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# PECULIARITIES OF PROFESSIONAL TRAINING OF FUTURE BIOLOGY TEACHERS IN SLOVENIA AND ROMANIA

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## INTRODUCTION

In the context of the reform of higher education in Ukraine, it is necessary to review carefully the content of vocational training of pedagogical personnel, taking into account the experience of other countries in this area. According to M. Barber and M. Murshed, "the reform of education is one of the main tasks of almost all countries", the quality of school education is based on the quality of the work of teachers at school[1]. The fact that the teacher organizes the pedagogical process as a methodologically correct one depends not only on the level of student achievement, but it also influences on the development of their cognitive interests, the choice of the future profession and so on.

With this in view, it is expedient to study the domestic and foreign experience of methodical training of future biology teachers and introduction of the best achievements in higher educational institutions of Ukraine.

In the conditions of higher education integration of Ukraine into the European educational space, introduction of new requirements for the quality of training for future specialists in accordance with the provisions of the Bologna Convention will be useful to get acquainted with the current state of methodological training of future biology teachers in the countries of the European Union, to use their progressive experience in the educational process of domestic higher education institutions[2].

In view of the above, we consider that it is expedient to analyze the peculiarities of the future biology teachers training in the Republic of Slovenia and Romania. Different aspects of professional training of teachers in Slovenia and Romania were studied by T. Desiatov, T. Kristopchuk, N. Melnyk, S. Sapozhnikov, O. Tovkanets and others. However, the professional training of natural science teachers at Slovenian and Romanian universities has not been studied in detail by Ukrainian scholars.

[1] Барбер М., Муршед М. Как добиться стабильно высокого качества обучения в школах. Уроки анализа лучших систем школьного образования мира / пер. с англ. *Вопросы образования*. 2008. № 3. С. 7–60.

[2] Грицай Н.Б. Теорія і практика методичної підготовки майбутніх учителів біології : монографія. Рівне : О. Зень, 2016. 440 с.

*The purpose of the article*: to analyze the peculiarities of the professional training of future biology teachers in the universities of Slovenia and Romania.

**1. Training of future biology teachers at the University of Ljubljana**

The first university in Ljubljana was opened in Slovenia in 1919. After it, universities were established in Maribor (1975), Koper (2001) and Nova Gorica (2006). There are 3 state universities in the Republic of Slovenia today (Ljubljana, Mariborsky, Primorsky) and 1 private – Nova Goritsy University. In these institutions of higher education, a special attention is paid to natural sciences, in particular biological (bio-cybernetics, biodiversity, biochemistry, molecular biology, biotechnology, etc.).

In the largest state university – Ljubljansky (Univerza v Ljubljani), the Faculty of Pedagogy specializing in "Two Subjects Teachers" prepares teachers for two subjects, such as: biology-chemistry, biology-physics, biology-households and other.

The students study for 4 years (240 credits ECTS) according to the program of the first degree studying. The training program is aimed at the training of primary and secondary school teachers who acquire basic knowledge, skills and abilities in two subject areas that are important for education in this subject area, special didactic knowledge from the two selected educational objects, as well as practical pedagogical training. The curriculum consists of three main groups of disciplines: 1) general education; 2) biological disciplines; 3) disciplines from the chosen second subject (chemistry, physics). The graduate acquires the basic skills of pedagogical, psychological, philosophical and sociological sciences, which are essential for work in the field of education.

The biological cycle includes: general zoology, general botany, basic principles of invertebrate zoology, microbiology, human anatomy, didactics of biology, systematics of botany, biochemistry, genetics, phytophysiology, zoology(physical aspect), ecology, human biology, evolution, higher nervous activity and disciplines for choice (cell biology, embryology of vertebrate animals, marine ecology, surface water ecology, neurobiology, ecological changes and nature conservation, flora and fauna of Slovenia, plants and humans, toxic organisms, living organisms in biological science and education, microbiology-at school.

The mastery of these disciplines is based on modern pedagogical techniques supported by the use of information and communication technologies and they envisage active activity of students(pupils), for example, through experimental work in the laboratory, preparation of individual speeches, group and project work, e-learning, etc.

