

THE USE OF INTERACTIVE METHODS IN ECOLOGICAL AND HEALTH EDUCATION OF 8TH GRADE STUDENTS IN THE SUBJECT OF BIOLOGY AND HEALTH EDUCATION

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Abstract – The aim of the present study is to look into the effectiveness of applying certain interactive methods in teaching 8th grade students in the subject Biology and Health Education. The object of study is the process of teaching in Biology and Health Education lessons in Hristo Botev comprehensive school in the town of Kubrat. The subject of study are the interactive methods (case study, incident, associations, mind mapping, brainstorming and simulation) used in the lessons in Biology and Health Education for the ecological and health education of 8th grade students. The study was conducted in Hristo Botev comprehensive school in the town of Kubrat, Razgrad region in 2011/2012 academic year. The topics included: Hygiene and Respiratory System, Hygiene and Nervous System, The Role of Man in Nature. The article presents illustrated fragments of methodological models of lessons with the use of interactive teaching methods. The results of the study are presented both qualitatively and quantitatively. A survey was conducted among the students aimed at collecting their opinions on the interactive methods used in teaching the abovementioned topics. The conclusions are based on the obtained empirical results.

The study is a practical contribution to biology didactics in terms of using interactive methods for improving students' ecological and health education.

Keywords – Interactive methods; Ecological and health education; Educational process; Students; Biology and health education

I. INTRODUCTION

Ecological and health education are among the priorities of the Bulgarian educational system. The teaching of Natural Sciences and Ecology gives students an overall idea of nature in its entirety and diversity, and provides them with knowledge, skills and attitudes related to ecology, nature preservation, sustainable development and healthcare. The school subject Biology and Health Education raises students' awareness of biodiversity and the application of this knowledge, the importance of healthy lifestyle and the norms of behaviour in natural environment.

Biology teachers should be familiar with the modern trends in didactics in order to be successful in their teaching, which in turn will result in firmly established environmental and health awareness in their students.

The teacher as a manager of educational process has to have knowledge of the effect of different teaching methods on students' learning, in order to select those which can unlock students' creative potential and initiative, improve their interpersonal skills and achievements in a particular situation. It is common to combine some traditional methods, such as lecture, discussion and observation, which have proved successful in teaching, with interactive methods, e.g. brainstorming, associations, mind mapping, role play, etc.

II. RESEARCH METHODOLOGY

The aim of the present study is to investigate the possibility of applying some interactive methods in teaching

and study their effectiveness for the ecological and health education of 8th grade students who study Biology and Health Education as an obligatory school subject.

The aim of the study is realized through the following tasks:

1. Theoretical analysis of scientific and methodological literature regarding the aims and tasks of ecological and health education and its effect on the structure of the subject matter and the teaching process in Biology and Health Education in the 8th grade; the nature and the methodology of using interactive methods in teaching Biology.
2. Analysis of the subject matter for the 8th grade in the subject Biology and Health Education with respect to its potential for ecological and health education of students.
3. Preparing detailed teaching scenarios for different topics from the curriculum, which are relevant to the aim of the study.
4. Organization, execution, analysis and evaluation of the results of the pedagogical experiment.

Object of the study: the process of teaching Biology and Health Education to 8th grade students at Hristo Botev comprehensive school in the town of Kubrat, Bulgaria.

Subject of the study: interactive methods for ecological and health education in teaching Biology and Health Education in the 8th grade.

Research methods: theoretical analysis, observation, test tasks for measuring knowledge, skills and habits,

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mathematical models for processing and evaluating results; methods for graphic representation of results.

The study was carried out in Hristo Botev comprehensive school in the town of Kubrat, Razgrad municipality, during 2011/2012 school year and covered the following topics from the curriculum: Hygiene and Knowledge of the Nerve System, The Role of Man in Nature, as presented in the course book in Biology and Health Education for the 8th grade, published by "Bulvest 2000" publishing house, Sofia, 2009.

III.RESULTS AND DISCUSSION

Aims and tasks of ecological and health education

Ecological education is an organized aim-oriented process of education and self-education resulting from this process. It develops student's personality: getting to know and controlling their needs and emotions, skills and habits, building up motivation, responsibility and capability of ecological behaviour. Ecological culture, ecological awareness and ecological ethics regulate the ecological behaviour. It is realized through one's deeds and actions aimed at protecting nature and one's own health [1].

