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Fulfillment of the Principles of Personality-Oriented Education in the System of Natural Scientific and Mathematical Training in Primary School

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Abstract: The aim of the current research is to study the efficiency in the application of methods used in personality-oriented education while teaching natural scientific subjects to primary school children. Experimental research was performed on the basis of the pupils of the 3rd and 4th classes of comprehensive secondary schools in the city of Yoshkar-Ola, the Republic of Mari El. The research covered 120 pupils. The efficiency of training was analyzed according the following parameters: the level of visual and imaginative thinking; visual active thinking; the dominating type of thinking; the level of mathematical education of primary school children; the level of well-formedness of knowledge and ways to treat the surrounding world. Several methods were used as didactic materials: "Rubik's Cube", "Raven's Martices", "the ability to do sums in the head", "Complex Figure" by A. Rey, the method defining the way of thinking, tasks that were specially elaborated for the final math test and the test on the subject "world around us". The obtained experimental facts were analyzed with the help of t-criterion of student for independent and dependent samples. The analysis of the obtained results showed that the level of well-formedness of knowledge and ways of activities towards the surrounding world and the level of education on Mathematics that the primary school children showed in experimental groups are of a higher level compared to the level "higher than average" of the control group. The comparison of research results, shown by the experimental group "before" and "after" the formative work, indicate the positive influence of methodological means based on personality-oriented approach.

Key words: Personality-oriented education, development, personality, subject, choice, self-actualization, differential approach

INTRODUCTION

Training under tough pressure combined with strict discipline of students, education with equal approach regarding its contents and methods, unconditional submission of pupils to teachers have been characteristic features of educational establishments for many centuries. This way of training was defined as authoritarian pedagogics. Many specialists considered this approach as inappropriate and they came up with the ideas of humane treatment towards a student and training of a child.

World practice (beginning with J.J. Rousseau, J.H. Pestalozzi, M. Montessori and K.D. Ushinsky) has shown different efforts with the application of personality-oriented training. Moreover, the necessity to take into consideration children's individual peculiarities was mentioned by famous Soviet psychologists such as L.V. Vygotsky, P.Ya. Galperin and others. However such factors as the system of lessons and classes, supremacy of the authoritarian mode in pedagogics do not allow to fulfill the idea of a personality-oriented approach to every student.

Modern society of information technologies demands more than ever to teach people to work independently, act immediately, make decisions, adapt flexibly to changing life conditions. That is why the main strategic direction in the development of school education is based on the solutions to the problems of personality-oriented training which is defined as training that establishes pedagogical interaction based on subjective experience of a pupil, revealing child's peculiarities, admitting pupil's identity and inheriting the value of pupil's subjective experience.

Literature review: The authoritarian mode of relations, dominating for several centuries in many educational establishments has been replaced with the mode of

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pedagogical interaction during recent years. Humanistic pedagogic talks about the necessity to admit the subjective role of a pupil in the relations with the world and surrounding people and subjective-objective approach is replaced with subjective-subjective relations. The main tool of educational process is pedagogical interaction which envisages mutual and efficient development of teacher's personality and pupil's one based on the equality in communication and partnership of common activity (Bondarevskya, 2000).

At the beginning of the 20th century and several decades later the ideas of J. Dewey (1859-1952) had a powerful influence on the reforms in the sphere of education in the USA and in several European countries, including the USSR. According to J. Dewey, verbal-reproducing education does not prepare students for life; the authoritarian mode should be replaced by active independent training of students which is to be fulfilled by students themselves. In the middle of the 20th century and later on the scientific research was added by the representatives of humanistic physiology (C. Rogers, A. Maslow, A. Combs, R. May, V. Frankl, R. Berne and others). "I"-conception, developed by them, envisages that the behavior of a person is the external reflection of the inner world. The researchers express the opinion that the reasons of human behavior are connected with their emotions, beliefs, hopes, values and ambitions. The inner world of a child is first of all, formed in the family as it is the nearest social and natural surrounding. School education will be efficient only if a real "I" conception of a student of any age group is taken into account. This factor could be both encouraging and retarding for learning activity. "I" conception admits the original value of a person as a unique personality.

