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FORMATION OF INTERMEDIATE PHYSICAL CONCEPTS OF STUDENTS OF THE BASIC SCHOOL (ON THE EXAMPLE OF "NATURAL SCIENCE")

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Abstract: The Institute for Public Relations arose in Kazakhstan due to such objective reasons as the development of civil society and the desire of the authorities to establish a dialogue with the public. Socio-political transformation of the Kazakhstan society of the 90s of the XX century is a complex set of causes and effects, the development in which new communication systems is an interdependent process. From this point of view, it seems very interesting and relevant in all respects to analyze the process of such a new phenomenon for Kazakhstan as the formation of a system of public relations (PR).

Keywords: Public, media, journalism, professionalism.

INTRODUCTION

The modern stage of the development of the society in the context of a globalizing world makes high demands on graduates of school. In a dynamic society with a rapidly changing labor market, a social order arises for a person who possesses an appreciable ability and meta-cognitive skills. The modern cultural, economic and economic needs of a person put forward technical and natural sciences on one of the main places among other sciences. Natural sciences show the way to satisfying the material needs of people in food, clothing, housing, and, therefore, affect the development of the economy, they strive to create the necessary economic conditions of life and work, of which the health of people depends. The high level of development of natural sciences evokes a serious influence on the culture and humanization of human relationships.

In the conditions of the current scientific and technical revolution, the science, becoming an immediate prodigious force, requires a change in the approach to the solution of production, management, social and other problems. A it assumes a change of man's own thinking, in what sphere he would not work: the activity of people must be based on scientific data, exclude subjectivism and conjuncture. Therefore, the first plan is the universality of the problem of the formation of scientific thought, which in the first turn has a pedagogical aspect and is one of the priority directions of the strategic development of the formation in the twenty-first century.

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In shkolnoy practice without assimilation of interdisciplinary scientific concepts, other elements of knowledge (theory, laws, rules, ideas, methods of research, etc.) cannot be successfully mastered, since scientific concepts are the main form of human thinking and the basic structural element of knowledge.

Aktualnost dannogo issledovaniya obuslovlena with odnoy storony, sotsialnym zakazom obschestva shkole - formirovanie aktivnoy, samostoyatelnoy lichnosti, also able to nepreryvnomu samoobrazovaniyu with drugoy storony, nedostatochnoy razrabotannostyu metodov organizatsii usvoeniya estestvennonauchnyh ponyaty Trainings in estestvennonauchnym distsiplinam in shkolnoy praktike.

Conducting Pedagogical Experiment

To confirm the advanced hypothesis and the organization of the system of assignments, based on the formation of pro-pedagogical natural sciences and interdisciplinary scientific concepts, we conducted a pedagogical experiment.

The goal and the task of the experiment was the following: to find out how much we have put forward the hypothesis about us, that the effectiveness of the assimilation of interdisciplinary scientific concepts by students and the increase in the quality of their knowledge is realized if:

- modern technologies of teaching for the reconciliation of scientific concepts that meet the requirements of time are appropriately used;
- the formation of scientific concepts proceeds on the basis of the analysis of the available knowledge and experience or their practical needs;
- at the first stage of the training of natural sciences, the students learn not only about the subject, but also about the methods of the scientific knowledge, and they will follow all the stages of scientific research;
- the central link of scientific knowledge is experimental work, including the ability to discover and investigate the facts that lie in the basis of laws and theories, to reveal the limits of the applicability of scientific manifestations, to develop partial legitimacies and consequences; In shkolnoy practice without assimilation of interdisciplinary scientific concepts, other elements of knowledge (theory, laws, rules, ideas, methods of research, etc.) can not be successfully mastered, since scientific concepts are the main form of human thinking and the basic structural element of knowledge.

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- modern technologies of teaching for the reconciliation of scientific concepts that meet the requirements of time are appropriately used;
- the formation of scientific concepts proceeds on the basis of the analysis of the available knowledge and experience or their practical needs;
- at the first stage of the training of natural sciences, the students learn not only about the subject, but also about the methods of the scientific knowledge, and they will follow all the stages of scientific research;
- the central link of scientific knowledge is experimental work, including the ability to discover and investigate the facts that lie in the basis of laws and theories, to reveal the limits of the applicability of scientific manifestations, to develop partial legitimacies and consequences;
- Continuously applies continuity to the level of systemic associations through training aids and techniques;
- Theoretically reinforce and develop a system of assignments, focused on the formation of pro-state scientific knowledge among the students.

The information about the course of the experiment is divided into three stages of investigation:

1. Existing information, reflecting the level of complexity of the system of natural sciences, intrumenting, revealing the need for the assimilation of scientific concepts for the formation of pro-pedagogical natural sciences among those who are taking part in the further study of the courses in physics, chemistry, geography and biology.
2. The current information, the detrimental process of the formation of natural sciences, skills and habits among the learners on the basis of the assimilation of interdisciplinary scientific concepts.
3. Konechnaya information, reflecting the acquired levels of knowledge of the natural sciences, skills and habits of the knowledge of interdisciplinary scientific concepts that are taking place on the basis (Table 1).