The discipline "Didactics of Biology" is taught during I–IV courses (2, 3, 5, 8 semesters), which provides 19 credits, which include: 90 hours of

lectures, 15 hours of seminars, 15 hours of practical classes, 60 hours of laboratory work, 45 hours of practical training, 60 hours of pedagogical practice and 285 hours of individual work. In addition, the courses "Didactics with the basics of ICT", "Pedagogical methodology" are also interesting. A student must complete a second degree program – a magistracy, where the teaching of such disciplines of methodological direction as "Selected sections of Biology with didactics" ("Izbrana poglavja biologije z didaktiko"), "Extracurricular classes on Biology" ("Pouk biologije izven šole" – in other words, "Teaching Biology outside the school") and "Ecological Education" ("Okoljsko izobraževanje") for working and teaching in gymnasium.

Gregor Torkar and Jelka Strgar teach the Didactics of Biology and methodologically oriented disciplines. G. Torkar conducts scientific researches in the field of environmental education, education for sustainable development, nature conservation, he also studies the attitude of future teachers to nature, the role of a teacher in nature conservation, the influence of teacher's values on educational and educational work, which is based on nature conservation[3]. J. Stargar explores the problems of increasing the students' interest in biology, the motivation of educational and cognitive activity, as well as the methodology for studying the cell cycle, the properties of living systems, in particular the breathing of organisms and other related topics in secondary school[4].

At the Biotechnical Faculty of the University of Ljubljana, biology teachers are trained according to Master's program for a second-degree "Biological Education" ("Biološko izobraževanje").

Masters are trained on the basis of the first degree of "Bachelor" on the specialty "Biology". The preparation program of bachelors in Biology lasts for 3 years (6 semesters) in the amount of 180 hours and it involves the study of such disciplines:

The first course: *1 semester* – microbiology, cell biology and histology, general chemistry, selected questions of mathematics, physics and a discipline by choice; *2 semester* – workshop on microbiology, general botany, general zoology, human anatomy, organic chemistry;

The second course: *3 semester* – biochemistry, genetics, invertebrate zoology, biodiversity of vertebrate and a discipline by choice; *4 semester* – systematic of botany, genetics, comparative anatomy of vertebrates, field

[3] Torkar G. Vplivi učiteljevih vrednot na njegovo vzgojno izobraževalno delovanje na področju varstva narave: doktorska disertacija. Ljubljana : Univerza v Ljubljani, 2006. 206 s.

[4] Strgar J. Motivacija obiskovalcev kot izhodišče za pedagoško delo v Botaničnem vrtu Univerze v Ljubljani : doktorska disertacija. Ljubljana : Univerza v Ljubljani, 1998. 296 s.

researches on botany and zoology and a discipline by choice. Sports education as a compulsory activity in the first year is carried out in the form of exercises in the amount of 60 hours.

III course: *5 semester* – bioinformatics, animal physiology in combination with a workshop, statistics, human biology and a discipline by choice; *6 semester* – ethology, evolution, plant physiology, ecology and a discipline by choice.

The faculty offers the following selective disciplines: mycology, geology with paleontology, applied genetics, toxicology, practice on environmental protection, introduction to the relationship between organisms, beekeeping, project work.

Studying at Master's level lasts for two years and amounts to 120 credits[5].

The purpose of the training program is to educate a biologically and pedagogically highly skilled and motivated biology teacher who will respond to the challenges of teaching biology in gymnasia, as well as secondary technical and vocational schools.

After graduating from the magistracy, the graduate receives the qualification "Master of Biology Teacher" (abbreviated as mag. prof. biol.).

A pedagogical work in schools, in the centers of school and extracurricular activities, in museums and other similar institutions that require a high level of professional biological knowledge and, at the same time, pedagogical qualifications is the main opportunity for employment of graduates of the given curriculum. The corresponding biological and pedagogical education of graduates of the curriculum also includes an employment in the publishing house (publishing textbooks, manuals, popular science journals and other professional literature), as well as with other manufacturers of teaching materials and tools.

The curriculum of the magistracy on specialty «Biological Education» provides the studying of the following disciplines:

The first course: *1 semester* – didactics of biology, functional cell biology, ecosystemology, psychology of learning and teaching and pedagogical discipline by choice ("Methodology of pedagogical research" or "Philosophical and sociological aspects of learning"); *2 semester* – didactics of biology, biological practice for a teacher, pedagogy with andragogy, didactics, pedagogical practice and a selective discipline;

The second year: *3 semester* – didactics of biology, genetics of eukaryotes, human physiology and discipline by choice; *4 semester* – pedagogical practice and writing a research work on Master's degree.

