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MODELING OF PHYSICAL PHENOMENA AS A METHODOLOGICAL MEANS OF FORMING A KNOWLEDGE STRUCTURE IN PHYSICS AND PROGRAMMING

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To bring the theoretical basis to the improvement of the methodic of carrying out laboratory works in physics and computer sciences, a study of psychological and cognitive processes that accompany the corresponding educational activity was held. The important moment of the work is the research of the mental side of educational activities in the terms of formal logic. The accompanying steps to these mental activities and the talk activity are considered. The content component of the talk activity was considered in the work as an important diagnostic factor that indicates the level of understanding of the nature of the new material or the completion of the corresponding cognitive structure. The original graphical ways of formalization of the cognitive scheme of the object activity and the logic of its formation in the context of mental and materialized education activities are presented. These ideas were used to consider the processes of educational activity on the example of the creation of a simple physical model that is realized through the Python talk with the help of Visual library. Educational activities are considered through the prism of the evolution of the structural organization of mental representation of the objects of this activity.

The research demonstrates the cyclical nature of the corresponding cognitive processes, materialized activities, and hierarchical character of the structure of knowledge that is formed in the process of educational activities in physics and programming. The correlation of these processes with the dynamics of the evolution of knowledge is settled. The conceptual ideas that could be useful for modifications of the methodic of realization of laboratory knowledge in the direction of modeling of physical processes and phenomena are formulated. Individual algorithmic problems of modeling of physical processes are considered in the research as components of the holistic system of problems. According to the point of view of the authors, in the course of the preparation of highly professional specialists in the domain of natural sciences, it is necessary to devote a lot of time to the conscious, goal-oriented formation of protocols of abstract logical and causal thinking. The methodology of such work is well formulated, especially in the well-known methods of descending step-by-step detailing and in modular programming

Keywords: *methods of teaching physics, mental, materialized actions, hierarchy, evolution of knowledge structure*

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1. Introduction

Cognitive actions that accompany materialized actions during the performance of laboratory works in programming and physics have many common features. Both the first and the second activity involve multiple tests of the object (program or physical installation) at different stages of its readiness. Actions at a laboratory work, both in the first and in the second case, are cyclical and have signs of research. The cycle begins with mental actions of programming one's own activity and continues with materialized actions in the direction of mounting another fragment of a physical installation or writing a fragment of a program. After acquiring this fragment of logical integrity, it is tested. This test also consists of materialized actions, which are determined by mental processes, the meaning of which can be understood in the context of analytical-synthetic actions in relation to the content of the laboratory work. Testing a fragment (program or physical installation) provides feedback on the way from the initial to the final stage of the laboratory work. If the test of the logically completed fragment was successful, then the cycle of actions described above is repeated for another fragment. If the tests were not successful, the cycle is repeated for the current fragment. It is clear, that at repeated iteration of a cycle, at the first stage of these actions, there are materialized actions, but not on mounting of a current fragment, and on its modification. It should be noted, that the above-mentioned analytical-synthetic mental actions are also cyclical.

2. Literary review

In this paper, an attempt is made to consider the relationship of mental, materialized and language actions in the process of laboratory works, in particular, the modeling of physical processes. The work is based on the concept of cognitive psychology that intellectual activity is determined by the structural organization of the cognitive sphere. None of these structures is completely new. Each is a transformation or modification of the other [1]. In these conditions, the basic principle of learning is the principle of differentiation or detailing of mental cognitive structures [2]. This work develops on a simple application example a model approach to learning processes, which was presented, in particular, in [3]. The authors argue that practical activities on modeling physical processes, which contain a large number of interconnected concise models and tasks, such as in [4] are extremely useful.

3. Research aim and tasks

The aim of the study is to bring the theoretical basis for improving the methods of laboratory works in physics and programming by analyzing them through the prism of cognitive processes, the evolution of the structure of knowledge in terms of formal logic.

To achieve this goal, the following **tasks** were set:

1. Formalization of the corresponding cyclic educational cognitive actions and correlation of these actions with the evolution dynamics of the knowledge structure.

