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An example didactic model for learning in an interactive environment

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Abstract: *The current report presents the developed by us example didactic model for learning Chemistry and Environmental Protection. The model is deduced on the basis of theoretical research and a conducted pedagogical experiment with students from 9th grade of the High School of Mathematics "Dr Petar Beron", Varna.*

Keywords: *interactive educational environment, interactive methods and forms*

Introduction

The competency-based education approach for organization of the educational process, laid down in the *Pre-school and School Education Act* and the *State Educational Standards*, presupposes fundamental changes in the organization of the educational process, its management, and the roles of the subjects participating in it. The main goal of the training becomes not the absorption of a specific amount of knowledge by students but the acquisition of skills that will allow them to set their own objectives, to show independence, creativity and initiative, and to be able to apply what they have learned from class in both typical and unusual situations.

The role of the teacher also changes. He or she ceases to be a primary source of knowledge. His or her main task becomes to motivate students to master new approaches to learning and action, to organize and consult about their independent activities, in the course of which they realize their own interests and abilities and, as a result, form and develop essential key competencies.

Everything said so far can be successfully realized in an interactive educational environment with the use of interactive technologies.

The present report aims to exhibit an illustrative model of learning in an interactive environment developed by us. The model is deduced on the basis of theoretical research and a conducted pedagogical experiment. The study focuses on the invariant model of an interactive lesson in teaching the school subject Chemistry and Environmental Protection.

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Theoretical statement

The interactive educational environment is „a way to organize the environment and interpersonal relationships on the principles of child-centred learning." [1]

D. Todorina points out that „the interactive educational environment is established in the educational space in accordance with the current educational trends: an outgrowth of the impact on the personality on a subject-object basis into a subject-subject interaction; shifting the centre of gravity from giving knowledge in a pre-prepared form to its self-mastery through new knowledge, new activity, new communication; a new culture of learning through a new theory of the subject based on multifaceted contacts with the environment and inclusion in the unity of the products and mechanisms of thinking and activity." [3]

More significant characteristics of the interactive educational environment refer to „changing the roles of the trainer and the trainees; increased activity of learners, incl. through group/teamwork; the role of the intermediary (when available) as facilitating and supporting the school work; interactive work methods and techniques (based on interaction); specific organization of time and space – arrangement of different activities in a logical sequence; for individual work, work in pairs and groups; positive, supportive and stimulating microclimate (interpersonal relationships); permanent feedback". [2, 3]

The interactive educational environment presupposes the highest degree of use of interactive teaching methods.

There is no uniform definition and classification of interactive methods in the pedagogical literature. Based on the studied interpretations and our own pedagogical experience, during the pedagogical experiment, we have created and used the following definition of interactive methods:

Interactive methods are a system of rules and procedures for the acquisition of knowledge and the formation of skills/competencies, which are characterized by:

- communication not only between a teacher and a student but also between students themselves;
- cooperation and mutual assistance;
- open communication;
- development of critical thinking and independence in students;
- the active role of the student;
- encouraging cognitive interests and student motivation.

Discussion

The pedagogical model developed and applied by us includes learning objectives, incoming diagnostics to establish the attitude of students to the school subject and learning with interactive methods, selection of learning content, methods and forms for the realization of teaching in an interactive environment, organizing and conducting training in an interactive educational environment (Structure of the interactive lesson), expected learning outcomes, and final diagnostics to establish the achieved results.

The structure of the model and the relationships between its individual components are presented in Figure 1.

The main goal we set with the implementation of learning in an interactive environment is to create such conditions in which a student can discover, acquire and construct knowledge, discern his or her success and intellectual development, which makes the educational process more productive.

In order to achieve the ultimate goal, a specific set of tasks should be solved:

- development of lesson fragments and methodological units with the application of interactive technologies and their approbation in school practice;
- involvement of students in the learning process to master new learning material not as passive listeners but as active participants;
- development of cognitive interests in the process of independent acquisition of knowledge with the help of various sources of information;
- building skills for teamwork in solving tasks;
- development of skills for working with information and communication technologies (ICT) in processing, delivering and presenting the results of cognitive and practical activities;
- creating psychological and pedagogical conditions for the development of initiative, creativity, striving for self-improvement.