[5] Univerza v Ljubljani. URL: https://www.uni-lj.si/studij/studijski_ programi/ dodiplomski_in_enoviti_magistrski_programi/.

Students for Master's degree are offered to choose the following disciplines:

– pedagogical – "Organisms in the study of biology", "Talent and creativity at school";

– biological – "The fundamentals of theoretical and systematic biology", "Applied genetics", "Plant growth and development", "Ecology of inland waters", "Ecological changes and nature conservation";

– a broad professional choice – "Fundamentals of forestry" and "Technologies for agricultural crops production".

During 1–3 semesters, the methodologists Elka Stargar (Jelka Strgar) and Iztok Tomashich (Iztok Tomažič) for biology students conduct the course of the main discipline of methodological direction – "Didactics of Biology", which consists of 16 credits: 105 hours of lectures, 45 hours of seminars, 65 hours of laboratory lessons, 15 hours of field work, 250 hours of individual work.

The main questions of the course: the importance and use of living organisms in the study of biology (the cultivation and care of living beings in an artificial environment, the development of a positive attitude to living beings, safety rules and ethical standards in the use of living organisms in the learning process); forms of educational work; basic methods and techniques of educational work; means of training (textbooks and workbooks on biology, audiovisual means, information and communication technologies (ICT) in biology education); curriculum and programs in biology; the basics of the educational process construction (annual and thematic planning, classification and taxonomy of knowledge relevant for the school space (Benjamin Bloom, Robert Marzano and Grant Wiggins), adaptation of the content of education to the target group of students); realization of the educational process (usage of the corresponding forms and methods of work, management of the educational process in different situations and at different levels of education); evaluation of the educational process (methods of training evaluation, verification and evaluation of knowledge, self-evaluation); methods of laboratory works, biological experiment and field work conducting; pedagogical researches; school documentation; education system in Slovenia and foreign countries.

Methods for evaluating academic achievement of students: written examination, colloquium, seminar, portfolio, testing.

Over their course of study (the second and the fourth semesters), students conduct pedagogical practice in elementary and secondary schools, during which students observe lessons of their teacher-mentor, help him to organize the educational process, get acquainted with school documentation, prepare, conduct and evaluate their own classes and form a portfolio of pedagogical practice. The pedagogical practice is evaluated after the portfolio presentation in public.

We consider that the selective disciplines "Giftedness and Creativity in School" ("Nadarjenost in ustvarjalnost v šoli"), as well as "Organisms in the Study of Biology" ("Organizmi pri pouku biologije") are interesting and important for the methodological training of biology teachers. It should be noted, that there is a vivarium at the department under the direction of I. Tomazych, where the students have the opportunity to look after living organisms, observe their behavior and carry out experiments. In addition, the named scientist is a co-author of the manual for teachers "Wolf as a model organism in biology teaching" ("Volk kot modelni organizem za pouk biologije")[6], where the methodology for the study of living organisms in biology teaching is described.

## 2. Training of future biology teachers at the University of Maribor

At the University of Maribor *(Univerza v Mariboru),* applicants are offered educational programs of all levels: a) educational programs for higher vocational training of the 1st degree (3 years); b) university degree programs of the 1st degree (3 or 4 years); c) unified Master's degree programs of the 2nd degree (5 or 6 years); d) educational programs of the 2nd degree (from 1 to 2 years).

Future biology teachers are trained at the Faculty of Science and Mathematics. The training is conducted in two stages: Bachelor and Master (university unified two-subject educational program, 5 years, 300 ECTS). Biology can be combined with Chemistry, Physics, Engineering, Mathematics and Computer Science. Andrei Shorgo (prof. dr. Andrej Šorgo) is the head of "A Subject Teacher" program.

It should be noted that the development of curricula within the curriculum for Biology and Ecology is partly funded by the European Union through the European Social Fund.