TABLE 1: LEVELS OF CO-MORBIDITY OF LEARNING BY PARTICIPATING INTERDISCIPLINARY SCIENTIFIC CONCEPTS

Levels	*Criteria for determining the level*
Perception	The description of the notion with all significant prerequisites and the formulation of its supremacy
Recognition	Ability to distinguish the concept from the proposed situation, zadachi, texta
Application	Ability to divide, connect with others, disaggregate the aggregate of entities in connection with known concepts
Playback	Ability to recreate the system of concepts, to develop a rasskaz about the essence of the system for the whole or individual parts of it
Application of Creative	The ability, using the system of concepts, to solve the problem: (A) the use of the thesaurus in situations and tasks that are common to the student (activity on the specimen); (B) in situations that require the restructuring of the connections between theses of the thesaurus (transferring the studied regularities to new conditions); (C) in situations that require the development of the thesaurus with new concepts (activity in the formation of new concepts requiring the effective involvement of an unknown earlier information from textbooks, from the teacher and from other sources)

The results of the pedagogical experiment.

The setting stage of the experiment included the collection and analysis of the information about the course of the course "Naturalness" in the middle school. As a result of the performance of a qualitative and quantitative analysis of written works on the natural sciences, more characteristic fields were identified in the knowledge of the five classes concerned.

The pupil of the 5th class of the secondary transformation school was offered a checklist (see Appendix 1).

The analysis of the results of the control works allowed to note the following facts. The pupils showed the knowledge, which can be characterized in the majority by it, as the minimum requirements are met. Pupils from the 7 offered jobs with work performed those, the formulations of which were nonstandard. This fact testifies to the formalism in the knowledge of the students. Only 15% of the students did the work for 77%, the rest were distributed in the following way: 34% - 45%, 28% - 32%, 20% -17%, 3% - not fully implemented. Let's note that the fact that warehouses No. 3 and No. 4 almost all of the subjects caused difficulties, the reasons for which were clarified from the conversations with the students: the topics "Mechanic Movement" and "Density of substances" were studied for the first time, and it was a small time.

At the same time, the survey of participating five classes and teachers of physics and physics was conducted to determine the reason for the low success rate at the rate of "Naturalness" and the training of schoolboys in the training (see Appendix 2).

The results of the follow-up survey are as follows: 7% of the students are confident that their knowledge of the natural history in the future will be sound and stable; 23% of pupils for the implementation of

They attend special courses and continue to study with the tutors. Homework, called by the teacher, as a rule, on traditional collections of tasks and textbooks, are performed by a majority of students who do not understand (79%). These children should be taken to the number of children who do not fulfill their homes. 44% of the students agree on the control work as punishment and aspire to the possibility of not coming to this day on the job. Note that 87% of students among the reasons for unwilling to take control work call a sense of discomfort, strife before receiving a low evaluation and nervousness at the time of work, not always caused by a slow podgotovkoy to urks. 37% of children in general do not conduct an analysis of the results of the control work, they are appreciative of the evaluation. This means that the evaluation for monitoring the work does not have an important value for them, it does not stimulate the appearance of pain, and it helps to fix the spaces in their knowledge. Learned on the horizon "Naturalness" themes were called by 48% of the students, of them only 9% in the required sequential. Etot and other facts testify to the unsuccessfulness of the methods used in the study, the objectives of the quality of the knowledge of the students.

The goal of the experiment was the same as the teachers of the course "Naturalness" (see Appendix 2).

In the opinion of the teachers who use the traditional method of the prevention of physics (95%), this method is poorly focused on the personality of the student. But in an oral conversation, these teachers called the new techologies of learning and the reasons for the changes in their methods of doing things were difficult. The knowledge of the students does not amount to 69% of the teachers concerned.

It is worthy of attention to the fact that among the reasons for the low level of knowledge in the natural history of the great majority of pedagogues have been marked by inadequate quantities, which are worth studying not only natural science, but also other subjects of the natural cycle. In all classes of one parallels teachers (81%) apply one and the same task of monitoring work, motivating this requirement of the GSOO of the Republic of Kazakhstan. Complementary to Uroku psycho-pedagogical and metodic literature teachers are not always studied (57%). More often, they use the collections of problems and the didactic materials of the following authors: A.V. Lukashek [1], O.G. Skrelin [2], A.V. Orlov [3], G.N. Stepanov [4], M.E. . Tulchinsky [5]. Referring to the lack of time and a large number of students in the classroom, the teachers are building up the irregular check of their households (48%). Oral questions of students on the occasion are rare.

On the basis of the results of the experimental phase of the experiment, we came to a conclusion that the main reasons for the low level of material assay at the level of standard requirements is the following:

1. Metodika predpodanovaniya natures is aimed at students of knowledge, skills and habits. The learning process is organized without taking into account the personality of the student, as an active subject.
2. For better understanding of material, students need more time and additional responsibilities.
3. Students have a negative attitude to the control work. The received estimates do not have an impor- tant value. The analysis of the results of the control work is carried out only by individual students and does not have a systematic character.
4. Teachers in possession of didactic materials on the nature do not support the system of training, which would be different in the form of educational activity.

Rezultate konstatiruyuschego etapa eksperimenta pozvolili nametit programmu poiskovogo etapa eksperimenta Po probleme formirovaniya interdisciplinary nauchnyh ponyaty in uchaschihsya and Check of effektivnosti influence osoznannogo usvoeniya system estestvennonauchnyh ponyaty nA kachestvo znany uchaschihsya Po estestvennonauchnym distsiplinam. With the selection of monitoring and experimental classes for the conduct of the above-mentioned stage, we came from the need for observation of the requirement of representativeness for

Reception of reliable results. By the method of a tactile selection, the control and experimental classes were chosen.

