**REPORT ON THE ANALYSIS ON REPRESENTATION OF KEY COMPETENCES WITHIN EDUCATIONAL PROGRAMMES WITH A FOCUS ON NATURAL GROUP OF SUBJECT PROGRAMMES**

**CONTENT**

[**INTRODUCTION** 3](#_Toc36469866)

[**1.** **LEGAL FRAMEWORK** 4](#_Toc36469867)

[**1.1** **General Law on Education and Upbringing** 4](#_Toc36469868)

[**1.2** **Law on Primary Education and Upbringing** 4](#_Toc36469869)

[**1.3** **Law on Gymnasium** 5](#_Toc36469870)

[**2.** **METHODOLOGICAL INSTRUCTION FOR WRITING SUBJECT PROGRAMMES BASED ON LEARNING OUTCOMES (2017)** 6](#_Toc36469871)

[**3.** **ANALISYS OF EDUCATIONAL PROGRAMMES** 8](#_Toc36469872)

[**3.1. Pre-school education and upbringing** 8](#_Toc36469874)

[**3.2** **Primary Education and Upbringing** 9](#_Toc36469875)

[**4.2.1** **Compulsory subject programmes from the natural sciences group of subjects** 11](#_Toc36469876)

[**Programmes of elective subjects** 15](#_Toc36469878)

[**4.3 Secondary general education** 18](#_Toc36469879)

**INTRODUCTION**

For the purpose of this report, the following legal framework was analysed: the Methodological instruction for writing subject programmes based on learning outcomes (2017); the educational programmes for the level of pre-school, primary and secondary education; the educational programmes of the natural group of subjects for primary school in 2017; the natural group of subjects for general secondary education programmes in 2016; and examples of modularized vocational secondary education programmes (2017). The basis of the analysis is an overview of the representation of key competences in the aforementioned documents in relation to the Recommendations of the Revised Framework of the Council of Europe and the Parliament (2018 / C 189/01). The second report, which analyses the initial and continuing education of classroom teachers and teachers of the natural group of subjects, answers the question about the extent to which key competences are developed in the learning realization process, taking into account their representation in the programmes.

Comprehensive education reform in Montenegro began in 2000, while the first reformed programmes began to be implemented in 2004. In line with its tradition and following the recommendations of 2006, Montenegro incorporated the development of key competences into its legislation, strategic documents, education programmes and methodological instructions and manuals.

The implementation of the nine-year elementary school programme began from September 2004/2005 (group A schools) and was gradually being implemented until 2011, when a new educational programme was implemented in all primary schools. The implementation of new educational programmes in all first grades of the gymnasium began in school year 2006/2007.

Changes in teaching were reflected in the transition from lesson planning to goal planning. The programmes propose activities for students to achieve their goals, which puts the student at the centre of the teaching process. A characteristic of the new education programmes compared to the previous ones is their opening to the needs of students and the community. The obligatory part of the programme should be covered by 75-85% of the available annual number of classes for the specific subject, while the remaining part of 4 working weeks is determined by the school based on the interest, needs and initiative of the students, teachers, parents and the local community. Looking backwards, these changes are a significant step forward from the traditional approach of learning the content to learning in the context of lifelong learning.

Since 2004, students have been attending school starting at the age of six. The primary school is divided into three cycles: first, second and third. In the first cycle (grades 1, 2 and 3), classroom and subject classes are taught. Classes are taught by the classroom teacher and the teacher who teaches English. In the first grade, along with the classroom teacher, an educator takes part in the teaching of half of the classes. In the second cycle (grades 4, 5 and 6), classroom and subject classes are organized. Classes are taught by the classroom teacher and subject teachers (English, art subjects, physical education and computer science). In the third cycle (grades 7, 8 and 9), the subject is taught and the subject is taught. Elective courses are offered to students in the third cycle, i.e. in the seventh, eighth and ninth grades.

Implementation of reformed programmes in high schools began in 2006/2007. Elective courses and compulsory electives are also included. For general high schools, a 30% change in the plan and a 30% reduction of the subject programmes was determined in 2016. The Bureau for Education Services is currently reviewing them. In secondary vocational education, the reform of the curriculum based on professional and qualification standards in 2017 introduced the development of eight key competences according to European recommendations in all educational programmes.

1. **LEGAL FRAMEWORK**

**1.1 General Law on Education and Upbringing[[1]](#footnote-1)**

The General Law on Education regulates the organization and conditions for carrying out educational and upbringing work in the fields of: pre-school and primary education, secondary general education, vocational education, special education and adult education. This law aims, among other things, at:

* meeting the needs, interests, desires and ambitions of the individual for lifelong learning;
* facilitating the achievement of an internationally comparable level of knowledge, skills and competences;
* developing awareness, need and capacity for the preservation and promotion of human rights, the rule of law, the natural and social environment, multiethnicity.

**1.2 Law on Primary Education and Upbringing[[2]](#footnote-2)**

In the objectives of the Law on Primary Education, key competences are referred to as:

* developing critical thinking, independence and interest in new knowledge;
* education for respecting national values ​​of history and culture, as well as for respecting the cultural and other characteristics of other peoples;
* education for mutual tolerance, respect for diversity, cooperation with others, respect for human rights and fundamental freedoms, and thus developing the capacity to live in a democratic society;
* acquiring knowledge about the basic laws of nature and society development and preserving health;
* developing democratic attitudes, tolerance and cooperation (inside and outside the school) and respect for the rights of others;
* forming and promoting a healthy lifestyle and responsible attitude towards the environment;
* developing career guidance for students;
* developing students' basic competences as well as learning competencies;
* developing natural, mathematical and digital literacy;
* developing social and civic competences as well as cultural sensitization;
* fostering, understanding, solidarity and respect for diversity;
* developing social and emotional values ​​and skills.