2. Research of the mental side of educational actions in terms of formal logic;

3. Integration of actions of formal logic with accompanying materialized actions.

3. Research materials and methods

The research object is the evolution of the solution of a simple educational application physical problem for modeling a physical process. This task is as follows. It is necessary to simulate the motion of a body in the gravitational field. The body was given an initial velocity in a direction, parallel to the Earth's surface. As a result of this motion and gravity, the body moves in an arc, falls, is absolutely elastically pushed away from the surface. Bouncing again, moves in an arc, falls and is pushed away.

The task of the work in the sense of studying the educational process is to follow the process of forming the knowledge structure in programming and physics during the creation of this simple program.

The task of the work in the sense of analysis of the processes of formal logic is to consider the mental processes that determine the evolution of the knowledge structure.

Initial conditions. At the initial stage, let students be able to move a body on the screen in any direction, in particular parallel to the X axis.

4. Research results

Due to the limited field of attention (consciousness, short-term memory) by Miller's magic number (7±2) [5], each person is always inclined to break a task into smaller auxiliary logically completed subtasks. Each such problem does not go beyond 7±2 components. This is an important methodological aspect of learning to work with any complex object. Such objects include physical laboratory installations and programs, including those that simulate physical processes and phenomena. In professional programming in this sense, two mutually complementary technologies have been developed: the method of descending algorithm detailing and the method of modular programming. These two methodologies are the basis of the practice of structural programming [6]. Let's break the solution of the problem into subtasks:

1. Realize the motion of a body parallel to the X axis in a straight line evenly.

2. Realize the motion of the body parallel to the Y axis up and down in the gravitational field with a completely elastic rebound.

3. Align the motion of the body rectilinearly along the X axis, and the motion of the body in the gravitational field in the direction of the Y axis.

4. Take into account the force of friction.

Realization of the initial problem of body motion parallel to the X axis in a straight line evenly in Python using the Visual library is presented below. The simplicity of VPython has made this tool very convenient for illustrating "simple" physics, especially in the educational environment [7, 8]. The structure of knowledge, which will be discussed below, at the initial stage has the form, shown in Fig. 1.

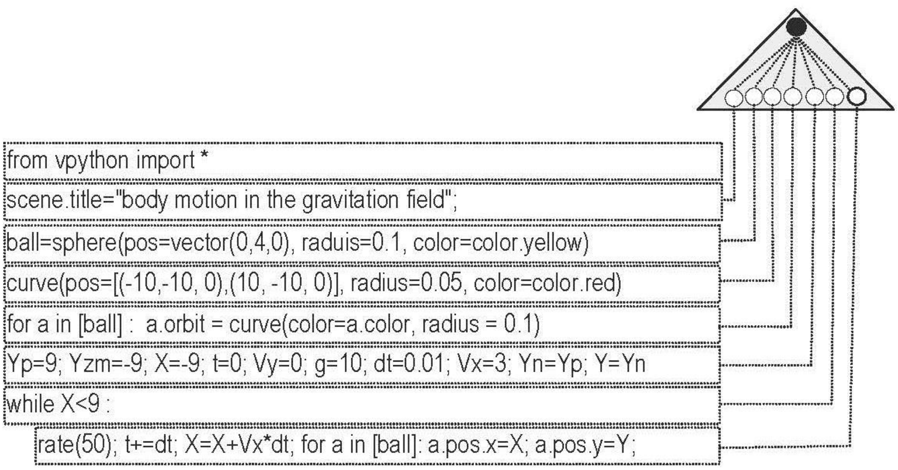


Fig. 1. The initial phase of training. The text of the program of the physical model and the graphic image of the cognitive mental scheme of the program object

The motion of the body parallel to the Y axis up and down in the gravitational field requires knowledge of the appropriate physical formula. Finally, the final task after realization of the intermediate subtasks takes the form of Fig. 2.

It is clear, that the second subtask is realized with the first replacement of the arithmetic expression X=X+Vx*dt; by the expression

```
if (Y<Yzm) : Vy=-g*t-Vy; Yp=Yzm; t=0;
Y=Yp-(Vy*t)-(g*(t)**2/2);
```

This is the differentiation of the notion of motion from the starting, where the motion has a rectilinear uniform character, to the intermediate somewhat complicated representation, where the motion has a rectilinear uniformly accelerated or uniformly deccelerated character and there is a push from the surface Yzm.