Having taken everything into consideration, the representatives of humanistic psychology (C. Rogers, R. Berne and others) came up with the initiative to create the system of education in which the teacher is not involved in pushing the child to achieve a certain level in forcing the child to learn necessary notes but teacher's aim is to guide and support students' development. Thus, the main aim of such education appears to be self-development of a personality and self-fulfillment without any compulsory programme or pressure.

Such ideas called "personal approach" have been developed since the beginning of the 80s by Soviet (now Russian and Belorussian) teachers and psychologists K.A. Abulkhanova, I.S. Kon, A.V. Mudrik, A.B. Orlov, V.V. Davydov, V.E. Zinchenko, Ya.L. Kolomsky, A.V. Petrovsky, I.S. Yakimanskaya and others. In didactics this definition is revised as the term "personality-oriented" education.

MATERIALS AND METHODS

The efficiency of education was defined by different parameters: the level of visual and imaginative thinking; the dominating type of thinking; the level of education of primary school children; the level of well-formedness of knowledge and ways to treat the real world. Several methods were used as didactic materials: "Rubik's Cube", "Raven's Martices", "the ability to do sums in the head" (Kalmykova, 1986), "Complex Figure" by A. Rey, the method defining the way of thinking (Barinova, 1999), tasks that were specially elaborated for the final math test and the test on the subject "world around us". The obtained experimental facts were analyzed with the help of t-criterion of student for independent and dependent samples.

The results of the research showed that the pupils of the third class have a low level of training in Mathematics (64% of pupils). The average level was shown by 26 and 12% of pupils were of a high level. Almost the same results of the development of visual active thinking and eye-mindness testify a low level 52 and 44% of pupils correspondingly, an average level 36, 44% and a high level was shown by 12% of pupils. The results of the method "the ability to do sums in the head" show the dominance of the pupils with the average group of 48%, a low level is defined among 36%, a high level is registered among 16% of pupils. Having analyzed the results of the research on revealing the way of thinking (compositional substructure, metrical substructure, ordinal substructure, project substructure and topological substructure), we could find out that the compositional substructure prevails among pupils. Pupils with this dominating idea constantly tend to complete different combinations and manipulations, divide into separate parts and then unite into the whole thing.

The diagnostics of A. Rey "Complex Figure" allowed to assess the level of the development of different parameters: perception, spatial representation, coordination of an eye and an arm, visual memory, the level of discipline and management of activities. The assessment is performed with the help of two parameters: the way of figure reconstruction and accuracy of detail reproducing.

The way of reproduction testified the level of activities' planning and organization. At the same time, it is the parameter of the level of the logical thinking development (operations of analysis and synthesis). The accuracy of detail reproducing while copying the image reflected the level of perception, imagination, coordination of eye-arm. The accuracy in memory reproduction is a parameter of the level of visual memory development.

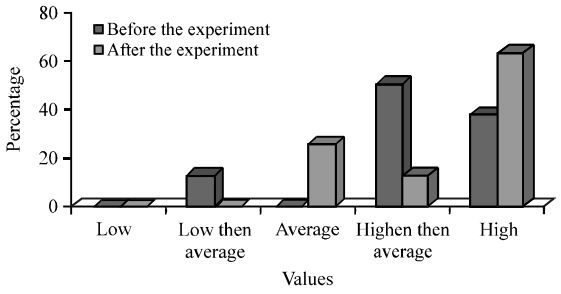

Fig. 1: Comparative analysis of the results of education in experimental classes at the beginning and end of the experiment

The results show high level (62.5% of students), 5th level of adequacy of the figure reconstruction, others have the 4th level (37.5% of students). While memory reproducing there were almost the same results. This level is rather high for 10 years old children, mainly showing a high level of organization development and activities' planning.

We managed to get certain results while assessing the reproduction accuracy of the details performed by pupils in the process of copying the figure. The research shows that 50% of pupils got the maximum level (20 points): they managed to keep to the same proportions, their details are depicted in the right places and at the correct turning. The 12.5% got 18 points. The 25% received 14 points. The lowest limit was shown by 12.5% of students (12 points). This result characterizes formedness that is lower than a normal limit and it means that these children have a weak perception, imaginative thinking and coordination of eye-arm (Fig. 1).

