evaluation of this experience is reflected in whether the participants of the educational process (first of all, students) consider distance learning as a preferable or undesirable option. The observed range of views may be a consequence of individual characteristics of learning activities in their motivational and regulatory aspects. The study of the relationship between students' peculiarities and their preference for distance or traditional format of learning is of practical importance for expanding the opportunities for individualization of learning.

The probable reason for preference of distance learning as an alternative to a traditional one is a negative attitude to the latter, caused by alienation from study and emotional burnout. These negative motivational and emotional states are combined with an unproductive profile of academic motivation and are expressed, first of all, in loss of meaning of learning activities, and interest in learning [5—8]. The main causes of emotional burnout are high demands with a lack of resources in the learning environment [14]. Students' burnout has some negative consequences, including, along with a drop in motivation, a decrease in academic achievement (the results of a recent meta-analysis demonstrate the effect size  $r = -0.24$  [16]) and life satisfaction [11]. Various personal resources, such as self-control [21], emotional intelligence [11], dispositional optimism and self-efficacy [23], help counteract academic burnout.

The state of emotional burnout is closely related to alienation from studying [7]. According to E.N. Osin, the importance of the category of alienation in the research field of learning activities is determined by the fact that it gives a well-developed theoretical basis for the analysis of more specific, private phenomena, such as burnout, extrinsic motivation, cynicism [7]. Without delving into theoretical approaches to the analysis of alienation, discussed in detail in the works of other authors [5; 6], we note that alienation from studying is manifested in the experience of powerlessness and meaninglessness of learning, reduction of interest, superficiality, nihilism, and dissatisfaction with education [5; 7]. E.N. Osin points out the excessive workload, lack of clear learning objectives and assessment criteria, lack of support from teachers and scarcity of opportunities for creativity and choice as the main reasons for learning alienation [7; 10]. Since alienation, like burnout, is associated with depressed academic success [7], monitoring of academic success is desirable in investigating their association with a preference for distance learning.

Unfavourable characteristics of the learning environment (for example, insufficiently clear goals and criteria) and inadequate requirements, making it difficult for a student to succeed, may thereby reduce the sense of controllability of learning activities. Perceived academic control represents the students' perceptions of their impact on academic achievement and their characteristics necessary for academic success, including intelligence, knowledge and skills, willpower, social skills, etc. [18]. Academic control is related to academic performance and intention to drop out or discontinue a course, academic motivation, and emotional states in learning activities (inverse correlations

with boredom and anxiety) [13; 18; 20]. All this suggests that a decrease in academic control can be an important factor of emotional burnout and learning alienation.

Self-control as an ability to manage one's thoughts, feelings, and actions in accordance with a long-term meaningful goal and to resist more attractive current temptations plays an important role in learning activities [12; 22]. Self-control is one of the most significant predictors of academic achievement at all stages of learning: results of a meta-analysis show that averaged over 138 samples, the partial correlation of self-control (measured with the Big Five Conscientiousness Scale) with academic achievement after controlling for intelligence is 0.24 [19]. Self-control is inversely related to students' burnout and is a moderator of the relationship between burnout and academic performance [21], which indicates its important role in preventing burnout and its negative consequences.

Although pupils' and students' attitudes towards distance learning were repeatedly studied [1; 4; 17], we could not find any information concerning the link between distance learning preference and the considered psychological characteristics. Considering the above-mentioned manifestations of burnout and alienation, it was suggested that these states are associated with a negative attitude to traditional learning and a preference for distance learning. Thus, this study tested the hypothesis that preference for distance learning is more typical for students who experience emotional burnout and alienation from study, combined with low academic and self-control. At the same time, the connection of self-control and academic control with a preference for distance learning can be mediated through emotional burnout and alienation from studying.

### Sample and Measures

*Participants.* Sample comprised 359 university students, 221 females (61.6% of

the sample) and 138 males (38.4%), mean age M19.34; SD=2.27. The majority of the respondents are studying in the humanities, social sciences, and economics in Financial University under the Government of the Russian Federation (46%) and National Research University Higher School of Economics (41%). The survey was conducted online from March 31 to April 5, 2020, it was launched two weeks after the transition to distance learning at these universities, which took place on March 17, 2020, so that each participant had at least two weeks of experience with distance learning. According to the survey data, most survey participants (97%) had not encountered distance learning before the introduction of distance learning in higher education.