Discussing the aims of ecological education in secondary school, Vakleva emphasizes the necessity to think of ecological education as a part of educational process in general, and as a basis for creating a new lifestyle necessary for the survival of humankind [2].

Biological education is of paramount importance for the ecological education of students

The introduction of State Educational Requirements for the subject matter in different subjects allows for creating tools for evaluating the effectiveness of the educational process and measuring the extent to which its overall aims and the aims of ecological education are achieved [1]. It is important that teachers work towards the achievement of the aims stated in the State Educational Requirements regarding decision making and developing students' ecological competencies based on their knowledge about nature and environment protection.

Health education is concerned with students acquiring knowledge about different aspects of health, healthy way of life, sexual relations, drugs, and the individual and social consequences of taking drugs and other types or high-risk behaviour in general. This knowledge will foster a positive attitude towards students' health, healthy way of life, individualized, informed and responsible choice students have to make in different real-life situations, which pose various health hazards. Healthy way of life entails adaptive and positive behaviour which allows different individuals to cope effectively with the requirements and challenges of everyday life.

Health education is the process of conscious and motivated attitudes to one's health, a process which has to be carefully planned in correspondence with students' psycho-physiological age-related and personal traits.

The national curriculum for the subject of Biology is based on the premises of unity of human physical and mental health.

These premises are realized in the process of education.

Ecological and health aspects of the subject matter in the school subject Biology and Health Education for 8th grade

The subject matter in the school subject Biology and Health Education for 8th grade provides opportunities for ecological and health education which emphasize:

1. acquiring knowledge about the human being as part of the organic world and as a biological and social individual;
2. learning a system of concepts related to the structures in human body, functions of organs and systems, hygiene rules of behaviour and a healthy way of life;
3. developing skills for analyzing connections and interrelations between a healthy state of the body and the rules of prophylaxis, as well as evaluating hygiene habits as part of civilized behaviour;
4. acquiring knowledge about the interrelations between organisms in nature, the circle of substances, and the adaptation of organisms to the environment as a result of the evolution;
5. realizing the importance of human beings for the environment and giving arguments for their responsibility for disturbing ecological balance and providing environment protection.

The integration of subject-specific knowledge and practical skills allows for applying them in a variety of real-life situations, which informs students' attitudes to their role and responsibility towards nature and society.

Using interactive methods for ecological and health education in teaching Biology and Health Education to 8th grade students

Teaching methods are the ways to achieve the aims of education. They are characterised by organisation and activities, and define classroom dynamics, reveal teacher's unique teaching style, and demonstrate the interrelation between teacher and students in the process of their interaction.

According to Evtimova [3] interactive methods appeal to students because of:

- their practical aspect of studying and active involvement of students;
- the new understanding of the role of the teacher in education - from main provider of knowledge to a moderator in the learning process;
- the changed structure of communication between teacher and students in the lesson, which is now decentralized.

The aims of ecological and health education can be met through different interactive methods: brainstorming, associations, making mind maps, project work, situational methods (case studies, incidents), role plays, games and modeling, etc., which can be combined with traditional methods of education. Our study uses topics from the syllabus in the subject Biology and Health Education for 8th grade, which lend themselves to a variety of interactive methods in combination with traditional methods, which are suitable for this subject matter and the needs of the particular students. The article presents only some fragments of the methodological design of lessons, which illustrate didactic aspects of the used interactive methods.

A fragment of the methodological design of the lesson on the topic of Hygiene and Health Aspects of the Respiratory System, with the use of the interactive methods Case study, Associations and Mind Mapping, and Brainstorming

At the introductory stage of the lesson the students have to work on the following situation: In the season flu epidemic your elder sister spends a several hours a day in a cafe where people smoke. Your parents do not approve of her behaviour as they think it is related to health hazards, but she responds that the cafe is the place where she meets her friends, so she can't be told what to do and will keep going there.

1. Can you think of potential health risks your sister's behaviour poses to her respiratory system and her organism as a whole?
2. If you were a parent, what arguments would you use to prevent your daughter from going out during a flu epidemic?
3. Can you justify the fact that quite frequently people have respiratory problems?