The analysis of figure reproduction showed high results. The 87.5% of surveyed 4th graders posses high level of visual memory; 12.5%, got 9 points and this result is lower than a normal limit and it testifies a weak development level of visual memory. The average index conforms with the norms.

Formedness of knowledge and ways to act towards the surrounding reality were estimated according to sufficiency of knowledge, understanding, argumentativeness, flexibility of knowledge and its practical application.

To complete the research we offered a test for 4th graders that included 10 questions on the topic "Natural Zones" (the textbook "world around us" by A.A. Pleshakov):

- Enumerate ecological issues of arctic deserts.
- Complete the sentence: "the taiga is…"
- Explain how plants managed to adapt to life in the tundra
- Why are forests called "lungs of the planet", protectors of reservoirs and soils?
- What influences the variety of animals in the forests?
- What is the reason for deforestation?
- Establish the connections between the animals of the tundra and the forest: lynx, reindeer white grouse, hazel grouse, wood grouse, squirrel, Arctic falcon, polar fox, lemming
- Enumerate the ways for forest conservation
- Draw how you imagine the taiga, mixed forest and deciduous forest
- Analyze the food chain: grass→field vole→sable. What will happen of we exclude "field vole" out of this chain?

The obtained results became the basis for scaling of pupils into five levels judging the level of formedness of knowledge and ways of arranging activities.

The results showed that the knowledge of children on the topic of natural zones of the tundra and the forest are at the level higher than average (50%) then a group of pupils with a high level of students (37.5%) and lower than the average level 12.5%.

The pupils answered the majority of questions correctly, mainly, about the peculiarities of forest types, flora and fauna biodiversity. The main difficulty was connected with the questions on the ecological problems of arctic deserts, the reasons for fauna biodiversity of forests, the causes of deforestation, the explanation of the name of the forest as "lungs of the planet", understanding of the forest as "protector of reservoirs and soils", adaptation of plants to life in natural zone.

The qualitative analysis showed that the highest results were connected with such parameters as "flexibility" and "practical application of knowledge" (81.2% of performance), less results refer to "sufficiency of knowledge" and "argumentativeness" (66 and 69% correspondingly). The parameter "understanding" is higher than of those mentioned above 76%.

The obtained results of diagnostics of the level of Math sufficiency, knowledge and ways of activities towards the surrounding world, coordination of thing processes testify the necessity of eliminating negative trends that have been revealed. Thus, it is vital to analyze and introduce changes into training process (alternation in the outline of the lesson their correspondence with the subject fields their structuring, adding data to certain subject spheres that will meet the necessary requirements).

The fulfillment of these tasks was performed on the basis of the principles of personality-oriented education and the peculiarities of teacher's activities. Further we

would like to reveal the opportunities to apply this approach in the course of certain classes of Mathematics and the subject "world around us".

The principle of concentration on subjective experience of a pupil. The use of various forms and methods of arranging learning activity that allows reveal subjective experience of pupils; the creation of the atmosphere involving every pupil; encouragement of pupils to express opinions. This principle might be applied at the beginning of the lesson, following the stage of actualization of knowledge when the pupils are asked to do the task devoted to the revision of previous material. For instance, at lesson "Layers of the Forest" on Natural Sciences the pupils were offered to recollect forest types where they are located, enumerate their inhabitants. To increase the involvement of personal experience of pupils,

the attention of children was drawn to the peculiarities of the forests in the Mari El Republic. Having discussed the material, the teacher asked the question why the inhabitants of mixed forest do not disturb each other regarding the fact that there is a great variety of species. The pupils faced some kind of a difficulty that required immediate solution during the introduction of new material. Further, hypothesizing and actions' planning arranged the activity of pupils that contributed to task performance. Thus, the use of elements of problem-based learning creates the conditions for pupils' awareness for the necessity of getting new knowledge as they are really relevant for them (Macakova *et al*., 2015).