Particular attention was paid to the practical activity of those involved, to the implementation of laboratory works that encourage each student to become familiar with new devices and methods for measuring physical quantities. To activate the active work of the students, they used a truly squeaky (heuristic) and exploratory methods of performing laboratory works [6, 7]. In experimental classes, complementary to the course run in laboratory work, and those who have a research character [8]. For example, it is necessary to solve such a problem: (1) How can one get a piece of ice with a piece of thread and a pinch of salt? (2) How can we detect the existence of an atmospheric pressure without using measuring devices? And a lot of other things. In the control classes, those laboratory works were held, which take place over the course of the course.

One of the main difficulties in learning is the creation and conduct of didactic games, aimed at assimilation of interdisciplinary scientific concepts. In our opinion, the main point, which would have to do the accent when creating and using games, is attracting children's attention to the content of the game, to the learning process. At this we need a thorough control of the knowledge of the students. Didactic games should be dynamical [9, 10]. This factor will acquire even greater significance, if we consider that the educational games are designed for children, which it is easier to get carried away by the possibility "not to learn, but to play on the urks" [11].

Educational games have removed internal restrictions, children have acquired the ability to open their knowledge freely, the strings have diminished before an apparent error, the psychological psychosocial conditions have been created on the stage. We have been marked by the developing character of didactic games: among the students there is a resilience, a logic, speed of reaction, a slope towards analysis. In the experimental classes, educational games were widely used,

Such as “Star Hour”, “Brain-Ring”, “Auction Zadach”, “Happy Chance”. In the control classes the games were not used.

We believed in the course of the experiment and the effectiveness of using test kits in the training [12, 13]. It was noted that the latter essentially depends on the quality of the organization of the “test” learning. The process of selecting test items, the planning of data and data, requires observation of certain requirements. Tasks-tests should be system-specific. With this, we have not developed a simple enough test suite, but a complex of level tests for each topic. In the experimental class, the developed complexes of test kits were used, in the classrooms students were offered triadic test kits.

As a result, the following was clarified: the students of the experimental classes in conversations with the teacher have noted the time-consuming effect on the execution of standard assignments and, accordingly, the increase in time for the solution of problems and problems of a high level of cohesion; Individual income has chosen to choose the level that is available to fulfill the task, stimulated the search of the solution of one and the same problem by various means; The efficiency of the learning process through the clear organization of the learning and the “vision” of each student for the final result of the training; The formation of samovar syncopation, when the disciples increase their responsibility for the solution of their problem; Each evaluation was objective, since each student had the opportunity to reconcile the decision of the problem with the etalon-symbol or to choose the right decision from the alternatives. Most teachers single out the growth in the quality of knowledge due to the availability of explanations for difficult topics in test-discussions and learning tests. Teachers also noted the same “loading”, the possibility of a thorough control of success, the absence of strata in the study of the execution of monitoring work. Such as “Star Hour”, “Brain-Ring”, “Auction Zadach”, “Happy Chance”. In the control classes the games were not used.

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The results of monitoring the crooked sections in the experimental and control classes on the second stage of the experiment revealed a higher level of success in the experimental classes (Table 2).

TABLE 2: RESULTS OF THE EXECUTION OF THE CONTROL SECTIONS ON THE SECOND STAGE OF THE EXPERIMENT

Stage of the experiment Stage of the experiment	*The experiment began*		*End of experiment*	
Class	*Expert.*	*Cont.*	*Expert.*	*Cont.*
Number of students performing work	108	96	110	94
The average score (of the total number of students taking part in the 4-point system)	3,54	3,60	3,87	3,71
4 - Very high level (%)	11	13	23	16
3 - Good level (%)	38	38	44	43
2 - Satisfactory level (%)	45	45	30	37
1 - Plogo level (%)	6	4	3	4

As can be seen from the results, the level of success in the natural sciences in the experimental classes has risen.

The simultaneous testing of pupils before and after the naturalization period was conducted by us to determine the influence of the formation of interdisciplinary concepts among learners on the results and the speed of the thought-provoking process. Examples of the proposed activities are given in Appendix 3.

The results of the testing showed that after the organization of the developmental training, and, in fact, after the use of didactic games, the speed of thinking increases.

Pupils of experimental classes before the application of the proposed method of instruction had 6.25% of students who had coped with the test for 5 minutes; After the application of the methodology, they were already 11% (1 tema), 12.5% (2 tema), 23% (3 tema), 27% (4 tema). This convincingly proves an improvement in the thinking work, which led to the growth of knowledge of knowledge in comparison with the control classes.

For the levels of natural science, we have developed and applied the level of knowledge for the development of experimental skills and habits. They were conducted in each laboratory work.

Conducted conversations with students showed the presence of the last great interest, namely, to practical work, to laboratory work, to experiments, even to the most simple one. Odnako tolko nA urokah in eksperimentalnyh klassah due to ekonomiey time when organizatsii razvivayuschego Trainings poyavlyalas vozmozhnost not tolko deepen and zakrepit znaniya uchenikov at vypolnenii laboratornyh rabot, Nr and organizovat "Tournament eksperimentatorov", "Obschestvenny smotr znany" and other didakticheskie game.