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- purposeful and systematic work for the formation of students' key competencies, enshrined in the *European Qualifications Framework* (EQF) and the *Pre-school and School Education Act* (PSA);
- diagnostics of the results of the implemented training in an interactive environment

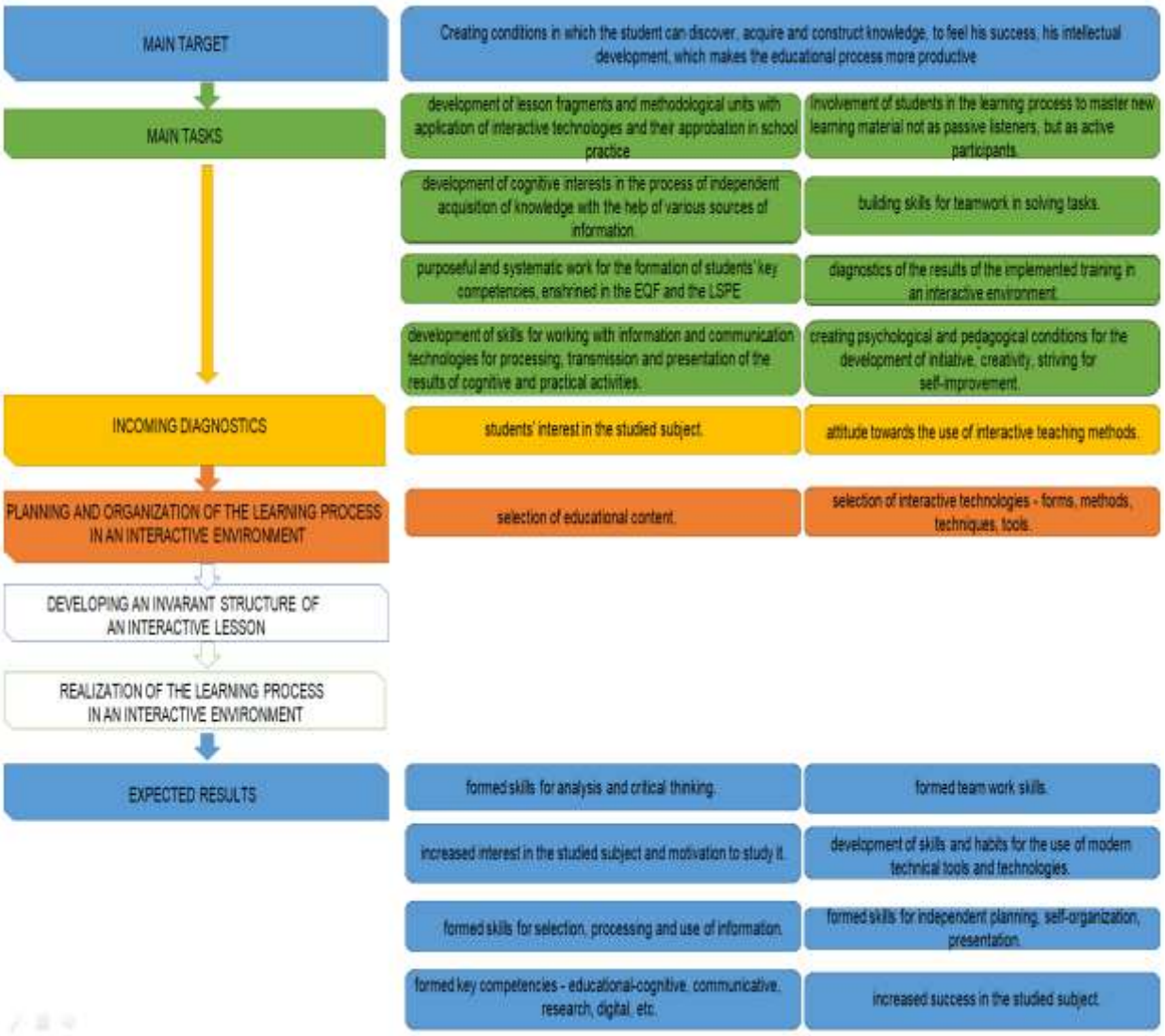

Figure 1. Example model of a realization of training in an interactive educational environment