**1.3 Law on Gymnasium[[3]](#footnote-3)**

In the objectives of the Law on gymnasium, key competences for lifelong learning are identified as:

* developing critical thinking and judgment;
* developing communication skills;
* developing a responsible attitude towards work and the environment;
* developing the capacity to live in a pluralistic and democratic society;
* fostering understanding, tolerance, solidarity and respect for diversity.

**1.4 Law on vocational education[[4]](#footnote-4)**

Key competencies are listed among the objectives of vocational education in this law (set aside among other objectives):

* facilitating the acquisition of knowledge and the development of skills and key competences that meet the requirements of a modern, democratically and economically developed society and market economy;
* provision of knowledge and skills necessary for life and work, personal interests, professional development of personality and for further education;
* fostering, understanding, tolerance, solidarity and respect for diversity;
* developing students' awareness of the need for lifelong learning.

In the glossary, "key competence" is defined as a transferable multifunctional package of knowledge, skills and attitudes that an individual need for personal fulfilment and development, inclusion and employment.

The **Law on the National Qualifications Framework** states that learning outcomes are expressed through knowledge, skills and competences (in Article 4 on objectives, it encourages and develops lifelong learning).

1. **METHODOLOGICAL INSTRUCTION FOR WRITING SUBJECT PROGRAMMES BASED ON LEARNING OUTCOMES (2017)**

This instruction sets out the structure of the subject programmes, which cover the following chapters:

A. Name of the item

B. Object determination

C. Objectives of the course

D. Relatedness with other subjects and cross-curricular topics

E. Course outcomes

F. Didactic recommendations for course realization

G. Adaptation of the programme to children with special educational needs and gifted students

H. Evaluation of educational outcomes

I. Requirements for realization of the course (education and literature)

**The term “competences” in this document is explained in the context of goals** that are divided by subject content into cognitive (acquired knowledge) and process goals (skills and values) that have a developmental and educational role in which key competences are contained in the way the EU Framework recommends. The following quote emphasizes the shift from content learning to authentic learning that links knowledge to real life contexts: *''When it comes to goals of the school and learning itself, lately it came to significant shift of focus from knowledge acquisition to its effective application (learning to learn, problem solving, decision making) and the ability to create new knowledge (creativity, innovation) with the proper use of ICTs that transform the nature of work and the meaning of social relationships (flexibility and adaptation to rapid change), to develop the ability to obtain information, to critically consider them, effectively address them (information literacy, critical thinking) and exchange them effectively with others, work on tasks jointly with others (self-awareness, social awareness and skills, constructive and healthy communication)."*

The **goals** include transferable **knowledge**, key or essential **competences**, soft and generic, higher mental processes, and the most comprehensive approach is "Competencies for the 21st Century" (Pešikan & Lalović, 2016), which is reviewed in a separate appendix. They include 4 general competences: (1) Cognitive, (2) Social, Emotional and Civic, (3) Communication (4) Responsible attitudes towards health, environment, work and responsibilities, which are then broken down into even more sub-competencies. Literacy, multilingualism, cultural, mathematical, and competence in science, technology, and engineering are not recognized, while others are represented.

The guidelines provide the following overview of the competences that most commonly emerge as learning objectives in the school, among which are the eight competences of the Reference Framework:

1. Communication competences (in native and foreign languages)

2. Mathematical competences (conceptual knowledge and application of mathematics in solving problems, including problems in different life situations)

3. Developed information literacy (knowledge and use of information and communication technology)

5. Knowledge and understanding of natural phenomena and developing awareness of the need for nature conservation

6. Developed scientific thinking (capacity for small research)

7. Developed ability to think critically and to solve problems

8. Developed creative skills (creativity)

9. Competence for self-organized learning (learning to learn)

10. Developed social competences (cooperation, teamwork .)

11. Knowledge of human rights and children's rights and training for their respect and implementation

12. Developed basic knowledge and positive attitude towards artistic creativity and expression

13. Developed basic knowledge and positive attitude towards one's own culture and that of other nations

14. Developed awareness of one's own health and that of others

15. Developed awareness of the need for nature conservation and environmental protection

16. developed practical work skills for daily life

17. Developed ability to make decisions about their own professional development.

In addition, **they are also called skills**: "In most modern education systems, these skills become equally legitimate, if not more important, goals of learning than acquiring knowledge."

There is a prominent instruction that **not every programme is expected to develop all the proposed development goals but those that are closely related to each other** (e.g. language learning is close to developing creativity and creative thinking; history is close to critical thinking, geography cares about the "health" of the planet, and biology in addition to the care for the planet also concerns with maintaining one's health). It also cites the subject (or subject area) as a source for formulating these formative and educational goals of the programme.

As a whole, the subject programme, in all its parts (learning outcomes, learning activities, conditions in which learning takes place, evaluation, etc.) is directed towards achieving and providing the anticipated educational outcomes.

*Chapter D - Relationships with other subjects and cross-curricular topics* indicate the **links that exist between the content of a given subject and the content of other subjects - the correlations** as well as the **role that the subject plays in the realization of the cross-curricular topics**, e.g. for the development of entrepreneurship, civic activism, responsible attitude towards one's own health, responsible attitude towards the environment and the similar.

Chapter E - *The educational outcomes of the subject* present the outcomes that are more general educational goals and learning outcomes, which are more specific and addressed in more details. For each educational outcome, didactic recommendations for the realization of the educational outcome, contents/concepts, learning activities and indicative number of hours of realization are proposed. It was pointed out that the realization of process outcomes (competences) takes more time (hourly, even the whole course) than the cognitive ones that can be realized in one or more hours.

Didactic recommendations appear in two places, with individual educational outcomes (emphasizing what is specific and important for the realization of a particular outcome), and as a separate chapter where recommendations are made for the implementation of the programmeas a whole. They are in principle given, often as a recommendation for the use of digital technologies.