*Measures.* The original questionnaire was used to measure preference for distance learning. It consisted of three questions, each had three alternative answers:

1. Think in general about distance learning (DL). From your point of view: is DL worse than the traditional format (1 point), is DL no better, no worse (2 points), is DL better than the traditional format (3 points)?

2. From your point of view, will the quality of education as a result of the transition to DL: decrease (1), remain the same (2), increase (3)?

3. In general, would you prefer: to return to the traditional format (1), to switch to blended learning (2), to stay on DL (3)?

The mean score for the three questions was used as an indicator of preference for distance learning. The Cronbach's  $\alpha$  coefficients for this and other scales used, which confirm their sufficient internal consistency, are presented in Table 1.

Alienation from studying was measured using E.N. Osin's subjective alienation questionnaire for students [7] based on S. Maddi's concept of alienation [15]. The questionnaire includes 16 positive items describing four forms of alienation: vegetativeness, powerlessness, nihilism, and adven-

turousness. In this study, a general index of “alienation from studying” was used.

Diagnostics of emotional burnout was carried out using a burnout scale for students by E.N. Osin [7]. It includes nine positive items with a six-point scale, grouped into three subscales: emotional exhaustion, cynicism, feeling of incompetence. In this study we used an overall measure of burnout. R. Perry’s scale [18] in adaptation by T.O. Gordeeva [2] was used to estimate the perceived academic control. It includes eight statements (four positive and four reversed items), agreement with each of them is evaluated on a five-point scale.

Self-control was measured using J.P. Tangney, R.L. Baumeister, and A.L. Boone’s short self-control scale [22] as adapted by T.O. Gordeeva et al. [3]. The scale consists of 13 items (four positive and nine reversed), agreement with which is assessed on a five-point scale.

To obtain information about academic success, students were asked to rate their average performance in the last session on a scale: “1 (Low — I am among 25% of the least successful students), “2 (Below average)”, “3 (Average)”, “4 (Above average)”, “5 (High — I am among 25% of the most successful students)” [7]. Such a scale cannot be recognized as an objective measure of academic performance similar to exam grades, but it characterizes subjective evaluation of academic success (hereinafter for short — “academic success”), which is of the greatest interest in the context of the objectives of this study, since it is subjective experience of failure that contributes to negative states like emotional burnout and alienation from the study.

Data processing was conducted using R, structural equation modelling (SEM) was performed in Mplus 8. To estimate the statistical significance of mediated effects in Mplus, bootstrap analysis was used (5000 samples) [24]. The statistical significance of the deviation in the frequency of differ-

ent response options to the questions of the questionnaire from the expected probability (33.3%) was estimated using the chi-square test with the Yates’ correction (“prop.test” in R).

## Results

Analysis of preference or rejection of distance learning based on answers to each item shows that students more often believe that compared to the traditional format it is worse or less preferable (41.2%; deviation from expected probability is significant:  $\chi^2(1)=9.79$ ;  $p \leq 0.01$ ) and only 22.3% ( $\chi^2(1)=19.12$ ;  $p \leq 0.001$ ) believe that it is better. The majority of students (57.4%;  $\chi^2(1)=92.65$ ;  $p \leq 0.001$ ) believe that due to the transition to a distance learning format, the quality of education will decrease, and the proportion of those who expect an increase in quality is only 18.1% ( $\chi^2(1)=36.63$ ;  $p \leq 0.001$ ). At the same time, only 15% ( $\chi^2(1)=53.06$ ;  $p \leq 0.001$ ) of the respondents would like to stay in distance learning, 44.6% ( $\chi^2(1)=20.02$ ;  $p \leq 0.001$ ) would like to return to the traditional format, but the proportion of those who would prefer a mixed format is also quite significant (40.4%;  $\chi^2(1)=7.81$ ;  $p \leq 0.01$ ). The answers to these questions correlate closely with each other ( $0.48 \leq r \leq 0.64$ ), which allows combining them into a distance learning preference scale with a reliability coefficient (Cronbach’s  $\alpha$ ) of 0.75.

The results of the correlation analysis presented in the table below show that preference for distance learning is directly related to alienation from studying, burnout, and inversely related to academic control. Weak inverse correlations were also revealed with self-control and academic performance. Consequently, in general, distance learning looks more attractive for students with lower success in learning activities, for those who are more characterized by emotional burnout and alienation from learning activities.