When the experiment was performed, the following qualities of practical skills were studied: privililnost (the student did the right thing all operatsii kotorye sostavlyayut mental deyatelnost, pokazatel harakterizuetsya otnosheniem chisla pravilno vypolnennyh operatsy their obschemu number) osoznannost (vypolnyaya certain operatsii, student osoznaet nA osnove kakih znany OH vybral and ustanovil posledovatelnost their vypolneniya, vyrazhennuyu in verbalnoy forme) The generality (the ability to distribute an identified skill in a large number of cases, is the ability to implement transfer to new conditions), reactivity, efficiency, integrity [14, 15]. Data on the experiment are presented in Table. 3.

Table 3 - Results of the application of experimental work to laboratory work For the levels of natural science, we have developed and applied the level of knowledge for the development of experimental skills and habits. They were conducted in each laboratory work.

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TABLE 3: RESULTS OF THE APPLICATION OF EXPERIMENTAL WORK TO LABORATORY WORK

Class	*Level of practical skills*			
	a great, %	*Good, (%)*	*Will satisfy., (%)*	*Bad, (%)*
Expert	13	35	42	10
Check	6	16	60	18

The results of the use of experimentation to laboratory work showed that their use allows not only to increase the level of the processing of material, but also helps it to understand better, to comprehend, and it means, to assimilation. In almost all laboratory works the student had the opportunity to choose for himself such an experimental task, the solution of which was for him the least interest and spoiled the battle with formalism in knowledge.

The analysis of the control works, shown by those involved in the course of the experiment, revealed a significant advantage of the experimental classes by the time of the completion of the work, more than a high dynamism of the change in the susceptible activity of the students. On the basis of the results of the sonic stage of the experiment, we came to the following conclusion:

1. The ways of organizing the organization of interdisciplinary concepts, applied at the level of science in the 5 th class, allow to take into account the individual traits of students.
2. With the organization of didactic games at the level of the participants, speech, thinking develop, and the quality of knowledge increases.
3. Urban attitudes are reducing formalism in the knowledge of students.
4. The time for carrying out household tasks is reduced.
5. Evaluation, exhibited by the teacher, becomes subjective.

On the third stage of the experiment, we put forward the following tasks: to be convinced of the effectiveness of the proposed method of organizing the process of fostering the natural sciences among learners and believing its influence on the level of growth of knowledge in natural disciplines.

In the pedagogical experiment, the school enrolled 204 pupils from gorodskie and obshestnyh schools. To monitor the activities of students, we basically took the state standard for general education and the academic program on the subject “Naturalness”. They used control works and tests on natural sciences. To assess

the effectiveness of the work, different parameters were singled out (Table 4). The results of the use of experimentation to laboratory work showed that their use allows not only to increase the level of the processing of material, but also helps it to understand better, to comprehend, and it means, to assimilation. In almost all laboratory works the student had the opportunity to choose for himself such an experimental task, the solution of which was for him the least interest and spoiled the battle with formalism in knowledge.

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The most popular are the technologies for improving general educational skills (SOS). The metod of the definition of the level of investment was borrowed from the work of A. P. Chernyavsky “Pedagogical techniques in the work of the teacher” [16].

The level of learning is determined by the level of the level of test costs. Degree of student’s cohabitation (СОУ) is calculated on the formula:

$$SOY = (AX + BY + CZ)/N$$

where, A, B, C - coefficients (shown in Table 5);

X, Y, Z is the most common number of “5”, “4”, “3” in the class;

N is the number of pupils.

TABLE 4: EVALUATION OF THE EFFECTIVENESS OF THE ORGANIZATION OF THE ESTABLISHMENT OF INTERDISCIPLINARY CONCEPTS AS A MEANS OF ACTIVATING THE ACTIVITIES OF THE PARTICIPANTS

Parameter	*Diagnostic and control tool*
Motivation for teaching natural science	Survey, observation
Communicative activity	Observation, conversation
Level of training	Test
Ability to work with educational text	Timing of the work with the text, oral and written interview
The development of speech	Observation, mini-composition, TCO, oral survey, conversation
Practical skills Practical skills	Level test and experimental tasks for laboratory work, observation Level test and experimental tasks for laboratory work, observation
Creative activity	Creative task

On the level of level control work, the first level of prevention is obtained. In the 5b class of 31 pupils, “5” - 4, “4” - 17, “3” - 9, “2” - 1.

COУ =

TABLE 5: COEFFICIENT OF COEFFICIENTS

Coefficient	*A*	*B*	*C*
1 level of teaching	1,00	0,64	0,36
2 level of teaching	0,64	0,36	0, 16
3 level of teaching	0,36	0,16	0,04

The control work, offered to the students, was supported as standard, so also non-standard assignments [17, 18]. An example of the control work is given in Appendix 4.

When assessing the effective work with the textbook, we have the following skills: to navigate right in the direction, to find the desired script or page, and also - in the text - a response to the question for the samomoctory. Bolee vysoko we otsenivali ability nayti textbook neobhodimy on the material, peredat ego svoimi slovami and ispolzovat illyustratsii in svoem rasskaze, svyazyvat rush Fusing Material of a studied ranee teoriyami and ponyatiyami, logichno and obosnovanno izlagat prochitannoe, otbirat glavnoe and delat svoi vyvody. In the process of an individual and a frontal oral voice, we trusted the ability of students to find a text in the textbook, select examples, based on which they summarized the conclusion, to select from the text the main information about the phenomenon being studied.

