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THE NETWORK OF THE INTERNET IN ADDRESSING RESEARCH CHALLENGES BY HIGH SCHOOL STUDENTS

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The abstract: The article deals with the components of senior high school students scientific potential, considers procedure of exploratory problems compilation which solution can be carried out by means of the Internet network, provides approaches for decreasing cognitive difficulties, which senior high school students come across in the context of the Internet network usage.

Keywords: the Internet network, senior high school students' scientific potential, educational and research culture, future profession research orientation, research problems

В статье представлены составляющие исследовательского потенциала старшеклассников, рассмотрены правила составления исследовательских задач, решение которых может быть осуществлено с помощью сети Интернет, предложены подходы к обеспечению снижения познавательных затруднений старшеклассников при решении исследовательских задач в условиях использования сети Интернет.

Ключевые слова: сеть Интернет, исследовательский потенциал старшеклассников, учебно-исследовательская культура, ориентация на исследование в будущей профессии, исследовательские задачи

Development of the innovative environment requires comprehensive school students to be trained for life in the conditions of rapid changes. It is evident that by means of the Internet network we can create conditions for making prompt decisions of research problems as it provides access to unlimited resources of knowledge, electronic libraries and museums, global newspapers and journals, scientific and creative laboratories, monuments of culture and the global latest news.

For an assessment of senior high school students' productivity of cognitive activity we developed criteria and indices of senior high school students' scientific potential development on the basis of the cultural approach, worked out computer diagnostic programs for carrying out its operative assessment. The senior high school students' scientific potential includes educational and

research culture components and future profession research orientation. Educational and research culture of the student's personality is a component of basic culture, its integrative characteristic defined by understanding of an integrated world image, scientific investigation skills and abilities, valuable attitude to the achieved outcomes which ensure both self-determination and creative self-development of educational and research culture. It expresses dominating properties of personality development, reflects universality of its connections with the environment, activates creative self-realization capabilities, determines informative activity effectiveness, promotes to application of scientific knowledge, abilities and skills in diverse fields of informative and practical activities. We defined the following criteria of educational and research culture: research motivation, scientific style of thinking, creative activity, technological readiness for investigation.

Considering future profession research orientation as senior high school students' ability to justify research value while exercising professional activity, we have determined its following components: an involvement degree in research activity; concern in exploratory research; concern in high school science. The degree of enumerated criteria manifestation enables to judge each criteria value and then define the development level of senior high school students' scientific potential.

The specified scientific potential components demand further development, the significance of which generates the task of purposeful and effective application of the Internet potential as all the Russian schools are current users of the network. While applying the Internet network, it is possible to train senior high school students to assess the magnitude of the gained data, to form valuable attitude to scientific search outcomes, to create conditions for involving students into productive search of new knowledge.

In the frames of the stated problem, we will consider research tasks as a means of senior high school students' scientific potential development. We distinguish a research task as an open response cognitive task for solution of which it is necessary to fulfill some additional non-routine open-ended cognitive tasks by means of heuristic methods and techniques (G.A.Ball). In addition to well-known methodically designed research tasks, we used the ones, worked on our own, basing on the contents of popular scientific texts.

The educational research tasks solving demanded finding of both a common solution mode of the whole range of partial tasks (a path from concrete to abstract), and usage of a common operation mode for solving partial tasks (a path from abstract to concrete), this corresponded to actual instruction practice concerning inductive and deductive approach in their interaction. We determined the research task complication by the quantity of concepts used for its solution and the amount of possible steps undertaken for its solution, the task complication was determined by the students' readiness (ability and intention) to solve it. Tasks typification allowed their attaching to

certain curricular subject units, to include them into the subject matter logically, to consider students' initial readiness to solve tasks, to draw up a cause-and-effect task system, to choose an appropriate instructional method.

The research task, set to a student, was a part of the task system in the context of a certain research problem. The research problem embraced a set of units of a certain subject, allowed to structure the students' research activity content.

According to the criteria and indices of senior high school students' scientific potential development, we worked out the guides which can be followed up during the process of setting research tasks, solution of which demands the Internet network usage:

- The task content should consider diverse students' interests, cover the curricular subject topic or have the integrated nature (intrasubject, intersubject).

- The task should have a level sensitive nature, and its fulfillment should involve students' technological readiness for its solution.

- The qualitative task should contain a contradiction; have a sufficient condition for its solving.