*Chapter H which deals with the evaluation and assessment of educational outcomes,* provides recommendations for the implementation of various forms of assessment through monitoring, evaluation and establishment of student assessment criteria in teaching that can serve as a good platform and for monitoring and formatively evaluating the acquisition of key competency outcomes.

1. **ANALISYS OF EDUCATIONAL PROGRAMMES**

*For the purposes of this report, educational programmes have been analysed from the perspective of the representation of key competences within the segments of the educational programme and subject programme: goals, definition of the subject programme, outcomes, cross-curricular topics and didactic recommendations.*

**3.1. Pre-school education and upbringing**

Preschool education includes children up to 6 years of age, that is, until they start primary school. Children up to 3 years old are covered by a nursery, while children from 3 to 6 years old are covered by kindergartens that are organized according to age groups.

Upbringing and education for children aged 3 to 6 years is implemented in accordance with **the Programme for Areas of Activities in Preschool Education** **and Upbringing** (for ages 3 to 6 years), i.e. the primary programme.

Basic areas of activities in the programme are:

1. Physical and health activities

2. Musical activities

3. Language and speech activities

4. Mathematical-logical activities

5. Social activities and knowledge within the framework of social-emotional development

6. Activities of getting acquainted with nature and managing the environment

7. Artistic activities

For each area of activity, the following objectives have been set:

* discovering and mastering yourself,
* developing relationships and building awareness of others,
* discovering the world and building knowledge about it.

In the primary program, in addition to the stated goals, types of activities and methodical instructions for work are given. In addition to the primary programme, **specialized programmes for English** are also used in preschool institutions, while in some institutions there are other specialized programmes (shorter programme, three-hour preschool educational programme).

**Additional programmes** - Entrepreneurial learning, sustainable development education and digital competencies are compulsory for all pre-schools, and are implemented through the areas of activity in the primary programme and develop key competencies among all children.

The *Entrepreneurial Learning Programme within the field of activities in pre-school education from 3 to 6 years (Podgorica 2016)* aims to develop personality traits, knowledge, skills and attitudes and enables the development of key competences sense of initiative and entrepreneurship **integrally through all activities**. The programme provides opportunities for creative application and is adaptable to the context of a preschool institution. Topics such as entrepreneurs and entrepreneurship, economic and financial literacy, innovation and entrepreneurship, the environment - resources and effective communication link knowledge, skills and values across learning activities in the primary programme, thus developing key competencies.

Programme *Education for Sustainable Development* *within the field of activities in preschool education and education from 3 to 6 years* (Podgorica 2015) is foreseen for realization as part of the primary programme, respecting the developmental opportunities of children from 3 to 6 years of age. The same principle as the Entrepreneurial Learning Programme, knowledge, skills and values are linked through topics such as *healthy lifestyle, security, caring for others, environment and basic economic principles,* through learning activities in the Primary Programme.

*Digital literacy* of children is introduced through the digital competence programme - a cross-curricular topic through educational goals related to information and digital literacy, communication and collaboration, digital content creation, security and problem solving.

A methodological instruction for the implementation of the programme - Education for Sustainable Development within the field of activities in pre-school education from 3 to 6 years was created for educators (Podgorica 2015).

**3.2 Primary Education and Upbringing**

**A general part of a publicly valid primary education curriculum**

The subject programmes for elementary school were after 2004, upgraded in 2009, 2011 and 2013. The last reform of primary education (2017) made a change to the curriculum, which meant a significant reduction of the number of science lessons. New subject programmes have been developed in accordance with the Methodological Guidelines for Writing Subject Programmes Based on Learning Outcomes.

|  |  |  |
| --- | --- | --- |
| **Natural Subjects Group** | **Until 2017** | **2017** |
| Mathematics | 39 | 36 |
| Nature and society | 9 | 6 |
| Getting to know the society | 4 | 4 |
| Nature and technical science | 2 | 2 |
| The Nature | 3 | 4 |
| Biology | 6 | 6 |
| Chemistry | 4 | 4 |
| Physics | 5 | 5 |
| Informatics with technical science | 4 | 4 |
| **Total** | **76** | **71** |

For the first time in the 2017 curriculum, **the objectives** state that pupils in primary education should acquire key competences that are largely similar to the European Key Competences Framework:

* Developing communication competences (in native and foreign language)
* Developing mathematical competences (conceptual knowledge and application of mathematics in solving problems, including problems in different life situations)
* Developing information literacy (knowledge and use of information and communication technology)
* Knowledge and understanding of natural phenomena and developing awareness of the need for nature conservation
* Developing scientific thinking
* Developing critical thinking and problem-solving skills,
* Training for self-organized learning (learning to learn)
* Developing civic and social competences
* Developing basic knowledge and a positive attitude towards artistic creativity and expression
* Acquiring basic knowledge and developing a positive attitude towards one's own culture and that of other nations
* Developing awareness of nurturing healthy lifestyles
* Developing awareness of the need to conserve nature and protect our lives
* Training students for entrepreneurial learning.

In the definition of compulsory and elective subjects, a **note** related to the cross-curricular topics is given: **cross-curricular areas/topics** are contents that enable inclusion of certain educational contents in the general curriculum, that are not part of formal disciplines or individual subjects, or which are interdisciplinary in structure. These contents contribute to the integrative approach of general education and are more closely related to other subjects. Chapter C, which relates to the connection with other subjects and cross-curricular subjects in all compulsory and elective subjects, states how the cross-curricular topics relate to a given subject programme.

For the purposes of this report, the following required subject programmes have been analysed:

* Mathematics for grades first to nineth;
* Nature and society for grades first to third;
* Getting to know the society for grades fourth and fifth;
* Nature for grades forth to sixth;
* Biology for grades sixth to nineth;
* Chemistry for grades seventh to nineth;
* Physics for grades seventh to nineth;
* Informatics with technical science from grades sixth to eighth.

