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Informationally oriented activity in education

In this paper the questions connected with the adaptation of the educational process to the demands of information society are discussed. The main attention has been paid to the applied direction of the education in secondary school, information oriented activity during the teaching of mathematics and computer literacy, and the mathematical modeling as an integrated part of it. In the article we find the results of author's research of the level of possessing some sorts of activities by the different age groups of learners.

Activity is one of the fundamental concepts of philosophy and psychology, which reflects the relationships of human and the surrounding world. Activity is one of the core notions of modern didactics. Special place in the educational process takes the activity, which lets to acquire the new knowledge out of the surrounding world and is directed to the application of acquired knowledge in life. In the information society applied direction of the education becomes especially demanded.

Any system of education should be directed to the acquirement of skills and abilities of a practical nature, to the acquirement of concrete applied kinds of activities by the learners. Determination and classification of such activities is one of the requirements of a modern learning process. The analysis of a wide spectrum of recent monitoring researches (TIMSS, PISA and others) shows that learners of all participant countries experience difficulties connected with the use of the knowledge while solving tasks of real or close to real situations. It concerns the inability to perform certain sorts of activity connected with information or data, such as comparison, data analysis, interpretation and other.

The applied direction of teaching the science school subjects is impossible without the full implementation of the activity approach into the learning process (John Dewey, L. Vygotskiy, V. Davydov). The modeling of activity, which provides the development of the ability to apply the knowledge into solving the applied tasks, and the creation of based on this model means for shaping of this activity and the evaluation of possessing of it is an actual practical problem in education.

Informationally oriented activity, as an integrated part of learning activity of applied nature is one of the research objects of the Center of Mathematical and Computer Education MIVT of Donetsk National University in Ukraine. The aim of this article is to reveal some of the features of informationally oriented activity integration into the educational process at the contemporary school.

Taking the ability to work with information as a determinative criteria every school subject takes part at this process in two levels.

I level (mean). To study a subject with a good quality it is necessary to work with information effectively.

II level (aim). Teaching a subjects involves teaching certain kinds of informationally oriented activities.

Domination of the first level is specific for the humanities subjects. For the sciences and especially mathematics and computer science teaching learners the ability to work with information is one of the basic aims of the **schooling**.

So which kinds of activities, abilities should master the learner in order to adapt to dense informational environment (schooling, mass media and so on)?

One of the basic activities during the teaching of math, computer literacy, physics and other science subjects should be such universal kind of activity as mathematical modeling. Being powerful self-sufficient tool of cognition, mathematical modeling at the same time accumulates in itself the most important activities of applied nature. Among the most common kinds of activity could be mentioned **data analysis, comparison,**

measurement, interpretation, activity with symbols and characters, classification and others. Every of these kinds of activity itself can be elaborated with the less common activities. For example, ability to **measure quantity** implies the ability to **calculate approximately**, which can be concretized by the ability to **round numerical values with a fixed approximation**, **ability to evaluate** and so on.

All these kinds of activity (ability to work with data, with values, with information) should be included in educational process in all the stages. They concern almost every school subject and first of all mathematics and computer literacy.

Interesting can be the data, acquired as a result of a research of the level of possessing certain kinds of activity by the learners. Such a project is being carried out on a base of Center of Mathematical and Computer Education MIVT of Donetsk National University in Ukraine. Some schools of Donetsk city and region take part in the project. One of the aims of the research is measurement of level and dynamics of possession three particular kinds of activity connected with information: **creation (choice) of a mathematical model, data interpretation, interpretation of the results** by the learners of different age groups (13-17 years). The measurement has been held in a test form with closed type tasks. It was proposed to the learners to solve 25 tasks. The texts of the tasks have been completely the same for the learners of all the age categories. Solving each one of the tasks implied that the learner possesses one, two or all three of the skills named. For example:

Task #22. The information about **company's production** of the first quarter of the year has been put into the table. Which of the clauses is correct?

Table 1. Company's first three months sales results

Month	January	February	March
Production sales, €	1054240	1245450	1326130

A.   *Monthly sales' rate of growth has gone up*
B.   *Monthly sales' rate of growth has gone down*
C.   *Monthly sales' rate of growth has not changed*
D.   *It is impossible to say anything about monthly sales' rate of growth basing on the table's data*

In the text of this task there is only data of production sales. Information on sales' growth existence, and also on rate of sales growth the learner should get himself by the analysis and interpretation of the data. If the learner gives a correct answer for the task #22 it can be assumed that he can interpret data. Some of the tasks have been directed to two or three kinds of activity at the same time. In total test included 17 tasks to measure the level of possession on every of the mentioned kinds of activity. (The project is open, the research goes on. To take part in one of its phases or to get more detailed information on the results of the research please contact chief of the project via e-mail: mathed@ukr.net).

Chart 1. Distribution of the task solving results among the activity kinds and age groups.
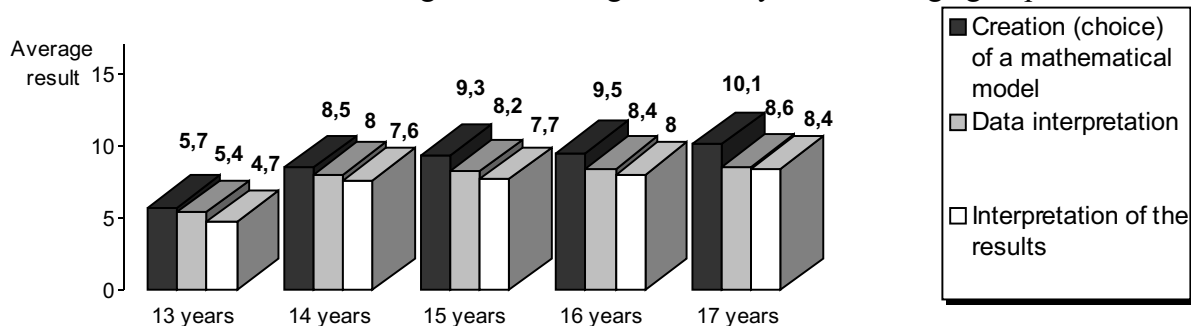
The chart shows that sufficient growth exists only between 13-14 years. ***This means, that fifteen, sixteen and seventeen years old learners can work with information almost on the level of fourteen years old.*** Alarming is the low average result of solving the tasks. Learners, getting knowledge at school every year in the form of accumulative information don't get the ability to work with information. The lack of learners' sufficient ability to work with information is a consequence of ignoring or incorrect interpretation of the activity approach in educational process, and also undue reaction of education to the demands of informationally developing society.

At the same time it is obvious, that there is no possibility to set aside or create standing alone schooling course teaching practical skills of knowledge application. Organization of every school subject's teaching should contain enough potential to realize this task. Concerning the informationally oriented activity such subjects should first of all become mathematics and computer literacy. Actual computer literacy programs in Ukraine aimed mostly to form the learners' skills of practical use of a computer. Mathematics programs aimed to the good level of theoretical knowledge of basics of the science. However, not less important is the formation in learners the activity kinds of a practical nature to work with information. It is necessary to remember that computers are only one of the means of information processing. Their purpose is connected mostly with large amounts of information processing. On the other hand, a learner should be able to cope with three numbers with no computer (for example, in task #22 only just a little more than 8% of 13-17 years old learners have marked the correct answer).

Taking the growing rate of *informatization* of the society into consideration, it is possible to assume that this side of mathematics and computer literacy education will be intensifying. Obviously, the task of filling the mathematics and computer literacy courses of secondary school with informationally oriented activity on both theoretical level and the level of educational means is relevant enough and waits to be solved.