

Formation of Cognitive Interest in the Teaching of Chemistry and Environmental Protection in the First High School Stage of Secondary Education through the Use of Interactive Methods

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ABSTRACT

The article reveals the content of the concept of cognitive interest as well as the possibilities for its formation and development in the learning process through the usage of interactive methods. The formation and creation of a lasting cognitive interest in learning determined the purpose of the current pedagogical research: to develop models of lessons in chemistry and environmental protection in the first high school stage using specific interactive methods in order to increase students' interest in learning, knowledge in chemistry and interest in the subject.

Keywords: interactive methods, cognitive interest, education.

INTRODUCTION

In the 21st century, during the modernization of the secondary education in Bulgaria, it is necessary to apply a new model of teaching in high school, which will develop the student's personality, as well as will form and increase the level of cognitive interest, desire and ability to learn. Today, the education in the first high school stage of the secondary education should be aimed at the development of the cognitive interest of the student as a basis for his personal development, because it is in the process of the secondary education that basic learning skills are developed which is the main goal of lifelong learning. One of the criteria for the effectiveness

of the pedagogical process is the formation of a stable cognitive interest in students, which is one of the main problems of the modern school. All of the above significantly changes the tasks facing the modern teacher. It is important for them not just to pass on a certain amount of knowledge to the students. A much more important task is to teach them to navigate and adapt to the modern world, to search and find information, to quickly and effectively absorb innovations. In reality, this is achieved through the use of a variety of interactive methods that form in pedagogical practice and develop students' cognitive interest. From the results of the interview it can be concluded that students are interested in learning activities related to their training in chemistry and envi-

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ronmental protection, but prefer these activities to be enriched with projects, group training, case studies, games, i.e. training in which interactive methods predominate. All this stimulates students' interest in learning the subject, developing their cognitive interests, memory and thinking.

The aim of the research is to present the interactive methods as a means for formation and development of a cognitive interest in the students from the first high school stage in the education in chemistry and environmental protection.

Theoretical statement

The formation of cognitive interest in students in the first stage of secondary education is an important part of the modern pedagogy. Before analyzing the concept of "cognitive interest", a profile of the concept of "interest" must be made. In the pedagogical-psychological literature a number of definitions of the concept are presented: "Relatively permanent orientation of the subject to certain objects and phenomena in the world, which is expressed in regular, systematic and rhythmic concentration of attention and cognitive aspiration", [1] and "Such a concentration of thoughts on a particular object, which provokes a desire to get to know the object better" as well as "A powerful stimulator of the activity of an individual, under the influence of which all mental processes are particularly intensified, and activity becomes fascinating and productive", [2].

Cognitive interest is especially important for the formation of positive motivation for learning. It is characterized as a complex attitude of the student towards objects and phenomena, which expresses his/her desire for serious and in-depth study and knowledge of their essential properties [1].

Having cognitive interest lets one activate not only the cognitive process, but also every other brain activity. The interest is usually selective with respect to the various activities.

Cognition is a brain activity aimed at studying our reality. Cognitive activity is a means of satisfying cognitive needs. In order to have

cognitive activity, it is necessary to create a cognitive interest. Cognitive interest appears only after the environment is organized to satisfy the cognitive needs, meaning, to be diverse, new, interesting, emotional, etc. In this situation, cognitive interest arises, which activates and stimulates cognitive activity. Cognitive activity includes: needs → cognitive interest → cognitive activity → cognitive development [3]. Broad cognitive interest provokes more cognitive activity, which contributes to the development of the student. In order to develop cognitive interest, it is necessary to use education and training as factors for organizing the environment. According to Shtukina, the stages of the development of interest are:

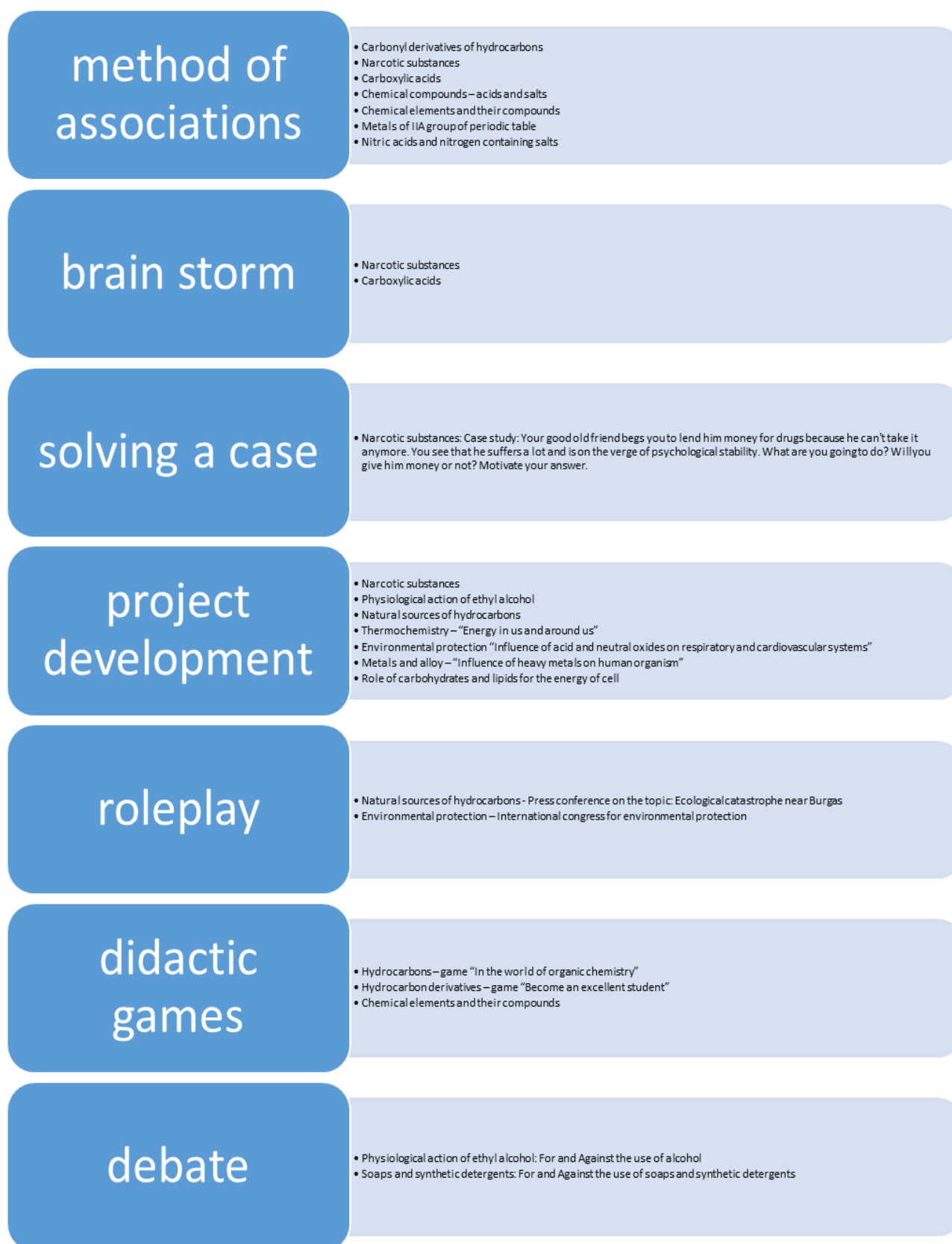
- curiosity - an elementary stage of orientation;
- entertainment - striving to go beyond the visible. Emotions, amusement and the joy of knowledge are essential. When it becomes a character trait, it affects the personality.
- cognitive interest - its most common feature is getting to know the causal relationships. Students should not be focused so much on the study material, but on the activity is the question. Interest becomes a starting point for curiosity, in the pursuit of finding evidence, seeking additional sources of information, interpreting and modeling [2].

Psychologists identified the essential features of the concept of "cognitive interest", namely:

- a complex attitude of the student to the objects and phenomena of the environment;
- a striving towards a serious, deep study of the essential features of objects and phenomena;
- a powerful stimulator for activity.

In pedagogical practice we use several basic approaches for the formation and development of cognitive interests in students - historical, environmental, research, problematic and effective. For example, the historical approach is especially suitable for eighth and ninth grade students.

They can independently study historical facts related to the discovery of various inorganic and



Scheme 1. Models of interactive lessons.

organic compounds, as well as biographies of notable scientists with significant contributions to the creation of structural theory, chemical bond theory, discovery of the structural formula of benzene, protein structure, esterification process, etc. Tenth graders can independently study historical facts related to discovery of various chemical elements, as well as biographies of notable scientists with substantial contribution to the development of ideas in thermochemistry, chemical kinetics and catalysis; solutions of electrolytes and non-electrolytes and the processes taking place in them, etc.