Also, the review of elective subjects from natural group of subjects is done:

* Introduction to combinatorics and number theory;
* Geometry; Sets, relations, functions;
* Measurement in physics;
* Chemistry through experiments;
* Medicinal plants;
* Graphics and image and photo processing;
* Introduction to programming;
* Interesting geography;
* Spatial valuation;
* Healthy lifestyles;
* Entrepreneurship.

**4.2.1 Compulsory subject programmes from the natural sciences group of subjects**

**Mathematics for grades first to nineth primary school**

The **goals** of the programme for mathematics, competencies are mainly related to developing critical thinking and problem solving. In the outcomes of the programme concerned, the development of key competences for lifelong learning is not directly mentioned anywhere. When it comes to **cross-curricular topics**, the use of ICT (information and communication technologies) in teaching is emphasized, while through the development of initiative, persistence, creative approach to problem solving and hypothesis setting, the importance of developing entrepreneurial competence is recognized. **The didactic recommendations** for the realization of the subject course have recognized the importance of developing digital literacy and linking it with the development of mathematical literacy.

**Nature and society grades first to third primary school**

The **programme for nature and society** states: "In order to adapt to the rapid development of technology and to respond responsibly to nature, environment and health, and thus contribute to sustainable development, students should acquire basic natural and social competences". The goals of the subject programme emphasize that during this course, students will be able to use information technology in collecting, processing and presenting data and will be able to think critically.

The chapter on **relatedness to other subjects and cross-curricular topics** reads: In the teaching of Nature and Society in primary school, the objectives of the cross-curricular topic **Education for Sustainable Development and Entrepreneurial Learning** are presented.

The educational **outcomes** of the course emphasize which cross-curricular topics can be realized within various learning outcomes.

Key competences for teaching and learning as well as digital competence are introduced in the part of the programme that relates to the **activities of students** to achieve learning outcomes and **didactic recommendations** for the implementation of the programme.

**Getting to Know Society for grades fourth to fifth primary**

Key competences are incorporated in the same way as in the subject programme for Nature and Society.

**Biology for grades sixth to nineth primary school**

The **curriculum definition** states that by fostering an interest in learning biology and developing scientific literacy by building a knowledge network, students are trained to seek information from a variety of sources and make critical reviews based on systematic, analytical and rational thinking. It further states that the biology content provided by this programme develops students' responsibility to themselves, nature and the environment and teaches them to apply the acquired knowledge and skills in daily life, following the principles of ethical behaviour. Through active learning methods, students are trained in independent learning and research, argumentative presentation of ideas, asking problem questions, planning, observing, presenting and interpreting results. The use of computers in research and communication for students develops information literacy. Different forms of work enable students to appreciate different opinions and attitudes, to cooperate and to respect the rules of good communication. The production of papers, wall papers, billboards, presentations, as well as oral presentations enable the development of language competence and the cultural expression of students. Conducting research, exercises and experiments develops in students the creativity and the art of realizing ideas.

Key competencies are included in the **objectives of the subject programme** through the following formulations:

* developing the ability to collaborate with others during team, group and pair work;
* developing environmental awareness and ecological culture;
* developing the right attitude towards the environment through responsible use of natural resources;
* developing IT literacy through computer-aided learning, searching, collecting, processing, organizing information and evaluating information sources;
* developing natural literacy.

The section on **relatedness to other subjects and cross-curricular topics** states:

In the elementary school biology classes, goals from Education for Sustainable Development, Education in the Field of Emergency Situations Caused by Natural Disasters and Entrepreneurial Learning are represented. As part of the educational outcomes, suggestions are given where cross-curricular topics can be implemented. Teachers, according to the specifics of the local environment, the resources, the affinities of the students, determine the goals that they will realize within this Programme.

In the nineth grade, within the given learning outcomes, the objectives of the cross-curricular topics Education for Sustainable Development, Entrepreneurial Learning and Emergency Education caused by natural disasters can be realized. It is recommended that entrepreneurial learning can be integrated with activities based on experiments, group and team work, application of biological knowledge in everyday life, as well as content dealing with natural resources and energy.

In the chapter on **educational outcomes** of the course it is emphasized that within the learning outcomes, the contents of the cross-curricular topics can be realized.

The **Didactic Recommendations** for the implementation of the programme in question recommend the use of digital technologies.

**Chemistry for grades seventh to nineth primary school**

The chapter on **description of the subject programme** states that chemistry is interdisciplinary related to other natural sciences and cross-curricular topics, while the **general objectives outline the development of key competencies** such as the use of scientific data and information and communication technologies in problem solving, developing the capacity for collaboration, communicativeness, tolerance, independence, self-confidence, innovation, creativity, curiosity, teamwork, taking responsibility and a positive interest in chemistry and the natural sciences, developing a positive attitude towards entrepreneurship, innovative ways of solving problems and making decisions, as well as developing a responsible attitude towards substance use and their environmental impact and developing the ability to participate responsibly and actively in solving problems for sustainable development.

The section on **relatedness to other subjects and cross-curricular topics** lists learning outcomes that can be linked to cross-curricular topics such as: Climate change, Environmental protection, Sustainable cities and towns, Green economy and Entrepreneurship can be achieved through most outcomes of this subject programme.

Learning outcomes pertaining to cross-curricular topics are included along with learning outcomes for individual educational outcomes.

The **didactic recommendations** for the implementation of the programme in question recommend the use of digital technologies.

**Physics for grades seventh to nineth primary school**

The **definition of the subject programme** states that physics as a fundamental natural science is closely related to other natural objects and cross-curricular topics related to the environment.

The chapter on **relatedness to other subjects and cross-curricular topics** explains in detail the potential of the subject for the development of key competences. It states that the problems that a student solves through independent research in physics influence the development of responsibility for their own learning, and contain elements of initiative and risk taking. Understanding the importance of creative innovation for economic development and responsible behaviour by nature are an integral part of the physics outcome and contribute to the adoption of the outcomes of the cross-cutting topics Entrepreneurship and Sustainable Development.