To study the skills of those involved to work with the educational literature, we created a special anket [19, 20] (Table 6).

TABLE 6: INVENTORY "WORK WITH LITERATURE"

Skills	*Level*		
	No	*Partially*	*Vladade*
1. Allocate unclear places in the text			
2. Determine the main idea of the text			
3. To make a review			
4. To create a report			
5. Resolve the text			
6. Create a text			
7. Making abstracts			
8. Quick text			
9. Execute separate text subsections			
10. Transcribe the text with your words			
11. Maintain a message on the material text			
12. To create connected statements on the basis of the comparison of the facts of text			

The method of processing of the anket is borrowed from us [19]. Levels of ownership of various skills are assessed in the following scores: 3-bride; 2 - partially; 1 - do not own. Teacher needs:

1. To count the number of points for the student.
2. Calculate the coefficient of the level of educational and organizational skills

Each student by formula

$$K = (M/P) \times 100\%,$$

where, K is the level of possession of the named skills, M is the sum of skill points, P is the total number of the controlled skills.

In the study, the following results were obtained: the level of ownership of the named skills in the work with the educational literature on the beginning of the experiment - 34%, on completion - 68%.

Table 7 presents data on the development of the development of oral and written speech, in Table 8 - data for the development of the main features of the experimental and control classes involved.

Figure 1 shows the dynamics of the change in the level of learning, as in Figure 2 - comparison of experimental skills and skills of the involved monitoring and experimental classes.

We observed in the course of the experiment the observation of an able-bodied student with a book: the pupils are more confident and faster not only in

TABLE 7: DATA FOR THE DEVELOPMENT OF THE SPEECH OF STUDENTS WHO PARTICIPATED IN THE SECOND AND THIRD STAGES OF THE EXPERIMENT

Etap	*Group*	*Proficiency in terminology (%)*	*Use of information from additional literature (%)*	*Speech before audit (%)*	*Mini-composition (%)*
II	Experiment.	51	20	13	3
	Cont.	50	7	14	1
III	Experiment.	74	92	28	9
	Cont.	52	13	17	2

TABLE 8: DYNAMICS OF CHANGES IN COGNITIVE ABILITIES OF STUDENTS

Etap	*Group*	*Knowledge, understanding, (%)*	*Application, (%)*	*Ability to analyze and synthesize knowledge, (%)*	*Creative activity, (%)*
II	Experiment.	39	48	10	3
	Cont.	52	33	14	1
III.	Experiment.	27	37	25	11
	Cont.	50	34	15	1

the textbook, the handbook of the necessary information, but also the answer to the question, the definition, the rule, an example of a physical phenomenon. Has received a confirmation that pictures placed in a parable can be used and not only as illustrations explaining the meaning of a physical phenomenon or the law of nature, but also as a means of developing speech, observation, logic, thinking, and purity. Testimonies to this - the manifestation at the joys of jelly to think up a picture of the problem, in order to reproduce the physical phenomenon, to figure out, to create

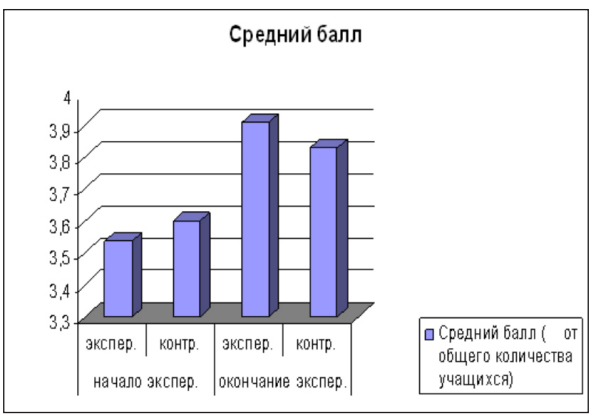

Figure 1: Level of exchange

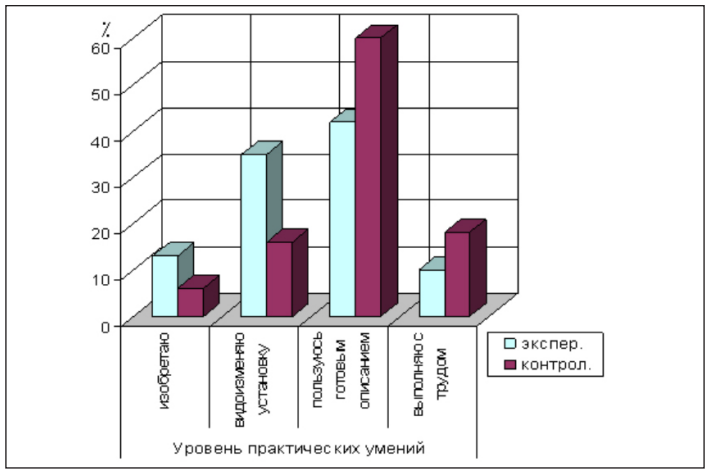

Figure 2: Practical skills

the theatrical restraints. The actual function of the urk at this, without doubt, is full of implementation, since there is joyous experience of children on the horizon. At this time, a positive motivation of the teachings is shown and consequently, the quality of knowledge on natural sciences becomes more high.