In the sense of the knowledge structure, the complication of the motion algorithm generates a new auxiliary logically complete algorithm, shown in Fig. 2 in the form of a lower triangle (construct) with corresponding interacting components, from a simple component (extreme left component of the upper triangle) (Fig. 1). This construct is complicated and supplemented in intermediate tasks.

In the third subtask, ideas about the nature of motion are further detailed and modified. Now the motion takes place in the two-dimensional space, both in the direction of the X axis and in the direction of the Y axis.

```
if (Y<Yzm) : Vy=-g*t-Vy; Yp=Yzm; t=0;
X=X+Vx*dt; Y=Yp-(Vy*t)-(g*(t)**2/2);
```

The final version of the program takes into account the friction with air and the fragment of the detailed program takes the form.

```
if (Y<Yzm) : Vy=-g*t-Vy; Yp=Yzm; t=0;
X=X+Vx*dt; Y=Yp-(Vy*t)-(g*(t)**2/2);
Vy=Vy-Vy*0.002; Vx=Vx-Vx*0.002
```

The tasks were tested. The trajectories of body motions, taking into account friction and without it, are presented in Fig. 3.

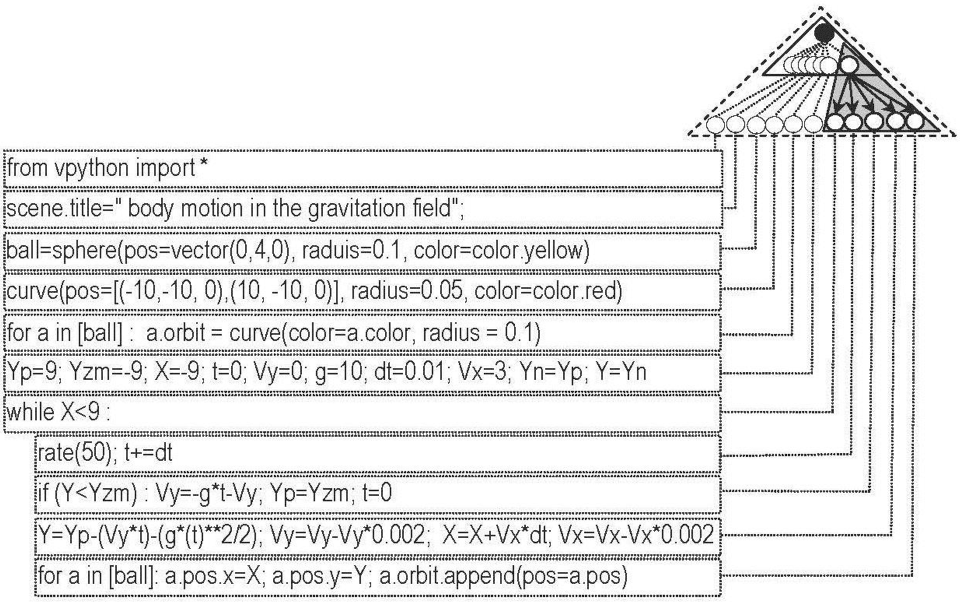
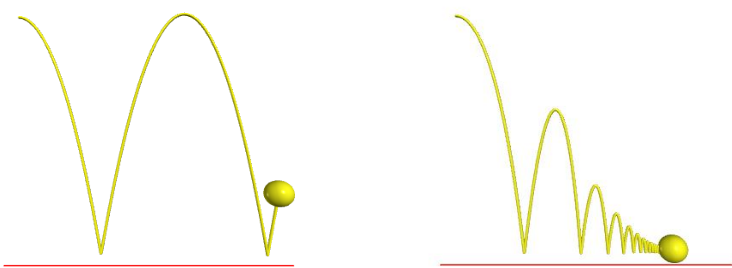


Fig. 2. The final phase of training. The text of the program of the physical model and the graphic image of the cognitive mental scheme of the program object



a b

Fig. 3. Trajectories of body motions: *a* – without taking friction into account; *b* – taking it into account

Fig. 1 and 2 show the texts of the programs and the corresponding original graphic formalizations of the mental schemes of the program object, which is formed as a result of long-term learning activities in the memory of an individual student. Fig. 4 shows the process of this formation in terms of formal logic.