A curriculum for the specialty "A Subject Teacher. Biological Education" provides the teaching of natural sciences: the biodiversity of Slovenia, biochemistry with the basics of microbiology and genetics, human biology, workshop on didactics of biology, field practice biology, biological research, cytology practicum, didactics of biology, ecology, entomology, ethology, evolution, phytocenology, physiology of plants, physiology of animals, human genetics, selected questions on physiology, molecular methods in botany, plant cell reaction to environmental factors, environmental research, the basics of biotechnology, pedagogical practice, botanical systematics, zoological systematics, general botany, general

[6] Tomažič I., Nagode D. Volk kot modelni organizem za pouk biologije: priročnik za učitelje biologije (2013). URL: http://www.dlib.si/details/URN:NBN:SI:DOC-EGFGXKZ4.

zoology, useful plants and plants in everyday life, the protection of birds and mammals, vivaristics, physics, chemistry, mathematics, the basics of computer sciences, the basics of science and technology[7].

In addition, a general pedagogical module is envisaged for future subject teachers: alternative pedagogical concepts, the work with special needs children, didactics, information and communication technologies, selected themes from the school subject, environmental project in school, pedagogy, psychology of development and learning, computer support for laboratory research, rhetoric and teamwork, creativity at school, e-learning, communication and rhetoric for students of natural sciences and technologies, Master's seminar, Master's work.

As the students acquire a teacher's degree in two subjects, the teacher training program encompasses three blocks of disciplines: general pedagogical disciplines (32 ECTS credits), disciplines of biological education cycle (29 ECTS credits) and disciplines of another subject teaching methods – chemistry, physics, etc. (32 ECTS credits). In total, it consists of 93 ECTS, which exceeds the minimum of required 60 ECTS in pedagogical education.

In order to compare the educational programmes of vocational training for biology teachers at Ljubljana and Maribor Universities, we present the academic disciplines and the number of credits assigned to their study in table 1.

As you can see, the main subjects in the preparation of future biology teachers are similar, but each faculty has its own differences. The subjects of pedagogical and methodical cycle in the magistracy are especially diverse.

The Maribor University attaches great importance to the methodological training of future biology teachers.

It is important to master the knowledge, skills and abilities that are necessary for teaching the subject, in addition to the professional biological knowledge in the work of a biology teacher. The teacher should act from a practical position, be ready to use novelties in own work and critically evaluate them. Therefore, the work at the Department of Didactics of Biology of the university is based on experimental teaching, where teachers are trying to prepare a student for an active process for a successful career.

In the process of learning, students get acquainted with the theoretical basis of the pedagogical profession, undergo testing in the educational environment of various types of professional activity and tasks of the pedagogical profession from preparation to conducting classes, study various methods by which it is possible to conduct studies, to design and organize

[7] Univerza v Mariboru. Dodiplomski študijski programi. URL: https://www.um.si/studij/dodiplomski-studij/Strani/Dodiplomski-programi.aspx.

laboratory and experimental exercises, work with living organisms, to check and evaluate knowledge, as well as to carry out research activities. Future biology teachers test their knowledge in direct contact with pupils during pedagogical practice in the secondary school.

The research work of the department is focused on the development of new laboratory exercises and the verification of their effectiveness in practice; study of socio-scientific topics that go beyond biology; use of ICT in the study of natural sciences; developing a methodology for problem learning; the development of interdisciplinary themes and the implementation of interdisciplinary connections.

The department of biology didactics provides teaching of the following methodological direction disciplines for the students of Master course: "Didactics of Biology" ("Didaktika biologije"), "Biological Didactic Practicum" ("Biološki didaktični praktikum"), "ICT in biological education" ("ICT v biološkem izobraževanju"), "Mentoring in extracurricular activities" ("Mentorstvo obšolskim dejavnostim") and conducting pedagogical practice in biology. Andrej Shorgo (Andrej Šorgo) is the lecturer of the named disciplines, he manages the department of didactics of biology and he is engaged in the research of information and communication technologies[8].

In the course of methodical preparation, students get acquainted with the theoretical foundations of the teacher's profession at lectures, they test themselves as teachers during laboratory studies, use different teaching methods, carry out laboratory experiments, experiments with living organisms, conduct testing and assessment of abilities and skills and then check their knowledge and skills in direct contact with pupils at schools.

The curriculum for the Master course discipline «Didactics of Biology» (Didaktika biologije) includes 6 ECTS credits: 30 hours – lectures, 15 hours – seminars, 45 hours – laboratory work, 90 hours – independent study.