The incoming diagnostics aims to establish the attitude of the students to the learning process, the interest in the school subject and the motivation for studying it, as well as the need to employ interactive methods in the lesson activity. A survey and oral interview with 106 students from 9th grade of the High School of Mathematics „Dr Petar Beron“, who participated in the pedagogical experiment, showed that 79% of respondents enjoy working in an interactive educational environment and that stimulates their motivation to study the school subject. The planning and organization of training in an interactive environment include:

- selection of methodological units for the implementation of interactive learning (determined by the specific learning content)
- research and selection of interactive methods, techniques and tools suitable for the selected learning content;
- preparation of the educational space (creation of conditions favourable for dialogue and active independent work in the classroom);
- building student motivation and readiness for teamwork in the learning process;
- planning situations that encourage students to combine efforts to solve a task;

- development of communication rules;
- determining the duration of each stage of the lesson;
- development of assessment criteria of the products devised in the group and individual activities within the interactive lesson.

The selection of learning content and interactive technologies for its acquisition is determined by the specifics of the particular methodological unit. Illustrative interactive methods and techniques – applicable in the individual stages of the lesson – are proposed in the displayed invariant model of the interactive lesson. Its structure was developed and used by us during the course of the pedagogical experiment. The proposed methods and techniques are exemplifying; their utilization in every lesson is not mandatory.

Table 1. Illustrative didactic structure of a lesson in an interactive environment

Lesson stage	**Didactic Tasks**	**Interactive methods and techniques**	**Additional Notes**
1st stage **Knowledge Update**	Organizing students for work; updating and consolidating the knowledge needed to achieve the objectives of the lesson.	Interactive techniques: • The three, four, five important things; • Lightning; • Avalanche; Game methods: • Chemical dominoes; • Chemical bingo; • Chain; • Find the mistake, etc.	The interest and desire to participate in the work of the class can be provoked at the stage of updating. For this purpose, it is necessary to repeat old knowledge with the help of game methods and techniques. In this way, in a shorter time, basic knowledge that students have can be checked to assess what difficulties they may encounter in mastering the new learning content and whether they are ready to work purposefully in an interactive environment.
2nd stage **Student Motivation**	Capturing the student's attention and awakening interest in studying the discussed topic.	• Interactive technique "I know, I want to know, I learned"; • Solving a puzzle or riddle; • Brainstorming; • Acting out sketches; • Reading excerpts from books or articles, etc.	Motivation should be closely related to the topic of the lesson. Thus, students adjust psychologically to perceiving new learning content and solving problems. Students must have a personal interest in what is being studied. Without motivation, no effective learning process can be achieved. Various methods can be used to create problematic situations that awaken interest in the content and motivate students. To fulfil their initial purpose, interactive techniques need to be diversified in different lessons.
3rd stage **Announcing the topic and goals of the lesson**	Deliberation on the objectives and the expected results of the lesson by the students.	• Problematic question or appropriate thought; • Interactive technique "Expectation"; • Exclusion brainstorming; • Searching for information; • Solving a puzzle or anagram, etc.	Cooperation between students and teachers at this stage is accomplished by the teacher guidance so as to help students formulate the objectives of the lesson. After introducing the topic with the help of appropriate interactive technology, the teacher can encourage students to express their suggestions about what they expect to learn, how and why they need it. The teacher writes students' expectations on the whiteboard, and afterwards, taking into account the suggestions, he or she informs the class of the specific didactic goals.
4th stage **Organization**	Organizing workgroups and providing necessary information	• Presentation; • Short story; • Case studies; • Handouts; • Forming groups	The teacher explains the stages of the forthcoming work, briefs the students on the results presentation format and the assessment criteria. He or she divides the students into groups, allocates team members to roles and provides