Experience in the implementation of our research has received a positive evaluation of teachers, sparked interest among a number of directing schools. The method of organization of the establishment of interdisciplinary concepts as a means of activating the activities of the participants was recognized as an opportunity for education.

To test the effectiveness of the use of the proposed method of organizing the establishment of interdisciplinary concepts in the teaching process, we produced a calculation of the significance of the criterion [21], taking into account that the number of C = 4 (well,

$$
\begin{aligned}
\mathrm{T} &= \frac{1}{n_1 \cdot n_2} \cdot \sum_{i=1}^{c} \frac{(n_1 \mathrm{O}_{2i} - n_2 \mathrm{O}_{1i})^2}{\mathrm{O}_{1i} + \mathrm{O}_{2i}} \\
&= \frac{1}{n_1 \cdot n_2} \sum_{i=1}^{4} \frac{(n_1 \mathrm{O}_{2i} - n_2 \mathrm{O}_{1i})^2}{\mathrm{O}_{1i} + \mathrm{O}_{2i}} \\
&= \frac{1}{n_1 \cdot n_2} \left[\frac{(n_1 \mathrm{O}_{21} - n_2 \mathrm{O}_{11})^2}{\mathrm{O}_{11} + \mathrm{O}_{21}} + \frac{(n_1 \mathrm{O}_{22} - n_2 \mathrm{O}_{12})^2}{\mathrm{O}_{12} + \mathrm{O}_{22}} \right. \\
&\quad \left. + \frac{(n_1 \mathrm{O}_{23} - n_2 \mathrm{O}_{13})^2}{\mathrm{O}_{13} + \mathrm{O}_{23}} + \frac{(n_1 \mathrm{O}_{24} - n_2 \mathrm{O}_{14})^2}{\mathrm{O}_{14} + \mathrm{O}_{24}} \right]
\end{aligned} \tag{1}
$$

where, n and n_2 is the volume of the sample.

The choices are made so that all the assumptions of the Wilkson-Mann-Whitney criterion are fulfilled (selections are case and non-dependent, measurable Where n and n_2 is the volume of the sample.

The choices are made so that all the assumptions of the Wilkson-Mann-Whitney criterion are fulfilled (selections are case and non-dependent, measurable

The substance has a continuous distribution and is measured on the scale of the order having four categories. - the number of the first sample with i ($i = 1, 2, 3, 4$), the number of those taking part in the second election (Table 9).

TABLE 9: RESULTS OF THE CONTROL WORK

Sample	*Sample size*	*2*	*3*	*4*	*5*
No. 1	$n_1 = 108$	$O_{11} = 7$	$O_{12} = 27$	$O_{13} = 52$	$O_{14} = 22$
No. 2	$n_2 = 96$	$O_{21} = 9$	$O_{22} = 39$	$O_{23} = 37$	$O_{24} = 11$

In accordance with the formula (1) and tabular data, we obtain the value of the statistical criterion In accordance with the formula (1) and tabular data, we obtain the value of the statistical criterion.

$$T = 6{,}58$$

For $\alpha = 0{,}01$ (the level of significance, which results in 1 error of 100) and the number of degrees of freedom $k = C - l = 3$, we need a critical value of the criterion of Tricity from the table:

$$\text{Tricitic.} = 11.31.$$

Everywhere faithfully

$$<\text{Tricit.}\ (6.58 < 11.31),$$

i.e., in accordance with the rule of decision, the results obtained do not give sufficient grounds for the elimination of null hypotension [22]. In ache chevorya, the received results of the performance of control workers are given justification to exclude the assumption that the students of the experimental and control classes have one and the same time verified the portion of the program for naturalization. Undoubtedly, the organization of the process of the formation of interdisciplinary concepts on the level of natural science in the 5th class promotes the increase of the knowledge of the students. This speaks of the effectiveness of our proposed methods.

In addition, we used the methods described in [23] to investigate the influence of this method on interest in obtaining additional information on the study of the nature of the material. The questionnaire for students is given in Appendix 5

We compared the answers of the students to one of the questionnaires: “Did you have a desire to find something else while studying the subject from the course of natural science?”

The inclusion of this question in the application is explained by the fact that the teacher does not have enough time to tell the name of the most interesting, that can make the student think, to be overcome, to show off, to test, to experience the most diverse feelings on the urks. This is not only touching examples from the life of great scientists, modern achievements and technical novices, mysterious tasks, but also in practice, the installation of a sufficient number of experiments. Therefore, the difference in the account is indicated above the question would believe (in our opinion) the result of the influence of our methodology on the formation of positive motivation to the teachings.

The answers of 32 pupils of the experimental class 5a and 35 pupils of the control class 5b are presented in the form of Table 10.

TABLE 10: DATA ON THE RESPONSES OF PARTICIPANTS IN QUESTION NO. 1 (ANNEX 5)

Sample	*Select volume*	*Yes*	*No*
No. 1	$n_1 = 32$	$O_{11} = 21$ (65%)	$O_{12} = 11$
No. 2	$n_2 = 35$	$O_{21} = 17$ (48%)	$O_{22} = 18$

The results of the students' prenuping of the students give a reasonable basis for rejecting the proposal for the publication of the same certificate to receive additional information on the examined matter, which indicates the formation of positive motivation for the teaching of the students of the experimental class. The results of the students' prenuping of the students give a reasonable basis for rejecting the proposal for the publication of the same certificate to receive additional information on the examined matter, which indicates the formation of positive motivation for the teaching of the students of the experimental class.