The lectures deal with the following issues: the subject of didactics of biology; the connection between general and special didactics; the specifics of the didactics of biology and the methods of teaching biology; the models of teaching biology in Slovenia and in the world; curriculum and syllabus on biology in elementary and secondary schools; the model of pedagogical content and technical knowledge; competences in the field of education; lesson planning, goal setting, teaching and learning strategy; didactic principles; methods of work within the class; forms of learning; checking and evaluating the work of the school; inquiry and problem-oriented learning; teaching aids and equipment; ICT in education; learning evolution;

[8] Šorgo A., Verčkovnik T., Kocijančič S. Information and Communication Technologies (ICT) in Biology Teaching in Slovenian Secondary Schools. *Eurasia Journal of Mathematics, Science & Technology Education*. 2010. № 6 (1). S. 37–46.

social and natural subjects; action research; the work of tutor-teacher. The students present their knowledge on selected topics at seminars.

Laboratory exercises include the practical work of future teachers: the preparation of lesson plans, the development of training manuals, teaching aids, methodical materials, the devices production, multimedia presentations, and microteaching.

After completing the course a prospective teacher should possess:

– theoretical and practical knowledge on the field of didactic and methods on biology education;

– skills needed for preparation, performance and assessment of student's and his/her own work in biology teaching;

– knowledge needed for leadership of the classroom and school administration;

– understanding of the meaning of lifelong learning and self-evaluation from the viewpoint of critical practitioner.

Written examination, colloquium, seminar, portfolio and testing serve as academic evaluation methods for students.

There are 12 ECTS credits for 2 semesters for the study of the discipline "Biological Didactic Practicum" ("Biološki didaktični praktikum"), among them: 30 hours – lectures, 15 hours – seminars, 75 hours – laboratory works, 15 hours – field work, 225 hours – independent work. At classes students learn methods of laboratory and practical work, conduct didactic biological experiments, planning of laboratory and experimental work, study safety rules during the work, apply ICT in laboratory and field work, learn to evaluate of laboratory and experimental work, work with living organisms, sampling and maintaining of collections; maintaining of vivarium; independently conduct laboratory work in the form of microteaching.

After the course student should know and be able to: teoretical knowledge from the field of didactics and methodics of laboratory and experimental work; skills for preparing, performance and evaluation of students work on laboratory and experimental work; skills evaluation of own work on laboratory and experimental work; skills needed for material preparation of laboratory works; knowledge and skills to work safely; knowledge how to adjust manuals to given situation; strategies to organize and lead excursions, nature days, or summer schools; usage of ICT in school.

Pedagogical practice for biology (6 and semesters, 8 ECTS credits) – basic skills in pedagogy and psychology; attendance at lectures, seminars and laboratory work for subject Didactics of Biology.

Seminars include the following types of student activity: organization of the education in primary and secondary schools; school documentation and subject curricula for technology education; organization of pedagogical

practice; the documentation of the observation, monitoring, implementation and evaluation of the activities in the continuous two-week teaching practice in primary school; planning of educational process – preparing for class appearances; diary of pedagogical practice; evaluation of class appearances and pedagogical class practice.

Laboratory work: practical instructions in lower secondary school and pedagogical school work at school.

Individual work: written lesson plans; to learn about pedagogical documents (annual and daily preparation for educational process, school diary); work and organization of departmental and school community; the structure of interest activities, school projects, associations and teacher groups; realization of class appearances and pedagogical class practice in primary school; writing of diary of pedagogical practice.

Pedagogical class appearances in school: 2 appearances in elementary school, 3 observations (teachers), least 3 observations (students).

Pedagogical practice with class appearances (instructions), observations and other pedagogical obligations (1 week): in elementary school, 4 class appearances, 6 observations (teachers), other pedagogical obligations.

### 3. Training of future biology teachers at the universities of Romania

In Romania, the methodical training of future biology teachers is being implemented in the course of studying the module of pedagogical disciplines. Thus, students who want to master the profession of a biology teacher, conclude an agreement with the department of teacher training and professional development at the university (departamentul pentru pregatirea personalului didactic, Departamentul pentru Pregatirea si Perfectionarea Personalului Didactic), so they study optionally the disciplines of the pedagogical module, in particular "Didactics of specialty" ("Didactics of Biology"). Students study during 3 years (6 semesters, 180 credits) for obtaining the bachelor's level (licenţă), they study during 2 years (4 semesters, 120 credits) for obtaining the master's level.

