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Abstracts

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C1. Current challenges in the training of Chemistry teachers

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The jubilee edition of the National Methodical Scientific Session "Methods and means of teaching in Chemistry MMIC" (MMIC) allows us to reminder some moments that marked the complex process of improving methods and adapting teaching aids, with priority necessary for teaching-learning of Chemistry in high school education. Representative titles and ideas of some works are reviewed by identifying the chain of ideas that are linked with those moments.

A selection of authors and their communications is discussed chronologically for the 2013-2018 period (chosen by comparison with other periods of the same duration after 1990). Historically, The MMIC Conferences began in 1972, being jointly organized by the Faculty of Physics and the Faculty of Chemistry until 1990, even after 1974, when the Faculty of Chemistry from "Alexandru Ioan Cuza" University became a part of the Iasi Polytechnic Institute (today "Gheorghe Asachi" Technical University of Iasi) till 1990. In 2020-2021 pandemic period, the event was not organized in 2020, and the following year it took place on-line.

The selection of moments and ideas aims to capitalize on a higher level the pedagogical conclusions regarding the curriculum, didactic design, didactic methodology, school assessment, etc., in order to connect them to the ideas and opinions that will be presented in the coming editions of MMIC conference.

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C2. Use of open educational resources in the Chemistry study in gymnasium

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Contemporary society assigns to the education a new structure of the social-human requirements. Thus, the school has the role of forming the human personality able to integrate in society, to react adequately to the changes that occur. This implies the education efficiency and its transformation from a passive beneficiary into an active agent of progress, which must prepare the person according to the exigencies of the future society. In chemistry lessons a central place is occupied by methods of reality exploration and those based on practical action. Contemporary information technologies are used to develop the active training process. An example is the virtual laboratories which model the behavior of different substances from the real world in a computerized system, but these open educational resources (OER) allow people to gain knowledge and skills in the chemistry field.

The paper presents the results obtained by the 8th grade students at the "Substitution Reactions" learning unit when they used both real and virtual experiments. A design model of the learning unit, the teaching worksheet, the test applied at the end of 2nd semester and statistical interpretation of the test results by comparison with the initial test marks are presented.

The design and achieving an educational information environment oriented only towards a digital training cannot replace the real chemical experiment. The use of digital technologies in the student training process allows the teacher to achieve the proposed objectives, but good results will be obtained using the combination of the two experiment types. The laboratory experiment and the virtual experiment are two learning methods which can be successfully combined with other teaching methods to help students to better understanding of certain notions of chemistry, which are otherwise more difficult to understand.

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C3. Interactive methods used in water study

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"A student is not a vessel to be filled, but a flame to be kindled."

By teaching method, it understands the way that both the teacher and the student must follow in the common activity of information and training, in order to achieve the proposed objectives at a high level of performance. In traditional didactics, the teaching functions is a purpose in itself and involves the transmission of knowledge by the teacher to the students, without being correlated with learning and assessment. Modern education considers teaching as a component of the educational process. Because the lecture is not exactly to the student delight, in the modern conception the teaching is a set of operations that the teacher undertakes to ensure an optimal organization and development of the instructive-educational process. Whatever the methods they prefer, students should be active when they are on the knowledge path. In the active-participatory methods, the simply idea of providing knowledge to the student is given up, the student being in the center of the instructive-educational process, taking control of their own learning and are encouraged to be creative and enterprising. Among many advantages of these methods, it can be mentioned that the exchange of ideas and knowledge are promoted, communication, creativity, independence in thinking and action are developed and, also, helps student to make correct decisions and to argue them.

When students working in groups, they depend on each other in achievement of work tasks. In this case, they become more involved in the learning process and share with other their experiences compared to frontal or individual approaches.

To fix and consolidate the notions studied by 7th grade students at the "Water in nature" lesson, we used several active-participatory methods, including: the bunch method, the Venn diagram, the tree of ideas, collaborative learning. During the lesson students prepared aqueous solutions of different concentrations, solved work tasks with different degrees of difficulty, collaborated for the preparation of the materials necessary to make a model that illustrates the water circuit in nature. The students also learned how to use laboratory utensils correctly, learned to weigh substances, to measure volumes of water, to apply the calculation formulas learned in the lesson "Percentage concentration".