Teaching physics as one of the basic general education subjects in elementary school develops basic competences in science and technology. The study and understanding of natural processes and phenomena, such as basic knowledge in the field of physics, plays an important role in the development of all technical disciplines and is essential for the successful understanding of phenomena from everyday life.

In the teaching of physics, **elements of key competencies** are developed, such as: developing critical thinking, problem solving, developing creativity, initiative, decision making, risk assessment. Physics education supports transversal and key competencies:

* development of mathematical skills for research and interpretation of natural phenomena from everyday life;
* developing digital literacy competences through the use of modern IT, especially in modelling phenomena in interactive computer animations and computer measurements as well as processing of measurement results
* communication in the mother tongue - developed primarily through speech (oral presentation), reading, writing, comprehension and presentation;
* communication in foreign languages ​​- students develop mainly through the use of computer programs and interactive computer animations and simulations in a foreign language, as well as the use of foreign printed and electronic sources in the preparation of reports, workshops and research tasks;
* learning achieved through the development of work skills, self-learning, planning of one's own activity, responsibility for one's knowledge and confidence;
* development of social and emotional competence, including teamwork, acceptance of diversity, perseverance, self-control, learning from mistakes, etc.

The **didactic recommendations** for the implementation of the programme in question recommend the use of information and communication technologies.

**Informatics with technical science for grades sixth to eighth primary school**

Key competencies are identified in the section on relatedness to other subjects and cross-curricular topics. The subject of Informatics with technical science is related to all subjects so that teachers can use examples from other subjects to achieve learning outcomes, and students can use the acquired knowledge and skills in the field of information and communication technologies for all other subjects. Through the subject Informatics with technical science it can directly and indirectly contribute to the achievement of cross-curricular topics: environmental protection, sustainable cities and settlements, health education and upbringing, education for and about human rights and entrepreneurial learning.

**Programmes of elective subjects**

In addition to the analysis of compulsory subject programs of the natural group of subjects, elective subjects were also analysed. The structure and content of the elective courses are given in the same model as the compulsory courses in accordance with the Methodology for Designing the Subject Programs. Compulsory elective courses in the curriculum have the function of a functional orientation for acquiring knowledge in the field that individually interests the students. There are over 20 elective courses offered in elementary schools, ten of which develop functional literacy in the natural sciences[[5]](#footnote-5). Elective courses include a note on the implementation of cross-curricular topics.

**Introduction to combinatorics and number theory for grades seventh, eighth and nineth**

The **objectives** state the ability to solve problems and to think critically, while the chapter section on **relatedness with other subjects and cross-curricular topics** states the expressed use of information and communication technologies in teaching, while through the development of initiative, persistence, creative approach to problem solving and hypothesis, and number theory deeply embedded in the development of entrepreneurship.

**Geometry for eighth grade primary school**

The **objectives** state the ability to solve problems and to think critically, while the section on **relatedness to other subjects and cross-curricular topics** first emphasizes the use of ICT in teaching. Through the development of initiative, persistence, creative approach to problem solving and hypothesis setting, geometry is deeply incorporated into the development of entrepreneurship.

In the chapter on **evaluation of educational outcomes**, he notes that stimulating the student's curiosity and their sense of progress in acquiring knowledge and skills are special challenges that teachers face in the teaching process. They are crucial to achieving good student outcomes. They are also directly related to self-learning, self-evaluation and, as a final outcome, the acquisition of competence to learn how to learn

**Sets, relations, functions for nineth grade primary school**

In the section on **relatedness to other subjects and cross-curricular topics**, the use of ICT in teaching is highlighted, but also through the development of initiative, persistence, creative approach to problem solving and hypothesis setting it is deeply incorporated into the development of entrepreneurship. In addition to the mathematical and scientific literacy competencies, critical thinking competencies and problem-solving competencies are the most common.

**Measurement in physics for the seventh grade primary school**

The subject Measurement in Physics, in the section on **relatedness to other subjects and cross-curricular topics** says that the connection can be achieved through topics that go beyond the content of the subject itself or represent the application of knowledge of Physics in another field, in the form of interdisciplinary student projects. The problems that a student solves through independent research in Measurement in Physics influence the development of responsibility for their own learning, and contain elements of initiative and risk-taking. Understanding the importance of creative innovation for economic development and responsible behaviour by nature are an integral part of the outcomes of Measurements in Physics and contribute to the adoption of outcomes of the cross-cutting topics Entrepreneurship and Sustainable Development.

Teaching Measurements in Physics mainly develop basic competencies in science and technology. The study and understanding of natural processes and phenomena, such as basic knowledge in the field of physics, plays an important role in the development of all technical disciplines and is essential for a successful understanding of the construction and functioning of measuring instruments and phenomena from everyday life. In Measurement in Physics teaching, transversal competences are developed: developing critical thinking, problem solving, developing creativity, initiative, decision making and risk assessment. Teaching Measurement in Physics enables the acquisition of components of key competencies:

* mathematical skills are developed primarily through the use of mathematical skills to process and display measurement results and to explore and interpret natural phenomena from everyday life;
* digital literacy competences are developed through the use of modern IT, especially in modelling phenomena in interactive computer simulations and animations, computer measurements and processing and presentation of measurement results.
* native language communication is developed primarily through reading, writing, comprehension and communication;
* students develop communication in foreign languages ​​mainly through the use of computer programs and interactive computer animations and simulations in a foreign language and the use of foreign printed and electronic sources in the preparation of reports, workshops and research assignments;
* learning achieved through the development of work skills, self-study, planning of one's own activity, responsibility for one's knowledge and confidence, skills;
* social competence includes competences in diverse group forms of work in the process of learning Measurements in physics.

**Chemistry through Experiments for grades eighth and nineth primary school**

Unlike other elective courses, the Chemistry through Experiments has no learning outcomes but is goal-based. In addition to developing scientific chemical literacy, this programme does not envisage the development of other key competences.