	for task completion.	with the help of game methods – solving a puzzle, composing a text by keywords, etc.	the students with time to get acquainted with the given handouts.
5th stage **Acquisition of new learning content**	Mastering the provided knowledge and skills and developing key competencies.	• Press conference; • Role-play; • Debate; • Didactic game; • Method of associations; • Discussion; • Project work; • Situation analysis, etc.	The main stage of the lesson involves the use of 1 to 3 interactive technologies, depending on the learning content and the expected results. Students work in groups and discuss the role of each participant in the completion of the whole task; they, likewise, observe the correct execution of their partners' separate tasks. Thus, teams need to do two main tasks simultaneously: - Academic – achieving cognitive and creative goals. - Socio-psychological – implementing a particular culture of communication. The teacher must supervise both the success of the assignment and the communication and cooperation. He is an organizer, assistant, discussion leader, and a consultant.
6th stage **Results presentation and evaluation**	Formation of skills for presenting results from theoretical research and practical activities.	• Essay • Presentation • Game • Physical model • Collage • Figure • Poster, etc.	The presentation of the results depends on the nature of the performed activity and students' creativity. When setting the tasks, the teacher should acquaint the groups with the assessment criteria. In summary, the criteria can reward abilities to gather information, as well as interpretation and presentation skills, depending on the particular performed activities and the expected results. Assessment is a powerful motivating component of the interactive lesson and must be flexible, impartial and fair. Depending on the goal and the chosen criteria, various assessment strategies (methods, techniques) can be chosen. The most commonly used assessment method in interactive lessons is scoring and team assessment. Assessed elements can be the following: participation (motivation, readiness for work), creativity, ability to analyze, present and support opinions, etc.
7th stage **Reflection**	Summary and analysis of achieved results.	• Discussion; • Decision tree; • Avalanche; • SWOT-analysis; • Interactive technique "I know, I want to know, I learned".	Summarizing is an essential part of the interactive lesson. It should be organized in a way that allows students to understand the nature and the significance of what they have done, to compare the expected results with the real ones, to consolidate or update their knowledge, and to formulate conclusions. Through summarizing, new topics for discussion can be delineated and a plan for further action can be prepared. Reflection provides students with the opportunity to deliberate on what they have

			learned, to assess their own level of understanding the new material, and to outline actions for further progress. In addition, it allows them to evaluate the organization of the training and form an opinion about it. Reflection helps the teacher to ascertain students' attitudes towards learning and to make the necessary adjustments.

Conclusions

Training in an interactive environment is conducted with a pre-set goal. Therefore, after its completion, students are expected to achieve specific results. In the illustrative didactic model, the outcomes can be summarized; further enrichment and concretization of the results could be conducted in the real organization of the learning process in an interactive environment. The following are the results that we expect the students to achieve after the implementation of the developed model in the course of training:

- developed skills for analysis and critical thinking;
- increased interest in the school subject and motivation for studying it;
- developed skills for teamwork;
- developed skills for information selection, processing and utilization;
- further development of skills and habits for using modern technical means and technologies;
- developed skills for independent planning, self-organization, presentation;
- developed key competencies - cognitive, communicative, research, digital, etc.
- an increased success rate in the particular school subject.

The final diagnosis aims to evaluate the results of the proposed training model application and to contribute to its improvement. The results obtained so far show that 73% of students prefer to use interactive teaching methods in Chemistry and Environmental Protection classes.

As a result of the conducted pedagogical experiment, we came to the following conclusions:

Interactive learning requires a complete change in the principles of classwork, as well as significant preparation time for both students and teachers. It is necessary to start with the step-by-step inclusion of elements of this model, gradually reaching its full deployment.

For the effective use of interactive learning, without compromising the logic of the learning process and its quality, the following should be taken into account:

- to conduct an attentive selection of topics for work in an interactive environment, considering the nature of learning content, the capabilities of students, and the necessary means to complete the tasks;
- to set the students tasks for preliminary preparation in order to be able to fulfil all planned activities within the lesson;
- to provide students with time to think about the task so that they consider it seriously, not taking it mechanically or "playing" to complete it;
- to employ up to three interactive technologies during the main stage of mastering new knowledge in one lesson, and not all their diversity.

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