The principle of application of various didactic material (tests and tasks designed for different levels and individual cards). At lesson on "world around us" the teacher offered three levels of tasks to explain new notions defining ecological terms: factual, based on the multiple-choice test (choose from four options); operational activity, defining the knowledge of process pattern, peculiarities of structure (what it consists of, how it is possible to explain what it is connected with, etc.); argumentative, a more difficult task which is based on an individual point of view that explains causes of the phenomena and its consequences, etc. At Math classes there was a wide variety of tasks according to the level of difficulty, the level of independence, volume, the level of creativity assignments for the pupils with different working efficiency and pace of work, tasks for different types of activities, etc. (Maltseva, 2013). Differential tasks according to the level of difficulty:

- Define the area of the sheet of paper
- Cut one part of the paper and define the area of a cut part
- Define the area of the paper that is left

Differential tasks according to the volume of teaching material:

- The length of the rectangle is 25 cm, the width is 12 cm. What is the area of the rectangle?
- The length of the rectangle is 25 cm, the width is 12 cm. What is the area of the rectangle? Change this question so that this task would have the solution (25+12)2
- What lengths of the sides would the rectangle have with the perimeter that is equal to 24 cm?

Differential tasks according to the level of creativity, the thickness of tree trunk is 12 cm. Seva wants to saw it in 3 min. What thickness of the truck can he saw in 6 min?:

- Let's analyze this task. Think over another way how it is possible to solve it
- What time does he need to saw it if the thickness of the trunk is 36 cm? Find two solutions to the task
- Let's solve the task in two ways. Use the answer and task data and calculate how much time he needs to saw 5 threes with the thickness of 24 cm

The principle of pedagogical flexibility of a teacher while working with pupils (group form of working, individual questioning, reports). Group way of training was applied while studying the topic about the natural zones of Russia ("Zone of Arctic Deserts", "Tundra", "Forests of Russia", "Zones of steppes", "Deserts', "At the Black Sea"). Relying on interests and desires of children, the teacher divided pupils into five groups: geographers, meteorologists, botanists, zoologists and ecologists. Every group of pupils had a certain task, while all the members were involved in the discussion. Every group had information maps, papers with tasks and report cards. Originally, report cards were cards-helpers where it was necessary to fill certain words and expressions into the gaps. "The animals of the arctic zone find food in … (the sea) … (crayfish) eat marine algae and they are eaten by … (fish). The main food for birds and animals is … (fish). On rocky slopes … (sea-gulls), … (guillemots), ….(razorbills) stock together. Here they … (breed). All animals are perfect … (swimmers) … (layer of fat) protects them from the cold. They are … (walruses) and … (seals). Seals are hunted by … (white bears). They have long hair of ... (white) colour and … (boad) paws so that they could … (step on the ice and snow) more skillfully". Gradually, pupils learn the material individually and make conclusions. The work of every group was assessed by a common mark which accumulated the activity level of every pupil in the group, relationships, the ability to ask

the questions and ask other groups, the ability to show new material to the class and answer the questions of other pupils.

Pupils presented interesting reports on a new topic. The choice of the topics, search and structuring of the material, making the presentation itself were completed based on personal preferences of pupils their opportunities and desires.

The principle providing personal emotional contact between the teacher and pupils is important. It is based on cooperation, common creativity, motivation, encouragement to gain success, the idea of importance of not only the result but also of the process of learning itself. At the lesson every student is listened very attentively, children's answers are supported, the conversation is approved by smile. The teacher summarized what the children would like to do one more time, what they would like to correct and change.

RESULTS

Personality-oriented approach as modern development of pedagogical activity is rapidly conquering educational space in Russia. Many members of the pedagogical society acquire theoretical basics and technology of this approach to educational process. Such popularity of personality-oriented approach can be objectively explained by the combination of many factors.

Dynamic development of the society requires the formation of bright individuality rather than something socially typical as it will allow a child to become himself and remain himself in a constantly developing society.

Psychologists and sociologists have recently noticed currently occurring changes in personal development of children. For instance, some researches prove that modern students tend to possess pragmatic thoughts, actions and independence. As a consequence these changes call for necessary application of new approaches and technologies in the interaction of teachers and students.