4.1. The mechanism of knowledge structure formation in terms of formal logic

Fig. 1, 2 present the cognitive structures of a student at the initial and final stage of learning respectively (already in its current form). Below the structure in each of the figures is the appropriate program. The mental structure has a hierarchical construction and is the logical framework of ideas about the object. The scheme in Fig. 2 is complete. The process of its formation is gradual in real time and will be considered in detail below in Fig. 4.

The lines of the program are marked with separate circles – **components** of the scheme. In Fig. 1 the lines of the program are composed of one block, and in Fig. 2 these lines are composed of two logically complete blocks. A logically complete block of components will be called a **construct.** In the figures, these blocks are delineated by triangles. These triangles will be called **attention triangles**. It is known, that human attention is limited by the magic number 7±2. This is the maximum amount of material in the field of attention (in short-term memory) a person can hold and accordingly realize and logically connect.

We will assume that students in the process of learning activities can focus on either the components of the upper triangle or the components of the lower. We will also assume that the individual operators of the program, written in a line in Fig. 1, Fig. 2 are perceived by students as a whole, as separate individual components.

It is also seen, that in Fig. 2 there is a component that is part of both the lower and upper triangle (construct) of concentration. This is the component at the top of the lower construct and in the component line of the upper construct. The component, located above the line of other components of the construct, summarizes their work. The component over the line of other components in the upper construct has a similar generalizing function. The generalizing component of the upper construct is the most concise characteristic of the whole program (can play the role of a task for its creation).

It is clear, that it is because of the common component for the two constructs that the attention is switched from the upper to the lower triangle and from the lower to the upper. It is clear, that the student's attention can be focused only on one of the constructs. The tonality of the triangle indicates the construct, on which the focus is.

The work of the formation mechanism of the knowledge structure in terms of formal logic, shown in Fig. 4, has a cyclical nature and is implemented by three types of cycles in Fig. 5.

The initial situation in the process of creating a model of the physical process of body motion in the field of gravity is as follows. Recall that students are able to move the body in a straight line evenly, as noted above. The corresponding program is presented above. It is necessary on the basis of this initial problem to realize the motion of the body parallel to the Y axis up and down in the gravitational field with a completely elastic rebound.

At the initial stage, attention is focused on the upper triangle of fig. 4d. Knowledge of physics about body motion in the field of gravity and elastic push of bodies give rise to new components of thinking. The set of new components generates a new construct (triangle of focus). It is under the initial, because the new components detail and transform the idea of the initial trajectory of the body of fig. 4a.

Generation of a new construct, which carries a complex logic of the physical process and is implemented by software, is represented by the transition from the initial situation, shown in Fig.4d, to the resulting, shown in Fig. 4a. In terms of formal logic, this is a scheme (Fig. 5a). Fig. 4a, 4d presents the transformation of the extreme right component in the line of components of the upper construct in a new construct.

The process of **creative** thinking begins to generate a new cell in the knowledge system with a focus on the component that is the source of the new. This is the component that is responsible for the old (straight, uniform) nature of the physical motion of the body (far right in a number of components in fig. 4d). There is an **abstraction** from all other components of the upper construct. Analytical and deductive actions form an idea of the components of the new construct.

The **analysis** divides a single component into several new formations in the context of the approximate basis of action (knowledge of the relevant physical laws, appropriate algorithmic mechanisms). Next, these new, newly created components of thinking are **deductively** connected, in the context of maintaining the newly lost integrity.