Alienation from studying and burnout showed the expected close direct corre-

Table 1

**Descriptive statistics and correlations between study variables (N = 359)**

	Preference for distant learning	Alienation from studying	Emotional burnout	Academic control	Self-control	Academic success	Age
Alienation from studying	0.29***	—					
Emotional burnout	0.28***	0.67***	—				
Academic control	-0.20***	-0.42***	-0.40***	—			
Self-control	-0.12*	-0.40***	-0.38***	0.15**	—		
Academic success	-0.12*	-0.25***	-0.27***	0.20***	0.17***	—	
Age	0.07	-0.04	-0.07	-0.15**	0.03	-0.11*	—
Gender (0 — female, 1 — male)	-0.03	0.09	-0.04	-0.05	0.04	-0.17**	0.03
Mean	1.71	2.77	3.52	3.70	2.86	2.02	19.34
Standard deviation	0.64	0.71	1.27	0.60	0.57	0.92	2.26
Reliability (Cronbach's $\alpha$ )	0.75	0.89	0.89	0.74	0.74	—	—

Note. \* —  $p \leq 0.05$ ; \*\* —  $p \leq 0.01$ ; \*\*\* —  $p \leq 0.001$ .

lation. Self-control and academic control demonstrated significant correlations with alienation and burnout. Academic success showed correlations with all other variables, while the strongest (inverse) correlations were with alienation and burnout. Weak inverse correlations were found between age and academic control and academic success. Gender showed a correlation only with academic success: the latter was slightly higher in female.

To analyse the contribution of academic success, alienation, and burnout in the preference for distance learning, considering the relationships between them, SEM was applied. Using SEM, we also tested the hypothesis of a mediated relationship of academic control and self-control with the distance learning preference factor, composed of three categorical indicators (relevant items). Academic success, burnout, and alienation from study were considered as direct predictors of distance learning preference in the model. In turn, these three variables were considered as a function of self-control and

academic control. After a preliminary evaluation of the model based on modification indices (Lagrange multiplier test), the covariance between self-control and academic control was introduced into the model. The resulting model (see Figure 1) showed a good fit to the data:  $\chi^2 = 26.19$  (WLSMV estimator);  $df = 12$ ;  $p = 0.01$ ; CFI = 0.986; TLI = 0.967; RMSEA = 0.057; 90%-CI for RMSEA: 0.027-0.088; PCLOSE = 0.306; N = 359.

A bootstrap analysis of mediated relationships showed statistically significant, though rather weak, inverse associations of preference for distance learning through burnout and alienation with both academic control ( $-0.15$ ;  $p \leq 0.001$ ) and self-control ( $-0.13$ ;  $\leq 0.001$ ).

**Discussion**

The prevailing in our sample cautious, rather negative attitudes toward distance learning, manifested in a preference for traditional and mixed forms, corresponds to the results of other foreign and domestic studies

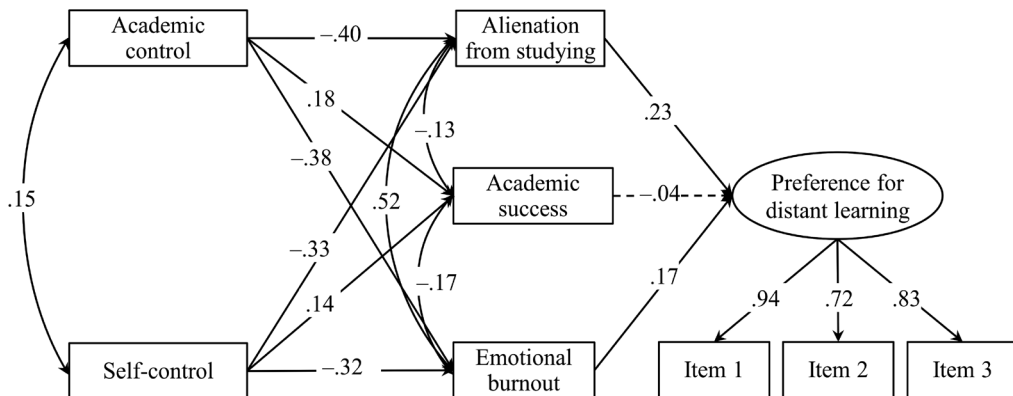


Fig. 1. Structural model of relationships between preference for distant learning, alienation from studying, emotional burnout and their predictors (dashed line indicates insignificant path, the other path coefficients are significant at  $p \leq 0.05$ )