Contemporary school lacks humanization of relations between children and adults in democratization of school society functioning. Apparently, it is evident that practicality of personality-oriented application in children's education is quite evident (Gorelik and Stepanov, 2001).

In pedagogical works on educational problems personality-oriented approach is often contrasted with traditional approach which is aimed at training a student with a set of social functions, so-called "implementator" of certain models of behaviour that is determined in the social "order" of school. It is possible to summarize that personality-oriented approach is not simple analysis in peculiarities of subject's of training but it is another methodology of arranging the conditions of education which does not presume "the analysis" as it admits "the implication" of individual and personal functions or needs its subjective experience.

According to I.S. Yakimanskaya, the aim of personality-oriented education is to "lay the mechanism of self-fulfillment, self-development, adaptation, self-regulation, self-education and others that are necessary for original identity of a child". We share her point of view. Describing the contents of subjective experience, I.S. Yakimanskaya includes in it:

- Subjects, notions, images
- Operations, methods, ways, rules explaining to fulfill actions (mental and practical)
- Emotional codes (personal understanding, aims and stereotypes)" (Yakimanskaya, 1996)

It is necessary to stress the functions of personality-oriented education:

- Humanitarian, aimed at recognition of inherent value of a human being and provision of physical and moral health, understanding of the meaning of life and active position in it personal freedom and opportunities of self-potential. The means of implication of these functions are understanding, communication and cooperation
- Cultural and forming, aimed at preservation, transmission, production and development of culture by means of education. The mechanisms of application are cultural identification as the maintenance of spiritual mutual connection between a person and people, acceptance of their values as their own ones and leading their lives in which they respect and take into consideration as these things
- Socialization which envisages provision of acquiring and reproducing of social experience of a person so that a student will be able to enter social life. The mechanisms providing this function are reflexion, identity preservation, creativity as a personal position in any activity and means of self-determination (Bondarevskaya, 2000).

The implementation of all these functions cannot be carried out without commanding, administrative and authoritarian mode of relationships between teachers and students. Personality-oriented approach presumes such approaches of the teacher as.

An optimistic approach to the student and his future the teacher is supposed to see perspectives for personal development of child's potential and the teacher should be able to encourage this development.

The approach to the student as to the subject of personal educational activity; the student becomes an individual who is able to study not under any kind of pressure but voluntarily on his own free will, expressing the desire and choice, showing personal involvement.

The approach is based on personal desires and interests (cognitive and social) of every child, encouraging him to study and to develop (Pimenov, 2001).

The contents of personality-oriented education should help a person build up personality, defining individual position in life: to choose values that are important for themselves, acquire the system of knowledge, mark the circle of significant scientific and life problems, open reflexive world of your personal "I" and learn how to rule it (Bondarevsya, 2000).

Thus, having analyzed everything, we can summarize some ideas and give the definition to personality-oriented approach. It is such education in which the interaction of subjects of education is based on their personal peculiarities and specific personal and subjective modeling of the surrounding world.

The creation of technology that might carry out personality-oriented educational process presumes specific construction of training texts, didactic materials, methodological recommendations to its application, types of educational dialogue, forms to control personal development of a student during the process of training.

Only provided by didactic support implementing the principle of educational subjectivity, we can arrange personality-oriented process.

We will try to lay down the main requirements for the formulation of didactic support of personality-oriented educational process.

Training material should reveal the contents of subjective experience of a student including the experience, including his preceding education.

Interpreting of knowledge presented in the text book (or by the teacher) should be directed not only at expanding of its amount, structuralizing, integrating, summarizing of knowledge but also at constant transformation of subjective experience of every student.

It is necessary to coordinate constantly subjective experience of pupils with scientific contents of training assignments during the educational process.

Incentivizing a student for an independent educational activity, contents and forms of which must provide a student with an opportunity for self-education, self-development and self-fulfillment during the educational process.

Constructing and arranging training materials that create an opportunity for a student to choose the contents, shape and the way of completing assignments and problem solving.

Defining and assessing the ways of scientific work that a student can use on his own, steadily and efficiently. The opportunity to choose must be incorporated in the assignment itself. It is vital so that the student should be stimulated to choose and use the most significant ways of material processing. This should be done with the support of a teacher or might be offered in the textbook

While introducing meta knowledge, i.e., knowledge about the ways of completing training actions, necessary general logical and specific ways (for every subject) of educational activity regarding their functions for personal development.