- Due to the necessity the task content can include the list of proper sites;

- The problem should provide various forms of work, including cooperation with other search participants.

- Task fulfillment time can differ due to complication, volume, contents, conditions of work (at a lesson, at home, at a lesson and education scientific society session, at a lesson and at home).

- Some reflexion staging points should be given in the task annotation (search analysis).

- The task fulfillment can be implemented both by means of theoretical and experimental research techniques.

- The task can have an incomplete condition that can assume its complition by means of the Internet network.

- The task can have a multivariate solving.

The research tasks used in our pedagogical experience have been focused on the findings of the concept significant properties, relations and ties between them; on acquaintance with the fact, specified in the theorem statement, verification, theoretical theses; on compilation of the converse theorem and its verification; on special cases selection of some general statements, on synthesis of different facts, problems; on classification of mathematical, natural-scientific, humanitarian objects, their interaction, on findings of major facts of the given scientific knowledge partition; on the proposal of a new task solution mode; on new problems compilation which stems from the solution data; on counterexamples construction etc.

A set of research tasks have been written by us with the help of semi-popular Network texts. The following task can be set as an example: «At the end of XIX century scientist Bernard Kurtua analyzed the situation which happened to him in the laboratory. There were two vessels in front of the scientist. One of them was filled in with a mixture of sulphuric acid with iron, the other with seaweeds infusion. On the scientist's shoulders, there was his dear cat. A sudden loud tap on the door frightened the cat. It leapt on the desktop and brushed the vessels of with its tail. The vessels were broken. The contents poured out. Resulting from a stormy chemical reaction there appeared a cloudlet. Soon it dispersed. The obtained stuff was iodine. 1.Recall and write down a laboratory mode of iodine preparation (acquaintance). 2.Give examples of scientific discoveries, which were done by chance (understanding). 3.Exercise the Kurtua's experiment (application). 4.Explain, why «a cloudlet» - gaseous iodine – turned into a crystal (analysis). 5.Suggest a mode of iodine obtaining without «a cat's help», in the school laboratory, using   bromine   water   and   …. (synthesis). 6.Estimate medical significance of iodine discovery (assessment) ».

While reviewing the possible research tasks relating to the lesson content and creating situations of their understanding, we showed students the Internet network potential for tasks solution. Within our research work context students mastered operating procedure with hypertext, modes of work with search engines, developed communicative skills while dealing with software products.

Taking into consideration difficulties, which students face during the research problem process, it is necessary to determine an «actual development zone» and a «proximal development zone» of students' scientific potential and to specify pedagogical support. It implies development of various instrumental-didactic means, which help students to assimilate information, to solve research tasks in accordance with the nature of difficulties (P.A.Orzhekovsky): information-performing, intellectual, personal.

In specialized classes of in-depth chemistry study the author of the article examined students' readiness for keywords compilation during the task solution process. Fulfillment of such work occurred to be important for students' eduction of cognitive difficulties, which can influence the outcomes of the Internet network search in the teaching situation environment.

For carrying out such activity, it is enough to ask students some questions of both reproductive and productive nature, which can be answered by using the keywords, and the system, which reflects students' intellectual operation. A reproductive question (for example, get across properties of any chemical substance) should be completed with some research task (for example: draw up a plan of some substance identification).

Due to the experiment, it was stated that basing on the students' answers a teacher can develop guidelines for the faster Internet network search paying special attention to the network

hyperlinks value, how it is important to use intellectual operation technologies and be aware of teaching material basic concepts.

Our Internet usage skills in research problems solution process revealed a 20-35 % increase in senior high school students' scientific potential components. The most evident development was gained by indices of research motivation and future profession research orientation.

References:

1. Makotrova, G.V. Educational and research culture of pupils [Text] G.V.Makotrova // Pedagogic. – 2007. – № 1. – P.47-52.

2. Makotrova, G.V. Development of senior high school students' value orientations by means of the Internet network [Text] / G.V. Makotrova // Informatics and education. – 2008. №8. – P.36-40.

3. Макотрова, G.V. Internet-technologies in creation of pupils' educational and research culture in classes of in-depth study [Text] / G.V. Makotrova: work-book for students of pedagogical specialties / under the editorship of Prof. I.F.Isaev. – Belgorod: Belgorod State University Publishing house, 2007. – 248 p.

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