**Medicinal plants for eighth grade primary school**

The section on relatedness to other subjects and cross-curricular topics states that the optional subject Medicinal Plants also contributes to the achievement of cross-curricular topics: Environmental protection, Green economy, Entrepreneurship, Biodiversity. Through theoretical and practical teaching within this subject programme, students will gain knowledge about the impact of local plants on the life of the local community, develop responsible behaviour towards the environment, understand the importance of sustainable development and natural resources.

**Graphic design and image and photo processing grades seventh or eighth or nineth primary school**

As a recommendation for relatedness to other subjects, this subject is said to be **related to all subjects** so that teachers can use examples from other subjects to achieve learning outcomes, and students can use the acquired knowledge and skills in the field of graphic photo processing for all others subjects.

The evaluation of educational outcomes states that the emphasis of this course is on practical knowledge in the field of information and communication technologies (ICT), so the essence of the activities in the phase of knowledge assessment is working with practical exercises, not just theoretical knowledge in the field of ICT.

**Introduction to programming for nineth grade primary school**

The programme interconnects with **cross-curricular topics** such as: learning to learn, entrepreneurship, healthy lifestyles, mathematical competences, technical science competencies and the use of information and communication technologies.

**Interesting geography for eighth grade primary school**

The programme for Interesting Geography provides cross-curricular linkage, but there are no learning outcomes through which this is achieved.

**Spatial evaluation for grades eighth and nineth primary school**

In the section on **relatedness to other subjects** and cross-curricular topics, it states that in addition to contributing to the objectives of similar subjects, this programme also directly contributes to the achievement of cross-curricular topics such as: Climate change, Green economy, Environmental protection, Entrepreneurship, Human Rights and Biodiversity. Outcome of the cross-curricular topic Sustainable cities and settlements are, to a large extent, incorporated through educational outcome 3 in nineth grade. Learning outcomes related to cross-curricular topics are included in the educational outcomes.

**Healthy Lifestyles for grades eighth and nineth primary school**

The section on **relatedness to other subjects and cross-curricular topics** says that the essential role of the Healthy Lifestyle course is to support the healthy development of children and young people, and that at the heart of it is the development of life skills. be correlated with or contribute to the achievement of the objectives of this subject. Responsible use of ICT technology is important especially in order to enable children to find reliable information, as well as to behave responsibly on social networks, and in this part, there is a significant correlation with the subject Informatics with technology.

**Entrepreneurship for grades seventh or eighth or nineth of primary school**

The section on **relatedness to other subjects and cross-curricular** topics states that Entrepreneurship in mathematics teaching is reflected in the connection of teaching contents with the real life and work environment - application of mathematics in sports, construction, finance, market research, technology, etc. Entrepreneurship can be linked to geography in topics related to tourism, transport, travel, industry, demography, the labour market, environmental protection and similar topics. In history teaching, it helps students better understand social processes in the past, the problems people face, their attitudes and beliefs, the activities and events in which they participate. In the teaching of languages, native and foreign, entrepreneurial learning is aided by the development of written and oral communication, the development of generic skills and the building of entrepreneurial attitudes. Language teaching is very suitable for all forms of entrepreneurship and is very important for gaining self-confidence through the development of presentation and public speaking skills. In the teaching of physics, chemistry and biology, entrepreneurship can be integrated with activities that are based on experiments, group and team work, hands-on activities, as well as content dealing with natural resources and energy. Entrepreneurship can be applied in informatics through practical knowledge in areas such as statistical analysis, development of simple applications, creation of various simple databases, creation of publications and promotional materials (websites, videos, brochures, etc.). Thus, students recognize the importance of information technology in contemporary society, whether in the field of business or for personal needs.

**4.3 Secondary general education**

**Publicly valid general secondary education curriculum (2016)**

The goals stated in this programme are:

* acquiring the necessary knowledge, skills, abilities and habits, based on the achievements of science and technology;
* culture and art, in order to continue education;
* achieving an internationally comparable level of knowledge;
* developing critical thinking and judgment;
* developing communication and non-violent conflict resolution capabilities;
* developing a responsible attitude towards the work and environment and their own health;
* developing solidarity and capacity to live in a pluralistic and democratic society;
* fostering understanding, tolerance and solidarity.

The revised educational programmes have been applied in all first grades of the gymnasium since the school year 2006/2007 and they have no educational outcomes. Although the last significant change to the subject curricula for high schools (curriculum change and 30% relief of the subject curricula) was determined in 2016, the Bureau for Education Services is currently reviewing them according to the Methodological Instruction for writing subject programmes based on learning outcomes.

**In all subject programmes** for secondary general education, the definition of the subject programme contains this **Note**: Cross-curricular areas/topics are obligatory in all subjects and all teachers are obliged to accomplish them. Cross-curricular areas/topics are content that enables the inclusion of specific goals and contents of education in the general curriculum that are not part of formal disciplines or individual subjects, or which are interdisciplinary in structure. These contents contribute to the integrative approach of general education and to a greater extent connect the contents of individual subjects.

Key competences for lifelong learning are **not recognized through operational objectives**. Only in the subject programme of Physics there are general goals clearly stated and emphasize the importance of key competences that need to be developed during the teaching and learning process.

In other subjects such as Mathematics, Chemistry, Biology and Informatics, developing key competencies is not found in the proposed activities for students or in the didactic recommendations for teachers.

**Physics**

The **general objectives of the subject programme** state that teaching physics, as one of the basic general education subjects in the gymnasium, develops mainly basic competences in science and technology. The essential elements of key competences that are being developed in teaching physics are the development of critical thinking, problem solving, developing creativity, initiative, decision making, risk assessment.