Students work in groups of 4 or 5. When the task time is over each group announces their decision through their spokesperson. A general discussion is held with the whole class which leads to a final decision.

The use of associations method channels students' thinking towards the stage of exploring the new subject matter. Then they are given 3 minutes to list as many factors as they can which affect our respiratory organs. After a group discussion, followed by a whole-class discussion, the teacher writes the topic Factors Affecting Respiratory Organs on the board, and the topic is consequently used to make associations and prepare a mind map (fig. 1).

The factors affecting respiratory system are elicited through brainstorming, in answer to the question: Why are smokers by 20% more prone to respiratory infections? Why do these people frequently suffer from viruses and cancers of the respiratory tract? Using their knowledge of the structure of respiratory organs, students make suggestions, which might involve reasons such as: cell damage, decreased breathing surface, undermined immunity, etc.

A fragment of the methodological design of the lesson on the topic of Hygiene and Health Aspects of the Nervous System with the use of the interactive methods Brainstorming and Mind Mapping, and Incident

Brainstorming is used for the partial consolidation of the knowledge about factors and hygiene rules supporting the normal functioning of the nervous system. The teacher poses the following problem: What can improve the exam results or the public performance of young people who experience extreme anxiety or insecurity? Several options are given as prompts: 1. daily routine, 2. physical activity and nutrition, 3. hereditary factors and health, 4. puberty and bad habits.

Each of the 4 groups has the task to discuss the problem in one of its aspects. The list of the ideas suggested by each group is in fact the strategy for solving the problem. Each group presents its strategy, and after that there is a discussion among all groups which results in a common list of solutions for each of the aspects of the problem (the list is called a General strategy prepared through positive thinking; focused studying, physical activity, proper nutrition, quitting bad

habits, such as alcohol consumption, smoking and passive smoking, avoiding stuffy and noisy places, drug prevention, healthy way of life, controlled use of medication, awareness of toxic substances near one's hometown or area, or other ecological hazards, alternating physical and mental exercise, being in a routine, being knowledgeable about infectious diseases which affect the nervous system; mental work corresponding to a person's capacity, etc.).

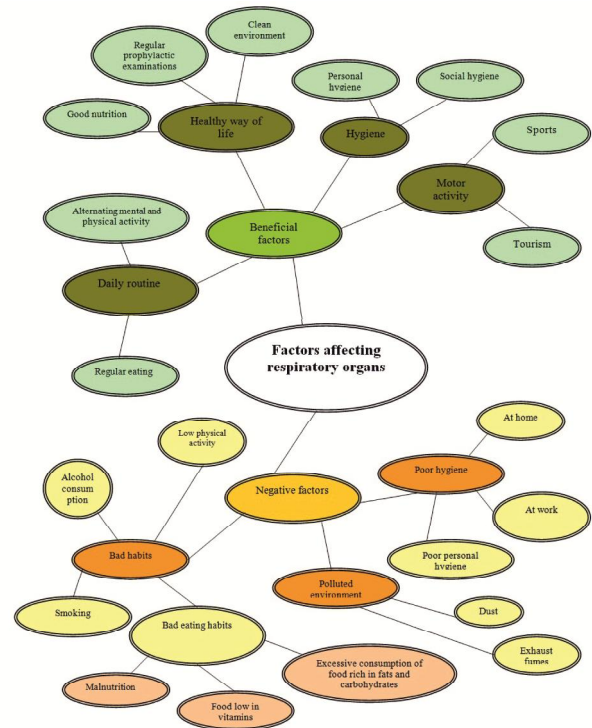


Fig. 1. Mind map of the notion "Factors Affecting Respiratory Organs".

The suggestions come as a result of students' radiant thinking and help the teacher to assess the orderliness and hierarchy in students' knowledge.

The proposed solutions are used to create a mind map with a central notion of Psycho-hygiene (fig. 2).