[1; 17]. Comparing the quality of learning in the traditional and distance forms, students rate traditional education higher, which corresponds to the results of studies conducted before the pandemic [4]. Blended learning, according to our data, is also much more likely to be rated as preferable to distance learning. It means that students are aware of the differences between these formats and their implications for educational quality. This fact is consistent with the findings of a recent study showing positive attitudes toward blended learning among undergraduate and graduate students [9].

In accordance with the results of past studies, burnout and alienation from study showed a close intercorrelation, as well as inverse correlations with academic success [7]. Burnout and alienation are inversely related to academic control and self-control, which once again confirms the important role of these personal resources in the prevention of such conditions [21].

The obtained results testify to the confirmation of the hypothesis: preference for distance learning is positively and directly connected with alienation and burnout. Besides, mediated inverse relations of distance learning preference with self-control and

academic control were revealed. Although the correlational design does not provide a basis for conclusions about the causal relationship, the obtained pattern of relationships corresponds to the assumption that lacks personal resources (self-control) together with low perceived academic control contribute to burnout and alienation from studying, which is expressed in a negative attitude towards the traditional learning and preference for distance learning.

The results of the study do not answer the question of whether distance learning is more or less effective for the students who prefer it. Given that the role of external control is lower in distance learning, self-control and self-regulation should play a more important role. Nevertheless, paradoxically, distance learning is preferred by students with less self-control. This may mean that for students who prefer the distance form, its effectiveness may actually be lower. Testing this assumption constitutes the perspective of the study.

Perhaps the situation of transition from habitual, traditional to new, distance learning due to the stress of adapting to a new environment influenced the evaluation of its preference. The adaptation to the conditions of

distance learning that requires a higher level of self-regulation and self-control should proceed more favourably in more successful students with a lower level of burnout and alienation, so that in such a situation they have less reason to reject distance learning than in burnt-out students with less self-control. However, the results of our study show the opposite: it is the burnt-out students who are more inclined to prefer distance learning, probably due to the fact that they are less adapted to the traditional one.

A limitation of the study is the moderate representativeness of the sample, which includes mainly students from two Moscow universities, so that verification in other student samples is required. The possibility of generalizing conclusions is also limited by the fact that the experience of distance learning was gained by the participants under conditions of an emergency and forced transition to it due to the unfolding pandemic of COVID-19. Insufficient readiness of universities to implementing distance learning, which caused inevitable difficulties, combined with its forced introduction, frustrating the need for autonomy in students, could be important factors that reduce the subjective attractiveness of this form of learning. This means that the results of this study characterize not the attitude to distance education in general, but rather to that particular form of its implementation, which took place in Moscow universities at the beginning of the pandemic.

The conclusions obtained in the study are limited in that they state only students' preferences, without revealing their subjective basis. The questions of how students with different individual characteristics explain their preferences, what criteria they are guided by in their evaluation require a special analysis, which constitutes the perspective of this study.

## Conclusions

The preference for distance or traditional forms of education reflects the motivational and regulatory features of students' learning activities. The preference for distance learning by students experiencing alienation from studying and emotional burnout, revealed in this study, may mean that the desire to find a new, more suitable format that better suits their needs and characteristics, caused by the difficulty of adapting to the traditional format lies behind it. Subsequent studies of the relationship between personality characteristics and educational activities of students with a preference for different forms of education are of great importance for the effective individualization of education in the context of the further spread of distance and mixed forms.

In the practice of distance learning, it should be considered that the preference for this form is more a characteristic of students experiencing negative motivational states in their studies, combined with a relatively low formation of regulatory qualities: self-control and academic control. Considering the great importance of self-control in distance learning, when developing distance courses for students who prefer this form of education, it is desirable to provide special measures that contribute to the maintenance and development of self-control.

From a practical point of view, it is important to conclude that the transition to distance learning at a university for most students looks like an unattractive alternative to traditional education that threatens the quality of education, while blended learning is assessed much more positively. Therefore, if we can choose between distance learning and blended learning in situations like the current pandemic, the use of blended learning in universities seems more justified.



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