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C4. Statistic considerations regarding school results in the framework of Organic Chemistry

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In the current context, the most efficient method of knowledge verification is assessment. In this paper, it was analyzed and interpreted statistically the results obtained at the evaluation of the learning unit „Carbonilic compounds" for four student groups: 11th grade, Natural Sciences profile, Neamț, Romania; 11th grade, Real Sciences profile, Nisporeni, Republic of Moldova; 11th grade, Real Sciences profile, and 12th grade, Humanistic profile, Taraclia, Republic of Moldova, respectively. The assessment consisted in a written test and an essay for the humanistic profile. In our study, we considered the students' options regarding the baccalaureate exam in chemistry and their intention to participate in school competitions.

The results were interpreted using type t-tests or ANOVA unifactorial analyzes.

The final results show that there are no significant statistical differences between the grades obtained by the students participating in this research (three locations and two countries). Although the number of subjects in the samples was not large, the conclusions showed the connection between the profile followed by the students and their concern for the Chemistry discipline.

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C5. Students' vision on "Chemistry" and some optionals related to Chemistry for a better integration in academical environment and work market

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A key word in pedagogy is curriculum. Two important key concepts about curriculum are "student-centered curriculum" and "curriculum development" (centered on the development process). The curriculum is divided into two parts: the common trunk (C.T.) and the curriculum at the school's decision (C.S.D.). C.T. means all the fundamental knowledge, capacities and competences necessary for the training of individuals and C.S.D. is characterized by educational freedom and curricular flexibility for educators and students as a result of capitalizing on national and international experiences. Over time, the development of the theory of the school curriculum has led to the outlining of a system of principles for curriculum development that can be divided into four categories: those that refer to the curriculum ensemble, to the learning activity, to the teaching activity and those that refer to the evaluation activity. Therefore, the Maslow theory of needs highlights each individual's needs and proposes new solutions and paradigms in the field.

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C6. Performance on two fronts

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Performance descriptors are used to increase the objectivity and accuracy of the evaluation. They follow the activities and performance of the students. These descriptors are a way of assess actual results. Since they are standard benchmarks, performance descriptors achieve uniformity of assessment conditions more than the variety of conditions under which education is carried out. In order to achieve performance, a student needs of creativity.

Formative assessment has a strong learning-boosting effect compared to other forms of assessment which automatically leads to a substantial increase in students' school performance. The main aspect of formative assessment consists in the constant evaluation of the students belonging to a class through an evaluation built according to the educational objectives provided for each lesson or group of lessons.

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C7. Chemistry - between modern and traditional, virtual and real

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The paper presents the results obtained from the application and comparison the modern methods - student-centered teaching-learning methods and classical ones. A comparative analysis of the use of virtual experiments versus real experiments was also performed. The objectives of the research were to increase the level of learning of students as well as to develop motivation and interest for the Chemistry discipline.

The research was carried out on a group of 19 students from the 8th grade of “Ion Creanga” Gymnasium School from Targu Frumos as the experimental group, at which modern methods were used, centered on student and a control group consisting of 6 students from the 8th grade of the "Moldova" Special High School, Targu Frumos. The teaching activity at control group was traditionally carried out, the student being guided by the teacher.