At the stage of consolidation of newly-acquired knowledge we suggest using the interactive method Incident. Students work on the following situation:

Two girls from Plovdiv ruined their Christmas party. 16-year-old Eleonora and Hristina secretly smuggled and drank a bottle of home-made brandy in a cafe. After a while both girls felt sick, and Eleonora fainted. She had a slowed heart rate, low temperature and slowed breathing. Their friends gathered around them wondering what was going on. The patrolling policemen asked if the girl had drunk alcohol and called the emergency.

1. What caused the girl's condition?
2. If you had been present at that party, what would you have done to help her?
3. What would you advise your peers who do things like that?

Each group discusses the questions and their opinions are reported by the spokesperson for the group, after which a

whole-class discussion is held. As a result of this discussion, the answers are summarized as follows: 1. alcohol intoxication; 2. first aid measure include: induced vomiting, drinking liquids, breathing fresh air, and most important - contacting a doctor; 3. alcohol is a strong poison which kills nervous cells; therefore it should not be consumed by children; alcohol consumption may cause euphoria and behavioural changes, which in turn can lead to making wrong

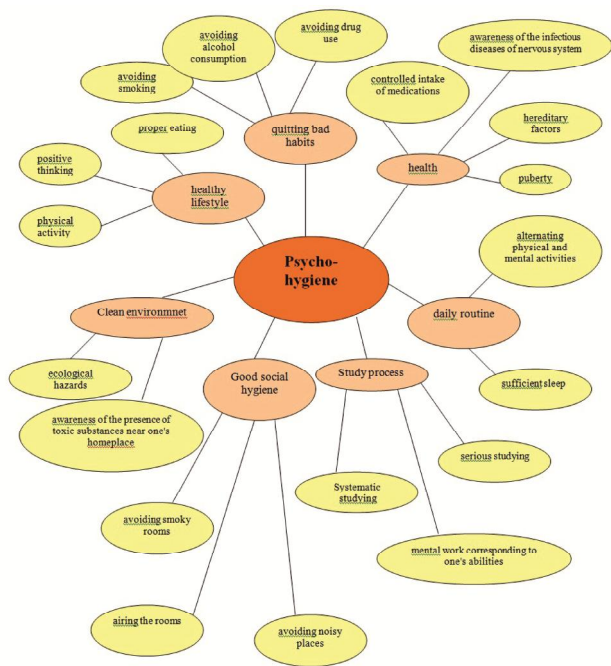


Fig. 2. Mind map of the notion “Psycho-hygiene”.

decisions with undesired consequences.

After all suggestions are discussed, a conclusion is reached that being aware of the factors affecting our nervous system, we can protect our health and avoid hazardous situations. Proper development and functioning of the nervous system depends on having a healthy way of life - good nutrition, physical activity, positive attitude to studying, discouraging bad habits, such as smoking, alcohol consumption and drugs.

A fragment of the methodological design of the lesson on the topic of The Role of Human in Nature with the use of the interactive Methods of Associations and Mind-Mapping and Simulation

The method of associations is used for consolidating students' knowledge about the harmful effects of human activity. Students are given the following task: For about 2 minutes write in your notebooks examples of manifestation of the anthropogenic effect on the environment in your area. Anthropogenic effect is a key notion (core notion) for creating an associations cloud.

The lesson ends with a game-like simulation used for developing students skills in correct expression of ideas and effective and tolerant communication. Each group assumes the role of an editorial board, which takes part in competition organised by the Students' council in the school. The aim is to

prepare a brochure for the school initiative *Energy. Let's save it!* Three student are the panel board which has to chose the winner in the competition for the best brochure. The criteria, agreed on after a discussion, and announced by the head of the panel board, involve:

1. Appropriate symbol of the initiative.
2. Convincing arguments for joining the campaign.
3. Brief and precise wording of the text.
4. Correct use of ecological and biological terminology.

The time for work is 15 minutes. Each group receives sheets of paper and colour pencils. After the groups finish work, the panel board chooses the winner by using all abovementioned criteria. The most important criteria (as recommended by the teacher) are the correct use of terminology and the weigh or arguments for joining the initiative. Each group receives points (4 criteria by 15 point makes 60 points maximum altogether). The extent to which the requirements are met form the result and the place the participants take in the competition (fig. 3).

Energy. Let's save it!