The education in Physics enables the acquisition of **many components of other key competencies**:

* mathematical skills are developed primarily through the use of mathematical skills to investigate natural phenomena and to interpret phenomena from everyday life;
* digital literacy competences are developed through the use of modern information technology, especially in modelling phenomena in interactive computer animations and processing measurement results;
* native language communication is developed primarily through reading, writing, comprehension and communication;
* communication in foreign languages ​​is developed mainly through the use of computer programmes and interactive computer animation in a foreign language and the use of foreign printed and electronic sources in the preparation of reports, workshops and research tasks;
* learning is achieved through the development of work skills, self-study, planning of one's own activity, responsibility for one's knowledge and confidence, skills;
* social competence includes competences in diverse group forms of work in the process of learning physics.

**Elective subjects**

Elective courses were reviewed: Business Informatics for grades second or third, Research Methods and Techniques in Chemistry for second grade, Methods of Isolation and Identification of Organic Substances for fourth grade, Biodiversity for all four grades, Mathematical Functions in Physics for all four grades. The elective courses of the natural group for general secondary education do not recognize the determinants for the development of key competences.

**Guidelines for implementation of cross-curricular topics**

In order to support teachers in the implementation of cross-curricular topics, several guides have been developed:

1. Guide for the implementation of the cross-curricular topic on Entrepreneurial Learning for preschool education;
2. Guide for implementation of the cross-curricular topic on Entrepreneurial learning for primary education;
3. Guide to the implementation of the cross-curricular topic on Entrepreneurial Learning in secondary general education;
4. Guide for the implementation of the cross-curricular topic on Education for Sustainable Development for preschool education;
5. Guide for the implementation of the cross-curricular topic on Education for Sustainable Development in general education;
6. Guide for the implementation of the cross-curricular topic of Climate Change;
7. Guide to the implementation of the cross-curricular topic on Spatial Evaluation and Planning;
8. Guide for Implementing Healthy Lifestyles;
9. Guides for developing students' social and emotional skills.

A guide for implementing the cross-curricular topic on Digital Literacy is under development.

**4.4. Secondary vocational education**

According to the EU Strategy and Recommendation 2006/962 for VET on key competences for lifelong learning, the integration of key competences within vocational education has been achieved through the reform of the curriculum based on professional and qualification standards in 2017 under the responsibility of the Centre for Vocational Education and Training of Montenegro. The outcomes of key competences have been introduced into the modules of the teaching and learning programmes, for all levels of vocational education as well as into the standards of professional qualification. In addition, in vocational education, key competences are realized through compulsory, vocational-theoretical, general education and elective subjects, where they are stated through goals and methodological recommendations. Part of the goals, in addition to the professional competences that are taken from occupational standards, are key competences that are achieved through the programme. The achievement of key competences in all modules is not compulsory if this is not possible, but development of all eight is required within the educational programme. The methodological recommendations instruct teachers how to relate student-centred learning and learning strategies that develop responsibility for their own knowledge, learning from multiple sources, and the use of information technology.

The outcomes of the eight key competences equivalent to the European Framework are contained within the section called the General information section of the educational programme, which states that, upon completion of the educational programme, the student will be able to:

* communicate in the mother tongue, using proper and creative oral and written expression, interpreting concepts, attitudes and facts, as well as the use of language in education, work, leisure and daily life;
* communicate in a foreign language, using proper and creative oral and written expression, as well as the use of language in education, work, leisure and daily life;
* use mathematical competence and basic competences in natural sciences and technology, applying mathematical thinking to problem solving in different everyday situations, as well as knowledge and methodologies explaining the world of nature to ask questions and make conclusions based on facts;
* use information and communication technologies for work in personal and social life, for finding, assessing, storing, creating, displaying and exchanging information, as well as for developing collaborative networks through the Internet;
* organize lifelong learning of its own, including the effective management of time and information, both in independent and group learning;
* participate in social life and work, especially in ever-changing societies, with the aim of resolving conflicts, if necessary, in an efficient and constructive manner, based on developed interpersonal and intercultural skills;
* turn ideas into action, including creativity, innovation, willingness to take risks, seize opportunities, promote good governance, the ability to plan and lead projects to achieve goals, as well as lead a daily, professional and social life with a developed awareness of ethical values;
* see the importance of expressing creatively ideas, experiences and emotions in a range of arts and media including music, performing, literary and visual arts, as well as the importance of local, national and European heritage and their place in the world.

Special attention has been given to the development of entrepreneurial competence in vocational education, as envisaged by the Lifelong Entrepreneurial Learning Strategy (2015-2019). Entrepreneurship as a special module, as a subject or entrepreneurial club as an extracurricular activity, is found in all educational programmes. In addition, linking schools and businesses is supported by the establishment of a training company and a service centre that assists with company registration procedures, obtaining a VAT and a bank account through an online platform. Companies for exercise develop their own business plans and participate in international fairs.

Key competences are developed through all general education subjects, where they are integrated with the goals given in the programmes, e.g. "to develop the ability among students to reflect on their own social position... as a basis for participation in social life and tolerant and responsible behaviour".

Student leisure activities or extracurricular activities containing compulsory and optional content are also a chance for developing key competencies. They are represented with starting from one hour a week, offering a wide range of activities such as getting to know the cultural and historical landmarks of their environment, nature days, processing environmental issues, visiting fairs, freedom and responsibility, human dignity and human rights, etc.

**Conclusions**

In the legislative framework, key competences are represented within the formulation of goals, namely in the General Law on Education, in the Law on Primary Education, the Law on Gymnasium, in the Law on Vocational Education and in the Law on the National Qualifications Framework.

**The Methodological Guidelines** for Writing Subject Programmes Based on Learning Outcomes (2017) are explicitly listed or recognized in the following chapters: B. Identifying the subject that is the source for formulating the formative and educational goals of the programme, C. Objectives, D. Relatedness to other subjects and cross-curricular topics, E. Educational outcomes of the course and F. Didactic recommendations.