The largest academic institution in Romania named after A.Y. Kuzi (Universitatea Alexandru Ioan Cuza din Iași)[9], has a special pedagogical module of 30 credits, including pedagogy, pedagogical psychology, didactics of specialty, elective courses and pedagogical practice at the Department of Biology for Bachelors of Biology. It should be noted that the plan also provides a final evaluation of the didactic portfolio of the student.

The discipline program "Didactics of Specialty" provides the following general topics: the curriculum and its structure, a school textbook, a teaching

[9] Universitatea Alexandru Ioan Cuza din Iași. URL: http://www.uaic.ro/studii/facultati-2/facultatea-de-biologie/.

project, a lesson as the main form of learning organization, the structure and types of lessons, a traditional lesson and a modern lesson, analysis and evaluation of lessons, a learning through research and discoveries, teaching methods, small group learning organization, cooperative learning, learning strategies, learning tools, assessment, didactic principles and more.

In terms of the Master's degree, 30 credits are allocated to the optional psychological-pedagogical module, which covers such disciplines as "Psychology and pedagogy of teenagers, youth and adults", "Design and management of educational programs", "Didactics of the specialty development (secondary school, lyceum, university)", pedagogical practice and selective disciplines (educational communication, methodology of pedagogical research, counseling and assistance, integrated education, sociology of education, educational management, education policy, intercultural education, modern doctrine of education).

At the University of Bucharest (Universitatea din București), at the faculty of Biology[10], the disciplines of methodical direction such as "Didactics of Biology" and "Didactics of Biochemistry and Ecology" ("Didactica biochimiei şi ecologiei") are taught at the magistracy for a specialty "Biochemistry and Molecular Biology".

The University of Kluz named after Babesh-Boya (Universitatea Babeș-Bolyai din Cluj-Napoca), the faculty of Biology and Geology[11] also prepares future biology teachers, but they are on a contract basis. "Training Program of Psychology and Pedagogy" is designed for 30 credits and covers such disciplines as psychology of education, pedagogy (general pedagogy, theory and methodology of training programs, theory and methodology of teaching, theory and methodology of assessment), didactic of a specialty, computer education, the work of a class teacher and a pedagogical practice. These courses are taught for six semesters.

Stela-Gabriela Jelea provides teaching the course of "Didactics of Biology" ("Didactica biologiei") for Bachelors of Biology in the 3rd semester (licenţă, specializarea "Biologie") at the Faculty of Sciences of the Northern University Center Baia Mare at the Technical University of Cluj-Napoca (Centrul Universitar Nord din Baia Mare, Universitatea Tehnică din Cluj-Napoca)[12]. The objectives of the discipline are as follows: organization and implementation of training in accordance with the national curriculum; studying and teaching didactic principles in Biology lessons; knowledge of

[10] Universitatea din București. URL: https://unibuc.ro/studii/facultati/facultatea-de-biologie/.

[11] Universitatea "Babeș-Bolyai" din Cluj-Napoca. URL: https://www.ubbcluj.ro/ro/facultati/biologie_si_geologie.

[12] Universitatea Tehnică din Cluj-Napoca. URL: https://stiinte.utcluj.ro/.

teaching strategies which are used in teaching, learning and assessment in Biology; designing educational content and the usage of didactic tools in Biology teaching; selection and application of assessment methods appropriate to the purpose and objectives.

In the curriculum, the scientist outlined the following topics:

1. Purpose and meaning of "Didactics of Specialty (Biology)". A definition of the methodology, the role of the course and the teaching practice. Curriculum on Biology for gymnasiums and lyceums.

2. Application of didactic principles in Biology lessons (principle of consciousness, principle of systematization of knowledge, principle of accessibility of knowledge, principle of intuition, principle of theory and practice connection).

3. Reform of curricula (planning and organization of Biology lessons: purpose of Biology teaching in secondary school; general and special competencies in Biology teaching; tests, individual teaching tasks; types and forms of organization and activation of educational activities, types of Biology lessons, creation of educational resources and educational strategies; documentation on the project design of studying; classical and modern teaching aids; classification of teaching aids; specific strategies for Biology teaching; teaching methods, their usage in learning activation; computer education; organization and conducting of individual work, organization of group work, cooperative studying, structure and functioning of a group of students.