CONCLUSION

1. In the pedagogical experiment, 204 pupils took part (108 from the experimental, 96 from the control class).
2. In the process of monitoring, studying the activity of the pins by means of anketting and interviews with parents, the performance of tests and monitoring work, it was revealed that the level of success in the experiment in the experimental class increased by comparison with the control class.
3. The processing of the results of the pedagogical experiment with the use of the methods of the mathematical statistics allowed to be done
4. The following conclusion: the methodology of the formation of interdisciplinary scientific concepts is a means of activating activity, as it motivates the learning, helps to increase the level of the students' learning,

stimulates the development of speech, and forms the skills of practical activity.

5. The experiment confirmed the proposed effectiveness of the proposed methodology for the organization of the process of the formation of interdisciplinary scientific concepts as a means of activating the activities of students.
6. The results of the pedagogical experiment and the study materials are presented in the following publications: [34-41].

CONCLUSIONS

1. System analysis of literary sources on the topic of research allows identifying and identifying the main psycho-pedagogical and di-tactical features of the formation of interdisciplinary physical concepts as one of the effective forms of learning: didactic and methadic methods are provided for the development of the child; Knowledge, skills, skills are a basic, information foundation for the development of potential human capabilities; The building up of the educational process is based on the actual development of the students and stimulates their progress in the zone of the nearest development. A study of the best practices of teachers has made it possible to apply them Methodical techniques for the systematization of concepts and their assimilation.
2. The scientific substantiation of the necessity of assimilation of interdisciplinary physical concepts for activating the activity of students in the classes on "Natural History" was obtained in the work. The results of the theoretical investigation and the long experience of the training confirm that the process of the formation of interdisciplinary physical concepts among the students has real didactic abilities, as follows: logical structure of the subject knowledge; An exploring study of the theoretical material; Differentiated flow; Active forms and methods of teaching; Group methods of work; Creation and support of a positive emoional fan; Learning instruction; Borrowing; Individual advice.
3. The methodology of the formation of interdisciplinary physical concepts should be based on the laws of the processes of the formation of students' knowledge, skills and skills and at the same time respond to the generally accepted principles of teaching. Selection of tasks on an experimental, experimental basis and at the level of system associations oriented toward propaedeutics of natural science knowledge among students is based on the principles of: scientific and feasible complexity, consistency and systematic teaching, visibility of content and activity, activity and independence, the connection between theory and practice, harmonic Development of personality, educational training.

4. Taking into account the specifics of the teaching of the subject and the psychological and pedagogical features of the pupils of the main link of the secondary school, methodological recommendations for the formation of interdisciplinary physical concepts have been developed, including methodological methods, teaching aids and forms of organizing students' activities in class. In the course of the experiment, an educational and methodological complex was published at the course "Natural Science", which includes a textbook, methodological instructions for teachers and a workbook for students.

PRACTICAL RECOMMENDATIONS

1. The use of the associative logic, frontal laboratory and practical works, didactic games in the educational process allows us to create effective means for the development of students - the methodology of the formation of interdisciplinary scientific concepts.
2. Possibilities of the formation of interdisciplinary scientific concepts for the activization of the activity of the participants are provided by the following his metodic features: the logical structuring of subject knowledge; Further study of the theoretical material; Active forms of learning; Group methods of work at the level; Creation and support of a positive emoional fan; Learning instruction; Flexibility; Mnogobrasie forms and methods of work.
3. The technology of the realization of the process of the formation of interdisciplinary scientific concepts presupposes:
   – inbound monitoring and determination of the levels of the relevant

The abilities of the students;

   – selection and structuring of the educational material in the form of autonomy

Units - logical associations;

   – Modeling of the educational process in accordance with the teaching material,

Including: firing lows in active mode;

The construction of level didactic materials in the performance of frontal and practical laboratory works; The use of associations in the explanation of new natural science concepts; Ensuring the continuity of children's activities;

The subordinate of TSO, means of visibility, equipment;

   – selection of appropriate metodic methods;
   – current and final control;
   – Diagnostics and accounting of training achievements of students.

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ANNEX 1

Test work for students on the constituting stage of the experiment

1. variant

1. Give examples of bodies consisting of a single substance.
2. What is the nature of the difference in water, ice and steam?
3. What do you call movement? In what way is the movement measured? Express the following values in meters: 7 km, 9 dm, 3 cm, 5 mm.
4. How can I determine the speed of movement if the path and time of travel are known? What is the speed of movement?
5. The bee flew away from the flower. The interaction of which bodies is observed?
6. What is the mass of the body? Express in scales: 2 kg, 7 mg.
7. Why then, before building a house, they begin to pour a broad foundation?

2-VARIANT

1. In which environment is diffusion faster: in cold or in hot? Why?
2. Why does he take the whole volume of the vessel?
3. In what way is the movement time measured? Express in seconds: 7 minutes, 1 hour.
4. What do they call a substance? What does the expression "Water content of water equal to 1000 kg / m^3" mean?
5. What is the weight of a body? What is the difference in weight from the mass of the body?
6. What is the mass of the body? Express in the kilograms: 250 g, 9 tons.
7. What do they call a lever?