Key competences have been described in the context of school and learning objectives as a set of developmental, process, formative goals that imply skills and values ​​that fully correspond to the recommendation of the EU framework. They are not mentioned as a term, except as one of the names of these goals. Particularly emphasized is the concept of Competence for the 21st century (Pešikan & Lalović, 2016), among which the competencies of literacy, multilingualism, cultural, mathematical and competence in science, technology, engineering are not directly recognized, while the rest are represented.

It is not expected for every programme to develop all the proposed development goals but those that are closely related to it.

All parts of the programme structure lead to the achievement of outcomes that are formulated at a general and specific level. The cognitive goals formulate educational outcomes that are determined in the form of standards, which are then broken down into learning outcomes that are more appropriate for the organization of learning in the school. The outcome formulations (broader and narrower) set out in this way represent an already existing platform for “lowering” the broadly formulated meta-outcomes from the Key Competences Framework into school learning. This leads us to the conclusion that the developmental, formative goals of key competences in certain programs are formulated as outcomes, which is clearly seen in certain programs. It is also recommended that more learning time (part-time, even the entire course) be allocated to the realization of process outcomes (competencies) than cognitive ones.

The chapter dealing with the evaluation of the achievement of the subject outcomes is a good starting point for monitoring and formatively evaluating the adoption of the outcomes of key competences.

According to the overview of **programmes for the level of pre-school education**, the representation of the development of the eight key competencies recommended by the Reference Framework is fully covered by both the primary programme and the specialized and additional programmes through formulated goals and areas of activity. Linking knowledge, skills and values ​​across learning activities and topics develops key competencies through an integrative programming setting. The realization of these competences is foreseen for all children attending pre-school institutions and through all areas of activities in pre-school education.

In the analysis of individual compulsory and elective subjects **for primary school**, there is an incoherence with respect to which segments of the subject programme are represented with development of key competences, which probably depended on the authors themselves. For some programs, they are also included in the programme definition, goals and outcomes, linkage to other subjects and cross-curricular topics, and somewhere only through cross-curricular relatedness.

In grades of first and second cycle of primary school, the objectives of the cross-curricular topics Education for Sustainable Development and Entrepreneurial Learning are mostly represented, while the learning and digital competences are introduced in the part of the programme that relates to student activities for achieving learning outcomes and in didactic recommendations. Grades within third cycle contain broader descriptions and recommendations for the development of transversal competencies, most dominated by cross-curricular topics of sustainable development, learning competencies, information literacy and entrepreneurial. They are in the definition of the subject programme, in the goals and in relatedness to other subjects and cross-curricular topics. In the chapter on outcomes, it is generally stated that the contents of cross-curricular topics can be realized as outcomes.

The didactic recommendations are dominated by proposals for the use of information and communication technologies for grades of the first cycle, and for some subjects of second and third cycles methods of active learning are included as well as training for independent learning, research, argumentative ideas, asking problems, planning, observing, presenting and interpreting results.

Other key competencies, such as Literacy, Multilingual Competence, Personal and Social, Civic and Cultural Awareness, were not recognized in these subject programmes, probably because the authors of the programme included formative goals and outcomes that are close to their subject.

The reform (2016) of the **general secondary education** curriculum, within the operational objectives, identifies, among others, certain transversal and civic competencies, but others are not listed. Within the definition of the subject programme, it is noted that all teachers are obliged to pursue cross-curricular areas/topics within all subject programmes. In the subject programmes of mathematics, chemistry, biology and informatics, except physics, the development of key competences is not in the goals or in the part of the programme with proposed activities for students and didactic recommendations for teachers. Also, it is not found in elective subjects of the natural group.

The reform (2017) of an educational programme based on professional and qualification standards introduced the outcomes of key competences into all educational programmes and at all levels of **vocational education**. Key competences in vocational education are developed through general education subjects, modules - compulsory and elective, professional-theoretical subjects and free/extracurricular activities. Programmatically and conceptually, the approach to the development of key competences in VET programmes is comprehensive and coherent.

By reviewing and analysing the content of educational programs at different levels of education, they identify different conceptual and methodological approaches to the development of key competences. Certain conceptual and terminological diversity of approaches that programmatically encompass the development of key competences can be overcome by the Key Competence Framework Programme, which would integrate existing pluralism with guidance on outcomes for all levels. By looking at the findings of both reports - programme analysis and analysis of teachers' competences and practices, the Framework Programme does not modify but rather deepens and links existing practices in schools in Montenegro.

1. Official Gazette of the Republic of Montenegro, no. 064/02 dated 28/11/2002, 031/05 dated 18/05/2005, 049/07 dated 10/08/2007, Official Gazette of Montenegro no. 004/08 dated 17/01/2008, 021/09 dated 20/03/2009, 045/10 dated 04/08/2010, 073/10 dated 10/12/2010, 040/11 dated 08/08/2011, 045/11 dated 09/09/2011, 036/13 dated 26/07/2013, 039/13 dated 07/08/2013, 044/13 dated 20/09/2013, 047/17 dated 19/07/2017) [↑](#footnote-ref-1)
2. Official Gazette of the Republic of Montenegro, no. 64/2002, 49/2007 and Official Gazette of the Republic of Montenegro, no. 45/2010, 40/2011 – other law, 39/2013 (Article 34 in non-profred text) and 47/2017. [↑](#footnote-ref-2)
3. Official Gazette of the Republic of Montenegro, no. 064/02 dated 28/11/2002, 049/07 dated 10/08/2007, Official Gazette of Montenegro, no. 045/10 dated 04/08/2010, 073/10 dated 10/12/2010, 039/13 dated 07/08/2013, 047/17 dated 19/07/2017. [↑](#footnote-ref-3)
4. Official Gazette of the Republic of Montenegro, no. 64/2002, 49/2007, 45/2010 39/2013 I 47/2017. [↑](#footnote-ref-4)
5. <http://www.zzs.gov.me/naslovna/programi/osnovno> [↑](#footnote-ref-5)