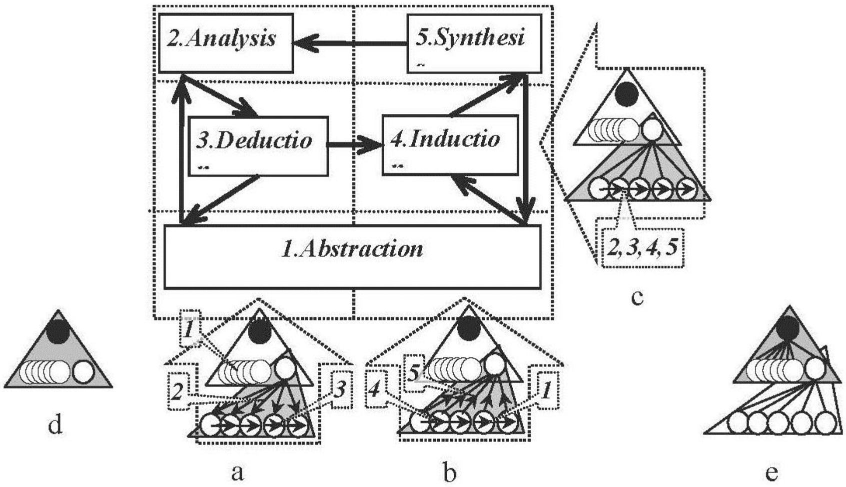


Fig. 4 The order of abstract-logical and situational actions in relation to the object of study: *d* – initial situation; *a, b, c* – development of events; *e* – final situation

Writing a new fragment of the program is materialized actions for realization of ideas, i.e. writing real operators of the program, providing the motion of the body in the field of gravity and elastic push. The mental actions that accompany this materialized activity can be correlated with the inductive-synthetic actions, shown in Figs. 4b, 5b.

The logical action of **induction** connects the new components of the lower construct into a new integrity, the physical process of body motion in the gravitational field. This binding ends with the **synthesis** of the whole. However, **induction** may not **achieve** the desired result, i.e. the correct nature of the motion. The program needs to be tested. If the goal is achieved, the field of attention is transferred to another activity, i.e. there is **abstraction**.

Program testing is those materialized actions that cause abstraction from the components of the lower construct (Fig. 4, *b*; 5, *b*) and the temporary exit of consciousness into the upper construct, when the ultimate goal of solving the problem of Fig. 4e is realized and verified. The initial and final laconic conceptual representations of the functions of the program as an integral formation are indicated in Fig. 4d and Fig. 4e by the black component at the top of the upper construct. These initial and final ideas about the functions of the program must coincide during the test. In the case of successful materialized actions to test the program, the goal is considered achieved.

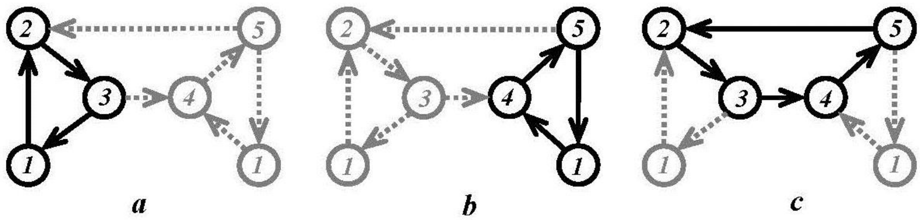


Fig. 5 The scheme of logical actions in relation to the functional nodes of the object in the field of attention in the mode: *a* – concretization; *b* – generalization; *c* – selection of operators. Black arrows indicate dominant actions, and gray – auxiliary

If the test of the program gave a negative result, the actions, shown in Fig. 4, *c*; 5, *c*, begin. The psychological essence of these actions is simultaneous (synchronous) analytical-synthetic activity, which is accompanied by appropriate deductive-inductive actions, as shown in Fig. 4, *c*; 5, *c*. The essence of the actions, presented in Fig. 4, *c*; 5, *c*, in the sense of programming is the selection of operators, and in the sense of physics – in verification of the correctness of the physical model.

The steps to implement the program are a gradual detailing of the code through several intermediate tasks. Therefore, the cycles of cognitive actions, presented in figs. 4 and 5, will be repeated many times for each intermediate task.