It is significant to provide control and assessment not only of the results but mainly the process of education itself, i.e., the transformations that the students is doing, acquiring educational material.

Educational process must provide arrangement, implementation, reflexion assessment of training as the subjective activity. In order to fulfill this it is necessary to reveal the units of training their use in training and individual work (different forms of correction, tutorials).

In the centre of personality-oriented technologies there is a unique and complete personality who strives to fulfill all opportunities in this self-fulfillment, open to absorb new experience and who is able to make a responsible and deliberate choice under different life conditions and in various situations. The key words defining educational technologies are "development", "personality" "individuality", "freedom", "independence" and "creativity".

Personality-oriented technologies search new methods and means of education that comply with individual peculiarities of every student: they take into consideration psychological and dynamic methods, change relationships and organization of students' activities and apply different educational means and rearrange the contents of education itself.

Personality-oriented approach is a methodological landmark for pedagogical activity that functions as the base for the system of interlinked notions, ideas and ways of providing actions and supporting processes of self-development and self-fulfillment of a personality his development and forming a unique identity.

The basis for arranging of personality-oriented approach lies on concepts of psychologists about the

dominating role of activity in communication and personal formation. In these terms the educational process is directed not only at the acquisition of knowledge and thinking process but at cognitive potential and creative abilities. In accordance with this the centre of education should be given to the pupil his aims, motives, interests, vocation, the level of his knowledge and abilities.

In modern pedagogics and psychology all systems and technologies of education can be conventionally divided into two groups: culturological or instrumental.

Culturological systems of education are based on several worldview paradigms or some general scientific notions about the essence of a human and peculiarities of his adaptation to the culture.

As a rule, instrumental systems in their turn have a certain method that has been practiced and has a certain practical pedagogical technology. Technologically this might be described in the following ways.

Culturological Sh.A. Amoshvili, V.S. Bibler, D.B. Elkonin, V.V. Davydov. Instrumental L.V. Zankov, V.F. Shatalov, S.N. Lysenkova, P.Ya. Galperin N.F. Talynzina, I.P. Volkov, E.N. Ilyin, V.G. Khazankin.

The lesson remains the main element of educational process but its role, function and the way of arrangement have been changed in the system of personally-oriented education. In this case the lesson has the aim of not only to give knowledge, report and check educational material but to reveal the experience of pupils in the application of the educational contents. In order to achieve this aim, the teacher should stimulate different thinking operations that the students should acquire while working with the educational material.

In this connection, I.S. Yakimanskaya developed the principles of personality-oriented lesson which are the following ones.

The use of subjective experience of a child. Actualization of the current experience and knowledge are important conditions that encourage understanding and introduction of new material. In general, understanding is closely connected with subjective experience and it is based on the previous experience, knowledge and rules (it depends on abilities, factors of understanding, etc). Understanding is the main component of educational process

The variety of tasks, a child is free to choose any of them or he might work with the assignment that is more relevant for him and he will use his ways of dealing with it.

The accumulation of knowledge skills is not the ultimate aim but it is an important means of child's creativity.

The provision of emotional contact between a teacher and a student based on mutual cooperation, co-creativity, motivation to gain success through not only the result but by the process of itself.

As a teacher follows these principles, the educational basis of lessons becomes really developing. The teacher holds a new position he becomes a subject teacher and a psychologist at the same time. The role of a teacher is reflected in his professional ability to use the potential of a student in the educational process to create diverse educational environment so that to allow every child to prove out. The teacher is not only a mediator of knowledge but also he is an organizer and coordinator of educational activity. At first such alternation in professional understanding increases a sense of frustration and arises big difficulties as it is necessary to increase methodological level and work out new outline for lessons and their didactic provision (Pimenov, 2001).

In our point of view, it is necessary to rely on certain criteria of personality-oriented classes which will increase the efficiency and encourage the increase in the quality of education. These significant elements are.