The use of various interactive methods gives results with the formation of cognitive interest in students: the method of associations, which is related to content - analysis and development of intellectual maps; role-playing and didactic games; debating; project development; discussions; brainstorming, etc.

RESULTS AND DISCUSSION

Currently, the curriculum of Chemistry and Environmental Protection classes in the first stage of the secondary education is grouped into several global topics: Structure of matter, Properties of metals and their compounds, Properties of non-metals and their compounds, Environmental protection, Carbon and its inorganic compounds, Quantities and dependencies, Hydrocarbons, Hydrocarbon derivatives, Organic substances in nature and in practice, Characteristics of chemical processes, Solutions and chemical reactions in aqueous solution, Classification of chemical processes and substances, Applied aspects of chemistry in the field of materials.

In order to create and develop cognitive interest in students we used a system of interactive methods that are applicable in each stage of the macrostructure of the lesson in accordance with our goals.

Pedagogical research was conducted within two school years (2018/2019 and 2019/2020) with 185 students from MG "Dr. Petar Beron"

Varna, who study Chemistry and Environmental Protection under the new curriculum and acquire their secondary education at the end of 10th grade (first high school stage). For the realization of the goal of the empirical research in the school year of 2018/2019 an analysis of the content of the curriculum of Chemistry and Environmental Protection for the 9th and 10th grade was made. From this analysis the possibilities for the usage of interactive methods in the separate methodological units were determined. Models of interactive lessons were developed and tested during the experiment (Scheme 1).

The attitude and cognitive interest of students in the subject of Chemistry and Environmental Protection in the first high school stage of the secondary education and the application of interactive methods in education were assessed using a standardized interview. A standardized interview was held with students from MG "Dr. Petar Beron" in Varna at the end of the 2019/2020 school year, in order to determine their attitude and interest in the subject of Chemistry and Environmental Protection after the purposeful work during these two years. Questions were read aloud by a researcher. The interview contained 6 questions with two specific answers (yes, no), but also with the possibility of extended answers. 185 tenth graders attended this interview. It was held in groups, the researcher read the questions and students answered. All this led to the collection of more extensive information about each individual student, as he/she could be asked at least two additional questions, which in turn revealed the most significant, emotional and behavioral manifestations during the study. The results of the standardized interview show that 78 % of tenth grade students declare a positive answer to Question No 1: "Do you like the subject of Chemistry and Environmental Protection?" (Fig. 1).

To Question No 2 "Are you interested in Chemistry and Environmental Protection classes?", 81% of students gave a positive answer.

For example:

Do you like the subject of chemistry
and environmental protection?

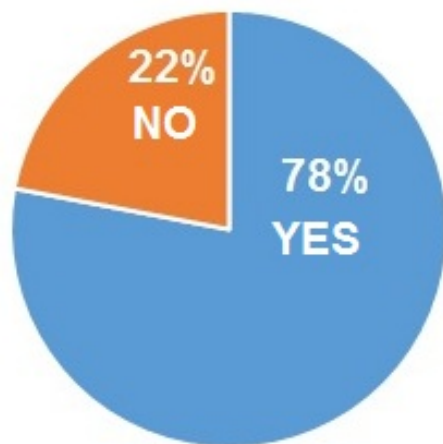


Fig. 1. Distribution of answers of Question No 1: “Do you like the subject of Chemistry and Environmental Protection?”

Are you interested in chemistry
and environmental protection classes?

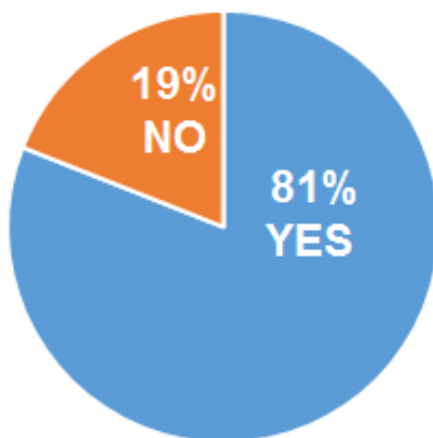


Fig. 2. Distribution of answers of Question No 2: “Are you interested in Chemistry and Environmental Protection classes?”

M.S. (a student from class 10th “b”) answered very clearly: “I love Chemistry and Environmental Protection classes because they are interesting and I have the opportunity for personal expression through my work on assigned tasks.”;

D.N. (a student from class 10th “g”): “It is interesting because the teacher uses different fun games in the learning process, we work on projects and solve different cases.” 19 % shared

the opinion that they are not interested.