3-VARIANT

1. How does the secretion spread in the air?
2. How is the mercury thermometer used? For what do you use it for?
3. If the cyclist goes 30 km for 2 hours, what is its speed?
4. What is the expression: "Aluminum gravity equal to 2700 kg / m^3"?
5. What product is produced when coal is boiled in oxygen?

6. How can I use the simplest electromagnet?
7. Explain the mechanism of sound emission in a dumbbell. What do they call a resona?

ANNEX 2

Student's Toolkit:

1. Will your knowledge be natural and stable?
2. Do you comply with the rules in terms of additional responsibilities?
3. Do you carry out your household tasks systematically and systematically?
4. Controlling operations you usually oppose as proof or as

An unquestionable test of your knowledge? ANNEX 1

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2. Do you comply with the rules in terms of additional responsibilities?
3. Do you carry out your household tasks systematically and systematically?
4. Controlling operations you usually oppose as proof or as an unquestionable test of your knowledge?
5. Do you conduct an analysis of your results of the control work?
6. Can you enumerate the themes of the theme that you have come across?

Teacher's Kit

1. What methodology do you use in class 5 for teaching - traditional education or innovative technologies?
2. Does the methodology of the preparation of the natural sciences apply to you, the requirement of accounting for the characteristics of the pupils' personality?
3. Do you think that your students' knowledge of nature is stable and stubborn?
4. Are you going to work with the accounting of the level of student learning or do you apply the same tasks in all classes of one parallels?
5. When preparing for the lesson, do you constantly study the additional literature?
6. Didactic material to the urks you create or do you find them in the metodic literature?
7. Show the agents of didactic materials used by you.
8. Do you systematically trust your household?

ANNEX 3

The simultaneous testing of students before and after naturalization to determine the influence of the formation of interdisciplinary concepts among learners on the results and the speed of the thought process.

Test 1

What is the reason to continue the series?

1. Convection - wind, radiation - warm, heat ...
2. Thermometer - temperature, scale - mass, calorimeter - ...
3. Gramm-pound, meter-mile, joule -...
4. The melting - the crystallization, the transformation - ...

Test 2

Set the phrase to meaning.

Calorie, calorimeter, energy, alcohol, molecule, rain, water, heating, sublimation, steam, ice, quantity of heat, jule, kilogram, temperature change, traffic, crystal lattice, power, work, thermometer.

Test 3

Choose synonym to slovem:

Crystallization, evaporation, the term, heat insulation, temperature change.

ANNEX 45. Do you conduct an analysis of your results of the control work?

6. Can you enumerate the themes of the theme that you have come across?

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Calorie, calorimeter, energy, alcohol, molecule, rain, water, heating, sublimation, steam, ice, quantity of heat, jule, kilogram, temperature change, traffic, crystal lattice, power, work, thermometer.

Test 3

Choose synonym to slovem:

Crystallization, evaporation, the term, heat insulation, temperature change.

ANNEX 4

Test work for determining the student's level of learning:

1. The copper chapel was heated. Has it changed at this time? A volume? A flatness?
2. Which thermometers should be used in the north to measure the air temperature: mercury or alcohol? Why?
3. The speed of the dolphin makes 72 kilometer per hour. The speed of the whale is 42 kilometer per hour. Who is moving faster? Why do you think so?
4. Which of the items - magnetic, charged ball on the radiated

   Podstavke, an iron bar or an ammeter - you need to place near

   A certain point in order to create an electric field in it? Why?

5. The object is nasdojanii 10 cm from the Plate Mirror. On how the distance from the object will it be seen if the object is not moved about 10 cm from the mirror yet? Reply clarify.

ANNEX 5

Ankleta for the student in the study of the influence of this method on the formation of positive motivation to the teachings

1. Did you have the urge to find something else that has been studied during the course of the subject from the course of natural science?
2. Is it easy for you to speak in front of an auditory at the time of an oral response to the urks?
3. Do you think you will receive the most important knowledge, received at the level?
4. How could you affect your urge?
5. How much time (on average) do you spend on the preparation for the poem?

Test work for determining the student's level of learning

1. The copper chapel was heated. Has it changed at this time? A volume? A flatness?
2. Which thermometers should be used in the north to measure the air temperature: mercury or alcohol? Why?
3. The speed of the dolphin makes 72 kilometer per hour. The speed of the whale is 42 kilometer per hour. Who is moving faster? Why do you think so?
4. Which of the items - magnetic, charged ball on the radiated
   Podstavke, an iron bar or an ammeter - you need to place near
   A certain point in order to create an electric field in it? Why?
5. The object is nasdojanii 10 cm from the Plate Mirror. On how the distance from the object will it be seen if the object is not moved about 10 cm from the mirror yet? Reply clarify.

ANNEX 5

Ankleta for the student in the study of the influence of this method on the formation of positive motivation to the teachings.

1. Did you have the urge to find something else that has been studied during the course of the subject from the course of natural science?
2. Is it easy for you to speak in front of an auditory at the time of an oral response to the urks?

3. Do you think you will receive the most important knowledge, received at the level?
4. How could you affect your urge?
5. How much time (on average) do you spend on the preparation for the poem?