1. Use re-usable or biodegradable bags!
2. Collect home refuse for recycling!
3. Use energy-saving bulbs and high-class electrical appliances!
4. In winter reduce the temperature in your home by at least 1 degree!
5. If you can reach a destination on foot, don't use your car!
6. Plant a tree!

Fig. 3. Project of the brochure for the school initiative “Energy. Let's save it!”.

The results of the study are processed both qualitatively in quantitatively. Qualitative processing is done through measuring students' participation during the lesson, the quality of their responses and their ability to draw and formulate conclusions. Quantitative processing is done through testing conducted in classes which follow the experimental lessons. The tasks aim to assess the degree of learning the key concepts, the amount of the acquired knowledge and the skills for transferring and applying this knowledge to new contexts. The didactic test involves tasks which test the level of the acquired knowledge according to the respective syllabus. A survey was conducted with the

purpose of establishing students' attitudes to the problems discussed in the lessons.

Table 1 presents the results of the students involved in the pedagogical research.

Table 1. The results of the students involved in the pedagogical research

Student №	Test 1 results	Test 2 results	Test 3 results	Average results from the tests	Yearly results
1.	5	6	5	5,33	5
2.	4	5	5	4,67	3
3.	4	4	5	4,33	5
4.	6	6	5	5,67	6
5.	4	5	5	4,67	5
6.	5	5	5	5,00	5
7.	3	3	4	3,33	4
8.	4	6	6	5,33	5
9.	4	5	5	4,67	4
10.	4	4	5	4,33	3
11.	5	5	5	5,00	5
12.	4	5	4	4,33	4
13.	4	5	4	4,33	4
14.	4	5	4	4,33	4
15.	4	6	6	5,33	5
16.	5	6	5	5,33	6
17.	4	5	4	4,33	5
18.	4	5	4	4,33	5
19.	5	5	5	5,00	5
20.	4	3	5	4,00	4
21.	6	6	5	5,67	5
22.	4	4	5	4,33	4
23.	4	6	5	5,00	5
Average results of the class	4,35	5,00	4,83	4,72	4,61

Figure 4 shows the comparison between students' test results and their overall results over the year.

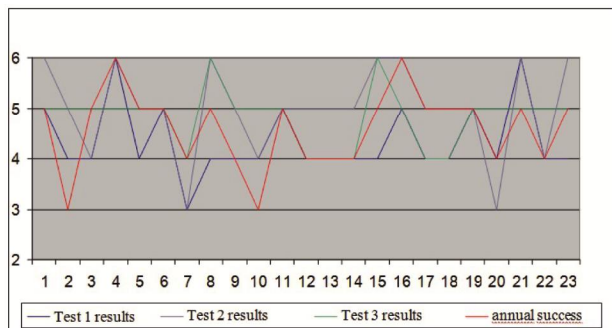


Fig. 4. The comparison between students' test results and their overall results over the year.

The results of the tests conducted after the experimental lessons show the positive effect of the interactive methods used in the experiment on students' overall achievement.

A survey was conducted at the end of the school year to investigate students' opinions on the use of interactive methods in the experimental lessons.

The survey revealed that 83% of the students liked the methods, and 75% thought that they improved their understanding of subject matter. Some of the students - 13% - had difficulties in doing the task by applying the interactive methods. For 70% of the students using the new methods increased their interest in this school subject, and 7% improved their communicative and argumentative skills. Almost all students - 96%, said that they would like to continue using the interactive methods in their lessons.

IV. SUMMARY AND CONCLUSIONS

Conducted experiments and their results allow us to draw the following conclusions:

1. The subject matter for the 8th grade in the subject Biology and Health Education lends itself to using interactive methods of education, which in the described experimental scenarios involve: brainstorming, associations, mind-mapping, case study, incident and game simulations. The use of interactive methods at different stages of the lesson macrostructure in combination with traditional methods, leads to better results and achievements of students, a fact which is supported by the results in presented tables and diagrams.

2. Group work, typical of interactive methods, develops essential student competences: communicative skills, argumentative skills, working out and applying an algorithm, abiding by rules, etc.

3. The survey with the students leads us to the conclusion that the use of interactive methods in teaching Biology and Health Education in 8th grade does not only facilitate the learning of the new material, but also increases students' interest in the subject, which is a prerequisite for improving students' achievements.

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