4. Evaluation of school work on the basis of educational goals. The grades are classic and modern.

5. Design of content units. At the University of Timisoara (Universitatea de Vest din Timisoara), the course Didactics of Biology is taught by Nicoleta Ianovici for bachelors at the Faculty of Chemistry, Biology and Geography. It is worth taking into consideration the manual "Didactics of Biology – lecture courses and seminars" ("Didactica Biologiei – suport de curs si seminar").

The book covers the following topics:

Section 1. Requirements for educational work. Educational competences. Educational communications. Learning styles. Motivational aspects in educational work. Short psychological guide. Competition and cooperation. The art of motivation. Biology teacher profile.

Section 2. Curriculum. The process of education in Romania. Curriculum and reform. National Curriculum. Planning in education. Aims of education. Educational programms. Programs for gymnasiums. Programs for lyceums. School textbooks. Hidden curriculum. Application of didactic principles in the projecting of Biology teaching and learning.

Section 3. Educational technologies. Methodology of Didactics. Specific methods of Biology: exposure, verbal (conversation, educational dialogue, method of questions), observation, demonstration method (intuitive), experiment, method of practical work, learning through discovery, problem-setting (problem-oriented learning, problem solving), modeling, algorithm-setting, computer training, interactive methods (methods of interaction). Teaching aids (classification of teaching aids, integration of audio-visual aids in Biology teaching).

Section 4. Pedagogical projecting. The essence of pedagogical projecting. Pedagogical projecting in modern didactics. The concept of educational (teaching) unit. Procedural algorithm in projecting of teaching modules. A unit of content (lesson) projecting. The sequence of calendar planning. Projects for teaching units.

Section 5. Evaluation of school performance according to educational goals Evaluation functions. Types of evaluation. Alternative (additional) assessment methods (systematic observation of students' activity and behavior, project, essay, portfolio, self-assessment, "investigation" (Investigaţia). Classification of subjects/paragraphs/questions (objective questions, half-questions, open-ended questions (subjective). Construction of testing (tests): oral test, written test, practical test. Success of students.

Section 6. A biology teacher and his role in formal and non-formal education. Reflections on the position of teachers in society. From environmental education to sustainable educational development. Class Hour. Time. Tutorial (Ora de dirigenţie).

Section 7. Organization and conducting of pedagogical practice. Journal of pedagogical practice with documents are prepared by student-teachers. They are: records/documentation of activities that assisted in teaching practice. Documentation of activities performed. Practice portfolio (a letter/a sheet/a list to assist with elective courses, a letter in order to help the class hour conducting, a letter in order to help the biology lesson performing, a psycho-pedagogical letter, student's self-assessment letter, a letter of assessment by a student's mentor)[13].

"Didactics of Biology" for future teachers is taught by Mariana Marinescu at the Faculty of Sciences (Facultăţii de Ştiinţe), University of Oradea (Universitatea din Oradea)[14]. Mariana Marinescu is the author of numerous works on the methodology of Biology teaching and she wrote the manual "Didactics of Biology. Theory and Practice" ("Didactica biologiei.

[13] Ianovici N., Frenţ A. Metode didactice în predare, învăţare şi evaluare la Biologie. Timişoara : Ed. Mirton, 2009. 167 p.

[14] Universitatea din Oradea. URL: http://stiinte.uoradea.ro/.

Teorie și aplicații")[15]. This work is a source of information, it provides a scientific and pedagogical training for medical students and biologists. It is about environmental protection. This manual can also be used for the improvement of teachers' performance (in obtaining the educational degrees).

The researcher (Mariana Marinescu) is the author and co-author of the books "Interdisciplinary Approaches in Education" (2004), "Contemporary Trends and Principles of Education" (2007, 2009), "European Dimension of Education" (2008), "Introduction to Biology Didactics" (2012), "New Eucation in the Society of Knowledge" (2013) and others.

Romanian scholars actively implement alternative learning strategies (problem, project, heuristic, computer-based teaching) and they confirm that these new strategies are more effective than a traditional teaching[16].

In assessing academic achievement, particular emphasis is placed on alternative methods of assessment, mainly on a portfolio.

**CONCLUSIONS**

The research work deals with the leading trends in the training of future biology teachers in Slovenia and Romania.