Model consideration of educational processes in the context of mental, materialized and language actions can be interesting for teachers, conducting laboratory classes in programming and physics. This review provides the key to the diagnosis of the learning process and, accordingly, makes it possible to respond correctly to situations in the performance of tasks by different students. The model analysis of actions in case of difficulties in the context of the model is also interesting.

Materialized actions in the formation mechanism of the knowledge structure will be considered through the prism of Halperin's theory of the gradual formation of mental actions and concepts [9]. This theory identifies the following qualitative points in the development of educational material: motivational stage; drawing up of own scheme of an orienting basis of actions; execution of materialized actions; transition from materialized to external-language actions; transition to intra-mental activity; ability to scale the material.

Fig. 6 attempts to detail this evolution of knowledge in the context of practical activities for educational programming of models of physical processes. Materialized actions are strictly determined by mental ones in the successful activity of creating or debugging software models of physical phenomena. The scheme of Fig.6 shows the relationship of mental and materialized actions. The scheme is a development of the work [10].

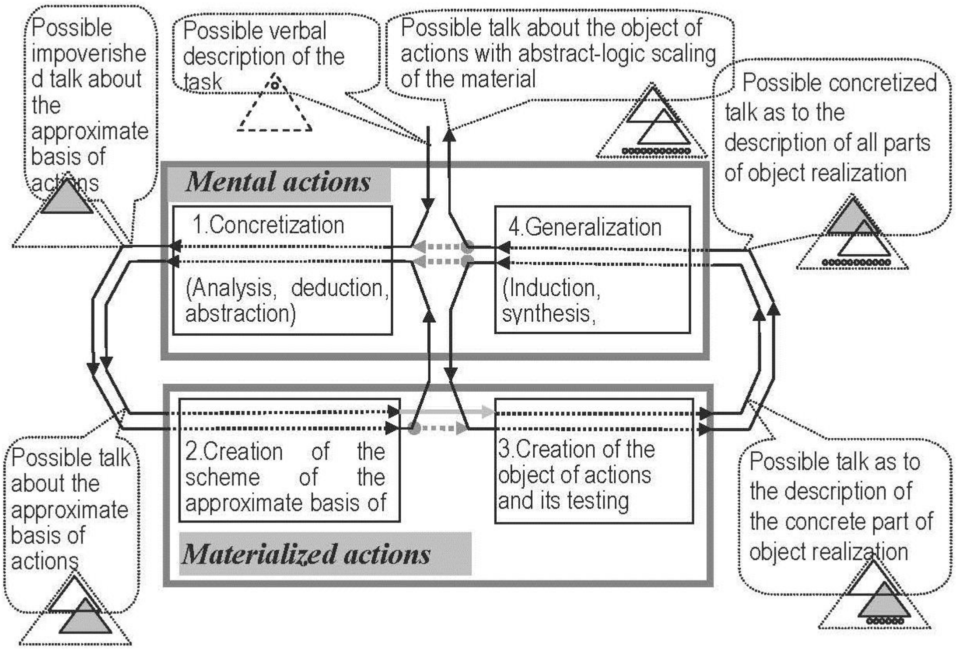


Fig. 6. Mental and materialized actions in the context of practical programming and laboratory works in physics

Drawing up one's own scheme of orientation basis of actions, which takes place after the motivational stage, is realized by concretizing the material that can be useful for solving the problem. As mentioned above, the concretization of the orienting basis of actions occurs through the following sequence of logical actions (Fig. 5, *a*).

Abstraction from everything except the condition of the problem or concentration on the condition of the problem. **Analysis** of this problem, i.e. division of the main problem into subtasks and retrieval from memory of all possible schemes (means) of solving these subtasks. Among the tools may be standard algorithms, mathematical and physical formulas, and so on. Next, deductive linking of schemes for solving individual subtasks into a single whole.

In the context of application of the physical model, presented at the beginning of the article, the basic problem of rectilinear uniform motion is analyzed. Within this problem there is a subtask that complicates motion to the motion in the gravitational field of the earth, taking into account the elastic push in the case of falling on the surface and friction of air.

