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ANCHORING STUDENTS IN ACTION THROUGH INQUIRY-BASED LEARNING

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Abstract. The article highlights the student's position, as well as the student's mission in inquiry-based learning. Teaching science exclusively in the traditional consecrated form is not a sufficient condition to develop student's ability to ask unique questions to both themselves and their classmates. Teaching the sciences only in teacher-centered form implies a reduced dynamization of the student's activity in the educational process, compared to the dynamism acquired by students in inquiry-based learning. The impact to improve teaching process by developing the ability to ask questions and seek answers is discussed. The mechanism that can stimulate students' activities in the context of inquiry-based learning has been analyzed.

Keywords: *exploration, teaching strategy, motivation, Inquiry-Based Learning.*

Rezumat. Articolul evidențiază poziția studentului, precum și misiunea studentului în cadrul învățării bazate pe anchetă. Predarea științei exclusiv în forma consacrată tradițională nu este o condiție suficientă pentru dezvoltarea abilității elevului de a-și pune întrebări unice atât lui, cât și colegilor săi de clasă. Învățarea științelor numai în formă centrată pe profesor implică o dinamizare redusă a activității elevului în procesul educațional, comparativ cu dinamizarea dobândită de studenți în cadrul învățării bazate pe anchetă. Este discutat impactul asupra îmbunătățirii procesului de predare prin dezvoltarea capacității de a pune întrebări și de a căuta răspunsuri. A fost analizat mecanismul care poate stimula activitățile elevilor în contextul învățării bazate pe anchetă.

Cuvinte cheie: *explorare, strategie de predare, motivație, învățare bazată pe anchetă.*

Introduction

The evolution of the formative character of the educational process is part of national school interests. The real disciplines are constantly involved in this complex process. A good development of teaching-learning process is strongly determined by the responsible fulfillment of the characteristic tasks of the pre-university program.

To identify the learning techniques appropriate to the developmental needs of the students and to set them according to the appropriate study stage often consist a part of the difficult agenda of the educational system. However, seriously addressing this issue, as

well as diversifying the learning strategies used by teachers, one can support the teaching-learning process of science in school.

In the second paragraph, the particularities of Inquiry-Based Learning in relation to the traditional teaching-learning method are set out.

The third paragraph highlights the advantages of exploratory activities practiced by students to learn science in particular, while keeping with the curricular content, as well as the importance of these activities to develop their personalities.

The work ends with conclusions and references.

Inquiry-Based Learning – a constructive point of view

In the conditions of the present education, with the purpose of fulfilling the aims of the national school, it is natural for teacher to focus on the activization of the students. The activization of the students is equivalent to the stimulation of their interest to get to know new things and to the amplification of their extrinsic and intrinsic will to be involved in the educational process. The diversification of the learning strategies used by the teacher, which at the same time also suit the child's development needs, is a challenge in this sense. On the one hand, it is observed that the teacher-centered methods do not develop to a satisfactory extent the cognitive abilities of students. At the same time, there are a number of authors who support the idea that the responsibility of the learning process should be assigned to the student [1]. For instance, in Oguz's vision, "when the students participate in the learning process actively, their learning becomes meaningful and they can develop themselves in various respects" [2].

According to the traditional teaching methods, the teacher is usually the only provider of the information. The students revise information received from the teacher. In contrast, the Inquiry-Based Learning is more dynamic from this point of view. As active members involved in learning, the students have the opportunity to take part in a process by which they build perceptions about the world around them through lived experiences and reflection on it. Referring to the constructivist theory of learning, we can deduce that children develop as they ask questions and seek to identify solutions to the questions that concern them. In such a way, students "actively build knowledge, integrating new information and new experiences within what they had previously managed to understand, revising and reinterpreting the old knowledge to reconcile it with the new one" [3]. Under this aspect, Doolittle considers that: "Constructivism involves the active creation and modification of thoughts, ideas and understandings as the result of experiences that occur within socio-cultural contexts" [4]. The newly learned things are acquired through the discussions between them. The students are taught not in the ordinary way, but indirectly by the teacher. The students begin to synthesize, interpret and evaluate the information.