***1. Implementation of competence-oriented learning***. The reorientation of learning is not grounded on the assimilation of a certain range of knowledge and the formation of special skills, but on the development of competencies that will enable students to master the professional activity of the teacher and implement it in practice at a general educational establishment. A competent approach has already been introduced in European countries, and nowadays it is gradually being implemented in Ukrainian education.

***2. Updating the content of vocational training***. Modernization of the content of disciplines through the inclusion in the educational programs contents information about new achievements of biological and psycho-pedagogical and methodological sciences. The emergence of new disciplines by choice and special courses, which reveal in details the specific issues of biology and methods of its learning, they also complement, extend and deepen the knowledge of future teachers, develop students' thinking. For example, the following methodical disciplines can be considered interesting:

[15] Marinescu M. Didactica biologiei. Teorie și aplicații. Pitești : Editura Paralela 45, 2010. 294 p.

[16] Simó Réka K., Szállassy N. Alternatív oktatási stratégiák alkalmazása a biológia tanítása során. A XI. osztályban. Didaktikai kísérlet. *Romanian Journal of Education*. 2010. № 3–4. Vol. 1. P. 71–84.

“Didactics of Biology”, “Biological Didactic Practicum”, “ICT in biological education”, “Mentoring in extracurricular activities”.

***3. The innovation strengthening*** of the future biology teachers training by introducing new learning technologies into the learning process, such as interactive technologies, project, case study, technology “workshop”, portfolio, research-oriented learning, etc.

***4***. ***The transition to information technologies training***, which involves the development of video courses, video lectures, video tutorials, multimedia presentations, virtual laboratories and excursions, computer testing of student achievements, etc. The usage of the Internet to find information (a text, images or some video) today is a prerequisite for the organization of the learning process. The Internet is becoming one of the main sources of knowledge.

***5. The development of distance learning*** for future biology students is closely linked ***to the development of a new teaching and methodological support*** of disciplines, in particular the creation of electronic textbooks and manuals, a bank of test tasks, a glossary. There is a program of the course, lectures, plans and assignments for laboratory and practical classes, tests and tasks for final control on the universities’ websites.

**6**. ***Raising the role of students self-training***, that envisages the future biology teachers of the individual teaching and research tasks, research works, designing their own educational trajectory, forming an individual methodological style.

***7. Strengthening the relationship of theory with practice.*** In the course of professional training of students, various types of field and pedagogical practices are organized, during which students test their forces as teachers, adapt to further professional activities. Practice provides opportunities for scientific work, scientific and methodological research in the teaching of biology. The indicated trend involves the elimination of the gap between the pedagogical theory and the practice of preparing a future biology teacher, involving experienced teachers in preparing students.

Consequently, in Slovenia and Romania, an important place is devoted to the training of future biology teachers, the introduction of practice-oriented learning technologies, the familiarization of students with information and communication technologies, the use of living organisms in biology teaching. It should be noted that universities generally prepare teachers for two school subjects, enabling them to master two related academic disciplines and increase opportunities for successful employment.

**SUMMARY**

A special attention is given to natural science in the world today, as there is a lack of specialists in this area, which negatively affects the sustainable

development of society. The problem of pedagogical staff training that provides training in natural sciences, in particular biology is relevant nowadays. The purpose of the study is to clarify the peculiarities of the training of future biology teachers at the universities of Slovenia and Romania. As a result of the analysis of scientific literature, teaching materials and information on the official websites of the universities of Slovenia, the main features of the of biology teachers training at the universities of Slovenia – the University of Maribor and the University of Ljubljana have been identified. *In* this *study*, it was *found* that teachers are prepared in accordance with two-level (bachelor + master) two-subject (biology + other subject) training program. Pedagogical and methodological disciplines are concentrated mainly in the magistracy. The students learn the basics of biological sciences at the first (bachelor) level. In Slovenia, an important place is given to the introduction of practice-oriented learning technologies, to familiarize students with information and communication technologies and the use of living organisms in the biology teaching. In Romania the study of didactics the biology acquainted with such issues as problematic, computer training, group work, alternative assessment methods (projects, portfolios, self-evaluation), as well as the role of the teacher in the formal and non-formal education. The experience of European countries requires careful analysis, systematization and generalization, as well as the introduction of the best achievements in the native education.

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