It is important to report not only the topic of the class but to inform about the whole outline of forthcoming class (lecture). The outline helps arrange the contents in a clear and logical material. At every stage the pupil is active and feels involved in real interaction and he treats the educational material conscientiously.

It is necessary to create a positive emotional mood and working atmosphere for every student and maintain it in the course of the class. Serious attention should be paid to the development of motivational sphere so that the educational process will be enriched with positive emotions.

The use of subjective experience of pupils. Actualization of subjective experience of students encourages the establishment of connections between new material and current experience.

The creation of the conditions for performing cognitive activity of students and for gaining success by every pupil.

The increase in the level of independence in educational activity, realization of cooperation strategy, combination of common work with the class together with group forms of activities.

The creation of the atmosphere in which every student will be interested in the common work of the whole class.

The use of different educational materials for different levels of students and for the students with various preferences. The students are given the choice of any kind, form or way of dealing with the material (verbal, graphic, conditionally-symbolic).

The orientation of pupils' activities to the development of intellectual skills, formation of educational activity (not the transmission of educational information), acquisition of components of training (educational objectives, activities, self-assessment, self-control).

The discussion at the end of the class in which students are supposed to speak up on what new material they learnt what they liked (what they disliked) and why, what they would like to do once again or they would like change something or complete in a different way.

The mark is defined regarding several parameters: final results, the ways how they have been achieved, the level of independence and creativity.

The main thing that should be pursued by the teacher in personality-oriented educational environment is to provide "episodic unity" with the student, help him to feel the position of subjective individual activity. It is important so that the student will be able to overcome passive position in the educational process and understand himself as an active participant of this transformative process (Andreeva *et al*., 2015).

Personality-oriented approach is impossible without revealing subjective experience of every student, i.e., his abilities and skills in the educational activity. It should be also noticed that the experience of every person is unique and it has different peculiarities.

Currently, the trends of personality-oriented education described above are applicable at every stage of training, starting with pre-school period then continues at primary and secondary school, further in the establishments of professional education and at higher educational establishments. The importance of following the principles of personality-oriented education at primary school is explained by the necessity of immediate involvement of a child in school environment, creation of favourable conditions of his adaptation and further development while studying different school subjects. Primary school is an important stage in the development and socialization of children. Basic education that has been formed at this age is extremely stable and will remain the basis for a long period of time. That is why primary school must guarantee a high level of education.

Modern concepts and standards of a new generation applied in the field of primary education have the priority in educating and developing the personality of primary school children on the basis of the educational activity. It is important to create necessary conditions for every child who will be able to fulfill himself and feel the real subject of training, willing and eager to study and skillful in this art. A wide application of modern information technologies of problem-based education, differential approach, methods of projects, portfolio, the method of training "without marks", technology of the development of critical thinking, technology of developmental teaching show high results and increase the efficiency of education and boost cognitive activity of children.

However, general conclusions and theoretical insights concerning the efficiency of technologies, methods, forms and ways of education and upbringing can be interpreted unambiguously as it is necessary to clarify the methods for every programme, course, subject sphere, aims and objectives of the lesson. At the same time it is significant to find out the factors and conditions for pedagogical supervision, providing high efficiency of personality-oriented approach.

This required holding of a special experimental research. To assure the accuracy of conclusions regarding the success of application of the methods and following the principles of personality-oriented education in training process in primary school we have chosen two educational fields-Mathematics and Natural Sciences. The research was carried out in the 3rd and 4th classes of the State-run Educational Establishment of the Mari El Republic "Lyceum No. 8 named after M.V. Lomonosov in the city of Yoshkar-Ola" and Municipal Budgetary General Education Institution "Comprehensive Secondary School No. 10" in the city of Yoshkar-Ola, Mari El Republic. Thus, 120 pupils were involved in the research.

DISCUSSION

After formative work the second diagnostics of pupils was organized. The procedure and materials were similar to the first ones. The results showed that in the experimental class the level of knowledge on Mathematics increased by 16%, comparing with the previous stage of the research. The number of pupils with the average level increased by 22% and it reached almost the middle (48%). The number of pupils with low level in the control group is much higher (68%) than in experimental (20%).