In Fig. 6, these actions are realized by two cyclic switches of attention through the concretization and drawing up of the scheme of the approximate basis of actions. As a result of these actions the scheme of an approximate basis of actions is formed as two constructs, which correspond to the problems, mentioned above.

Creation of an object of action and its testing is realized in several stages of solving from the initial task to the final one through several intermediate logically completed tasks. It is clear, that the final problem cannot be solved without the initial and intermediate problems.

Both the initial problem and each of the intermediate ones, as well as the final problem, go through the next process. This path for each task begins with an approximate basis of action (these are the appropriate algorithmic schemes, physical formulas, etc.). Then this information is transformed according to the specific task and there is an **inductiv**e linking of all of the above into a single whole and the formation of a **synthetic** vision of the functions of the program as a whole. Further testing. If the program shows the correct work, then the details of the implementation go into the background, there is abstraction from the specifics of the implementation of the program fragment (Fig. 5, *b*).

It is clear, that in a particular example, the lower construct can take three stages of completion, which correspond to the intermediate tasks and the final state. In fig. 6, this work is shown by multiple repetitions of actions in relation to the lower construct. In the process of these actions, ideas motion of the body are repeatedly detailed and transformed.

Debugging of a fragment of the object corresponding to any of the constructs takes place according to the scheme of Fig. 5, *c* without changing the field of attention by selecting a new approximate basis of action or coordination of action in the existing mechanism.

Possible language activity at different stages of solving the problem is represented by footnotes on the periphery of the scheme of Fig. 6. In Halperin's theory of gradual formation of mental actions and concepts, language activity occupies an important place. This activity is in particular diagnostic in nature. However, this theory does not take into account educational work with complex objects, in particular with programs that model physical processes.

The model, presented in fig. 6, takes into account educational work with complex objects and makes it possible to identify qualitative indicators of language activity. Footnotes on the edges of the scheme show the concise characteristics of possible language activity at different stages of the evolution of educational activities. Also, each footnote shows the corresponding cognitive scheme that determines this language activity. Fig. 6 shows the evolution of language activity from the state of "possible impoverished talk as to the approximate basis of action" to "possible talk as to the object of action with abstract-logical scaling of the material."

This language activity is enriched in the course of analytical-deductive actions when shifting attention in the mode of concretization from the upper to the lower construct (in a spiral inward, located in fig. 6 on the left). Then language activity becomes even more sophisticated, causal and abstract-logical in the course of inductive-synthetic actions in the process of generalization in the transfer of attention from the lower construct to the upper (in a spiral outward, located in fig. 6 on the right).

Analysis of students' learning in the context of the evolution of the knowledge structure leads to the conclusion that materialized and mental actions are inextricably linked in the process of performing laboratory works in the field of natural sciences. They are mutually stimulating and quasi-continuous. Even small corrections in a complex program object require a perfect mental scheme of the object. The approximate basis of action is formed both in the process of concretization and in the process of generalization. As a result of the combined action of these mechanisms, there is a gradual differentiation of the knowledge structure.

Studies of students' work through the prism of cognitive (cognitive) processes, the evolution of the structure of knowledge in terms of formal logic have shown that the formation of a specialist in natural sciences goes through several levels of grade in terms of structural and organizational protocol of mental work. In the first stage, a student can connect a small number of components (physical or informational), usually within one construct, and solve the corresponding problem. The second stage develops the ability to transfer attention between two constructs, covering an array of knowledge that already exceeds the amount of short-term memory (maximum twice). The third stage involves the ability to make long-distance transits with the structure of knowledge and makes it possible to create and debug natural or information structures of high complexity and large size. The amount of short-term memory is exceeded many times over here.

There are qualitative barriers between the first, second and third protocols of thinking that cannot be effectively overcome without realizing them. The transition between each of these barriers is difficult and requires appropriate packages of tasks. The latter protocol is characterized by developed abstract-logical, causal thinking. It should be noted, that the mentioned protocols of thinking often do not have a narrow professional specificity, but have the meaning of general educational development. The practice of educational programming, in particular, in the direction of modeling physical processes, powerfully shapes both abstract-logical and causal thinking.