The next aspect refers to the role of the teacher in this method. During the Inquiry-Based Learning, the teacher acts as a facilitator in the circulation of the information, as well as in the correct understanding by the students of information content. And here comes into the foreground an effective content planning, done on the basis of the curriculum [5], planning that should be in line with children's own questions. In such a way, Bransford and coauthors found that "children are both problem solvers and problem generators: children attempt to solve problems presented to them, and they also seek novel challenges" [6]. The Inquiry-Based Learning method often uses a design of students' exploratory activities. The lesson usually starts with an open-ended question. The teacher will prompt the students to

discuss the question and to look for their own answers to that question. This action entails the fact that children provide their own resources and are encouraged to synthesize. At the next stage it is necessary to be presented and discussed what they have found out. These discussions are followed by the process of reflection. In this way, the initial conditions are exposed to the children so that they have the opportunity to engage with provocative intent in investigating the case.

At the secondary school level, it is appropriate to assure a real development of investigative skills of the students. The students model their perceptions about the world around them effectively by studying the sciences. As an example, for a better learning of thermal phenomenon, a direct investigation of this particular process can be proposed, and the teacher will specify the content and the limits of the operation. The mechanism through which the heat can circulate and transmit into the environment and between bodies also plays a role here. Instead of the standard teaching of thermal phenomenon, one can look for ways that will push the children to draw up their own design plan for the desired device. The teamwork can be a way in this direction. And here is the purpose for which they want to attract students.

Studying the energy properties through Inquiry-Based Learning

While studying the characteristics of heat transmission between bodies, respectively of energy in nature, one can come with an idea for the students to work in groups of four, to investigate these phenomena based on the fact that they will have two warm water bowls of the same temperature. In this case, the students should be informed in advance about their activity. Each team needs to obtain in one of the bowls the coolest possible water and at the same time to keep the water in the other bowl as warm as possible. The students know that they are given time to make their own work plan taking into account the announced provisions. In order to foster creativity, they have the right to develop absolutely any device. The limiting elements are presented here by the restriction on the use of flames, of human-made containers, and of tools such as fans, thermoses or lanterns. The aim is to start the process from a scratch, on a paper, without using the existing technology. Beyond this, a table is reserved on which all the necessary infrastructure for the activity is placed. The table should contain all kinds of useful objects, fragments of fabrics of different sizes, packaging from nuts, construction paper, pieces of foamy material, newspapers, bubble bags, cotton wool, old transparent foils, funnels, aluminum foil, zippered plastic bags, scissors, cord, glue, staples and anything else that can be considered as insulating material, as well as materials that would absorb radiation and others that would reflect radiation.

The students can be allowed to examine the materials and plan their cooling and heat retention devices. Then we will give them time for construction. When everything is ready, the bowls with water and the laboratory thermometers are provided.

The stage of construction follows the cooling procedure in the first bowl and at the same time maintaining the heat in the other bowl, which will start for all the teams at once. During this process, the teams will have to set the temperature values of the water from both bowls every five minutes. This stage is followed by a round of discussions and comparisons. At this point, each team is invited to explain what their own mechanism is made of, and to discuss how effective the device is in comparison with the results of the temperatures measured from the control bowls. It is necessary to compare this by drawing

your own temperature values near those of the control bowls. A useful task may also be to ask the students to identify possible common elements of their heat retention devices, and then for the cooling devices. This task is a potential topic for reflection. Also, at this time it is appropriate to offer the concept of heat transfer mechanism through conductivity, convection and radiation.

Conclusions

1. Learning through teacher-centered methods does not actually lead to an increase in student's cognitive abilities.
2. Teaching science exclusively in the traditional form is not a sufficient condition to develop the student's ability to ask unique questions to themselves and to their classmates. Learning sciences only in teacher-centered form implies a reduced dynamization of the student's activity in the educational process compared with the dynamization acquired by the students in the Inquiry-Based Learning.
3. The student's efforts that make them to ask questions condition his/her availability to look for an answer to the situation.
4. The more questions the student asks, the sooner he/she can identify his/her own answer or give a useful hint to his/her teammates.
5. Engaging students in an exploratory space increases the impact of science learning.

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