The obtained results of the experiments were analyzed with the help of t-criterion of student for independent and independent samples. The results of statistical data manipulation for independent samples showed that the difference between control and experimental groups at the final stage of the experiment is tangible ($t = 2.04$, $t_{crit} = 2.01$ $|t|>t_{crit}$); for dependent samples the difference in the control group is not significant ($t = -0.43$, $t_{crit} = 2.06$ $|t|<t_{crit}$) in the experimental group is big ($t = -6.82$, $t_{crit} = 2.06|t|>t_{crit}$).

The second diagnostics revealing the level of knowledge sufficiency and the ways of actions towards the surrounding world showed positive changes that is

proved by the dominance of students with high results in the experimental group (62.5%) in the control group it is of the average level (52%). The number of students with the average level is by 11% higher than in the control group.

In both groups there were no records of pupils with a low level of knowledge. In experimental classes the level lower than the average is about 12.5%. The number of students with the level higher than average in control class equals to 36%. The qualitative analysis gives positive results regarding parameters of "sufficiency of knowledge" and "argumentativeness" as the number has reached the level of 73% and almost its maximum is registered for "understanding" (92%).

The obtained results of the experiment were analyzed with the help of t-criterion of Student for independent samples. They testify that the difference between control and experimental groups at the control stage of the experiment is significant ($t = 2.21$, $t_{crit} = 2.14$ $|t|>t_{crit}$), i.e., knowledge level of students in the experimental group has increased in comparison with the control group.

Thus, we made an attempt to analyze the system of personality-oriented education on the basis of systemic analysis of education in the sphere of Mathematics and Natural Sciences (subject "world around us") at primary stage. Obviously, the results that we obtained in the course of the research do not reveal the real depth of the analyzed issue. Similar research can be carried out on other subjects and in other subject spheres of primary school: the Russian Language, Literature Reading, the English Language, etc. that will create a broader picture of the process with personality-oriented training of primary school children. Possible directions of further research might be connected with comparative analysis of Russian and European experience in the field of personality-oriented education, development and approbation of efficient models and technologies regarding personality-oriented education of pupils and students.

CONCLUSION

Thus, it is possible to conclude that the level of sufficiency of knowledge and the ways of actions towards the surrounding world and the level of knowledge in the sphere of Mathematics shown by pupils of the third and fourth classes in experimental groups is of high level; in control groups it is higher than average. The comparison of the results of experimental group before and after formative work shows positive influence of methodological means, built on the basis of principles that incorporated personality-oriented approach. The number of students with a high level of knowledge and ways of activities has increased and there are no students with the level lower than average. These results are depicted Fig. 1. Results of mathematical analysis after the control experiment allow to conclude: experimental groups possess higher level of knowledge than control group; the difference between the results at the beginning and end of the experiment are not accidental, they show the results of formative work at the experimental groups: systemic and aim-oriented use of the ways of personality-oriented education.

Experimental work came to the final aim of the research which is to define positive influence of personality-oriented education and its main principles on sufficiency of knowledge and means of activities towards the surrounding world and the level of knowledge in the field of Mathematics.

Consequently, the results of the research allow to define the necessity to use personality-oriented approach at the lessons of Mathematics and Natural Sciences ("world around us") in primary school. It boosts the qualitative acquisition of knowledge regarding individual peculiarities of every pupil, development of his independency and combination of supervision of cognitive activity together with the personality development. Such education stimulated motivation of pupils to learning process, further successful education and self-development.

RECOMMENDATIONS

Having analyzed the results of the research we developed several methodological recommendations:

- Personality-diagnosing education must be performed regularly and systematically at the lesson of Mathematics and "world around us" during the process of primary school training
- In order to accomplish personality-oriented education, the teacher must know necessary age, psychological and pedagogical peculiarities of primary school children, peculiarities of their mental development and arrangement of activities with the help of special methods
- According to the results obtained after the analysis of mental development and activities' arrangement of primary school children, it is necessary to offer them specially prepared didactic materials: multi-level tests and tasks, individual cards. It accomplishes the development of every child within the contents of personality-oriented education
- It is recommended to use group work while performing activities of primary school children in order to accomplish the strategy of cooperation, increasing the degree of independence

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