Qualitative changes in the protocol of thinking require considerable effort, which concerns not so much the accumulation of knowledge as the reformatting of the protocol of thinking. This is confirmed by observations of students, learning a second programming language. Professional development in the second programming language takes place without overcoming the above-mentioned quality barriers. A professional thinking protocol has already been achieved when working with the first programming language.

The set of skills, required to create large software projects or complexly organized physical models, is formed by long-term practical training activities. Skills that are formed consciously, under the guidance of a teacher, do not go through a long phase of sporadic search for optimal work protocols.

According to the authors, in the training of highly qualified specialists in the natural sciences it is necessary to devote considerable time to the conscious purposeful formation of protocols of abstract-logical, causal thinking. The methodology of such work is well formalized, in particular, in the known methods of descending step-by-step detailing and in modular programming.

Prospects for further research. The paper considers the junction of physics and programming in the context of educational modeling of simple physical processes with screen visualization in two-dimensional space on the example of one problem. The formation of simple mental constructions of hierarchical type is discussed.

The study of the evolution of mental hierarchical structures of increased size, corresponding to the array of related complex physical models, is promising.

The work is the result of creative reflection on the place of the course "Modeling of physical phenomena and processes" in a number of other disciplines of physical, mathematical and informational direction for students of physics. This junction of mathematics, physics and programming is interesting because it affects the fundamental qualities of the modern natural science, because it is a powerful source for the formation of abstract-logical, causal, materialist thinking. The course gives an opportunity to develop to all participants of educational process, to formulate own interests.

5. Conclusions

1. The theoretical basis for improving the methods of laboratory work in physics and programming by analyzing them through the prism of cyclic cognitive pro-

cesses in terms of formal logic, the evolution of the structure of knowledge, was given.

2. The evolution of the structure of knowledge in the learning process in connection with materialized actions and possible language activity was considered. The content component of language activity was considered in the work as an important diagnostic factor that indicates the level of understanding of the essence of the new material or the completeness of the relevant cognitive structure.

3. The qualitative analysis of students' education in the context of the evolution of the knowledge structure, cyclical cognitive processes in terms of formal logic, materialized actions and language activity was conducted.

References

1. Kholodnaya, M. A. (2019). Psikhologiya intellekta: paradoksy issledovaniya. Moscow: Yurayt, 334.

2. Chuprikova, N. I. (Ed.) (2014). Differentsionno-integratsionnaya teoriya razvitiya. Moscow: Yazyki slavyanskoy kultury, 720.

3. Holovin, M., Holovina, N., Holovina, N. (2018). Computer Modeling of Physical Processes and Specifics of Relevant Educational Activities. Psychological Prospects Journal, 31, 57–70. doi: http://doi.org/10.29038/2227-1376-2018-31-57-70

4. Mayer, R. V. (2015). Kompyuternoe modelirovanie. Glazov: GGPI, 620.

5. Miller, G. A. (1956). The magical number seven, plus or minus two: Some limits on our capacity for processing information. Psychological Review, 63 (2), 81–97. doi: http://doi.org/10.1037/h0043158

6. Ivanova, G. S. (2016). Tekhnologiya programmirovaniya. Moscow: KNORUS, 334.

7. Getmanova, E. E. (2005). Ispolzovanie Visual Python dlya modelirovaniya fizicheskikh protsessov. Kompyuternye instrumenty v obrazovanii, 4, 43–47.

8. Windsor, M. A., English, L. Q. (2019). VPython for Introductory Mechanics: Complete Version. VPython for Introductory Mechanics. Available at: https://scholar.dickinson.edu/vpythonphysics/1

9. Podolskiy, A. I. (2017). Nauchnoe nasledie P. Ya. Galperina i vyzovy XXI veka. Natsionalniy psikhologicheskiy zhurnal, 3 (27), 9–20.

10. Holovin, M. B. (2008). Rozumovi ta materilizovani dii, yikh verbalne suprovodzhennia v konteksti praktychnoho navchalnoho prohramuvannia. Visnyk cherkaskoho universytetu. Pedahohichni nauky, 136, 7–13. Available at: http://evnuir.vnu.edu.ua/handle/123456789/12867

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