To Question No 3 “Do you find it difficult to perceive and understand the curriculum of Chemistry and Environmental Protection?” very few of the students - 11%, answered “yes”, 89 % answered “no” to the question.

Question No 4 “Do you feel at ease during Chemistry and Environmental Protection classes?” was intended to provoke students to

Do you find it difficult to perceive
and understand the curriculum of Chemistry
and environmental protection?

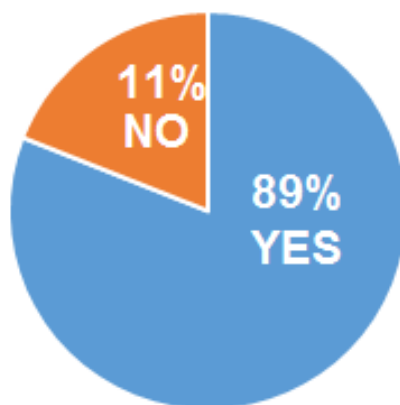


Fig. 3. Distribution of answers of Question No 3: “Do you find it difficult to perceive and understand the curriculum of Chemistry and Environmental Protection?”

Do you feel at ease during Chemistry
and environmental protection classes?

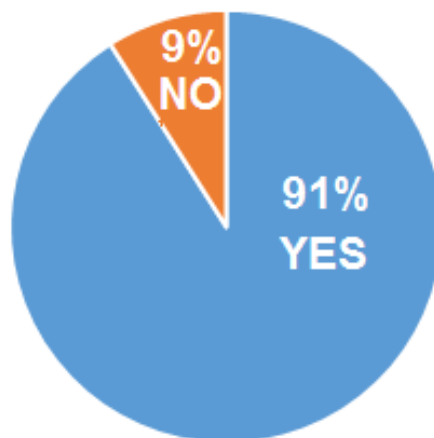


Fig. 4. Distribution of answers of Question No 4: “Do you feel at ease during Chemistry and Environmental Protection classes?”

share how they feel during these classes, whether they feel anxiety, restlessness, insecurity or fear. 91% of students gave a positive answer, meaning they do not feel anxious, which is due to the applied interactive methods, which form a positive interest in the subject, a fun and interesting learning environment in which they

feel calm and confident. Only 9 % of them gave a negative answer to the question.

To the fifth question “Do interactive methods spark your interest in the subject of Chemistry and Environmental Protection?” 181 students gave a positive answer and only 3 gave a negative answer. And to the last question from

Do interactive methods spark your interest
in the subject of chemistry and
environmental protection?

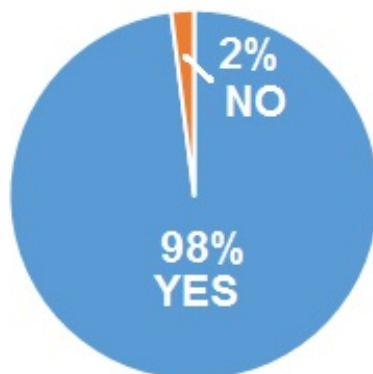


Fig. 5. Distribution of answers of Question No 5: “Do interactive methods spark your interest in the subject of Chemistry and Environmental Protection?”

the standardized interview “Do interactive methods and approaches help you in mastering the curriculum of the subject?” 100 % of the students gave a positive answer.

CONCLUSIONS

From the results of the interview it can be concluded that students are interested in learning activities related to their studies in chemistry and environmental protection, but prefer these activities to be enriched with projects, case studies, games, learning, which is dominated by interactive methods and group learning. All this stimulates students’ interest in learning the subject, develops their cognitive interest, memory and thinking.

It should be noted that interactive methods contribute to the social development of students, which is evident from their answers, their desire to work together, to learn in a more interesting and attractive way, which directly affects their development and needs. In conclusion, the use of interactive methods as a pedagogical tool enriches, develops and improves the learning environment, as well as the teaching process

during Chemistry and Environmental Protection classes.

The interesting combination of traditional and interactive teaching methods provide intensive interaction between the participants in the training, produce interest and positive attitude to knowledge and develop a number of social, intellectual and practical skills in students. This method successfully combines communication and activity.

The results of the standardized interview with the surveyed students from MG “Dr. Petar Beron” Varna show unequivocally that the inclusion of interactive methods in teaching chemistry and environmental protection in the first stage of secondary education provides a pleasant and successful course of education, guarantees the acquisition of knowledge and skills, as well as the formation and development of cognitive interest in the subject.

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