The special needs schools from inclusive and integrated special education focus all activities on the student with a different disability (locomotor, mental, sensory or associated). The learning and teaching processes are correlated with the recovery-compensatory therapy, the goal being socio-professional integration of children. Therapy process was focused on improving or stimulating both cognitive and socio-emotional characteristics. In the case of special education students, at the combination of traditional methods with student-centered methods, must take into account the type and degree of deficiency, the rate of learning, the understand and abstraction capacities, especially in the case students with amblyopia from the control group. They succeed to observe, analyze and even perform chemical experiments

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C8. Learning Chemistry in nature by scientific research projects

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We are going through a different period from everything we have encountered so far, including in education. The events of the last 2 years and, especially, the way they were presented created fear, uncertainty, insecurity for tomorrow, feelings felt by both teachers and students. The "Online School" challenge has somehow covered all the problems faced by education that is not adapted to the rapid changes in science and technology and cannot compete with the cerebral overexcitation offered by electronic devices, new gaming addictions and social media or to information access at "a click away". In this general drift, the motivation of students to learn chemistry, and not only, has decreased dramatically among many students.

An attempt to form a positive attitude towards learning chemistry and science in general is the "Scientific Research Project in Nature". We started from the premise that a positive attitude will increase students' interest in chemistry and then, implicitly, they will accumulate the necessary knowledge and skills, acquiring the skills that contribute to the formation of the student profile, as proposed by the new approach to student-centered education skills.

The exploration, investigation, data interpretation, consequences evaluation are the key words of the new educational approach and we consider that the research project in the natural environment meets these requirements.

The project was an extracurricular activity. We explored a specific place to our area - the pond or the peat bog, we visited it, explored it and took samples of peat, water, plants (dew of the sky - carnivorous plant) and moss for experimental study. Individually, in the laboratory students were study the peat (density, absorbent character - humidity, adsorbent character, electrical conductivity, pH, combustion), determined the pH of the water from the marsh and the peat, observed the feeding behaviors of the Dew of the Sky, created an ecosystem in a jar, etc. The project was attended by both gymnasium and 9th and 10th high school grades students.

The impact of the project was quantitatively evaluated and compared to the class activity activities in terms of knowledge, skills and attitudes, respectively the chemistry skills of students. The success of the project among students has led to its multiplication and amplification, becoming an integrated learning model at 3600.

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C9. On-line learning during the pandemic unit

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The pandemic caused by coronavirus has fundamentally changed us, affecting all areas of activity. For months, schools and universities have closed their doors, and on-line courses have become the new normal. It was a real challenge for both teachers and students.

Despite the difficulties, the educators discovered that this experience also has a positive side, changing the way they teach and assess. The paper presents the advantages and disadvantages of on-line learning during the pandemic.

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C10. Designing a teaching strategy at the "Compound Substances" topic

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The didactic strategies suppose the combination of all the elements of the instructive-educational process in real conditions, a way of combining and organizing chronologically the set of methods and means chosen to achieve the proposed objectives.

Most often, the teaching strategy combines learning tasks with learning situations, being a complex and coherent system of means, methods, materials and other educational resources, organized frontally, in groups or individually. It is necessary in any pedagogical act, occupying a central place in the teaching activity. The design and organization of the lesson is done according to the strategic decision of the teacher as a complex teaching scenario, in which the actors of teaching - learning, conditions of achievement, objectives and methods are involved. Thus, the strategy foreshadows the most appropriate, most logical and most efficient methodical route for approaching a concrete teaching and learning situation. On this way, strategic design can prevent errors, risks and unwanted events in teaching. The strategy is not to be confused with the teaching method or methodology, because the latter aim at a teaching-learning-assessment activity, while the strategy aims at the training process as a whole and not a training sequence.

The paper presents the way in which the didactic strategy was developed for a lesson to solve exercises and problems of the 7th grade, on the topic "Compound Substances".

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C11. Digital evaluation tools in inclusive education

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The issue of modern contemporary education is diversifying step by step and the innovative approaches are self-evident. Inclusive education is a part of this pedagogical renewal process. The combined efforts of schools belonging to different cultures pursue the same goal: the refinement of human quality in the individual - society relationship. Interdisciplinarity is the keystone in the dialectic of the formation and structuring of this educational approach.

The discernment takeover of digital tools, the exchange of experience between decision makers and educational actors, the approach with openness and skill of some aspects that seemed unapproachable will make it possible to overcome the shyness of the beginning, ending by creating an optimistic-inclusive and constructive climate.

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