**Annex 1: Logical Framework Matrix**

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| **Overall Objective** | **Objectively verifiable indicators** | **Means of verification** |  |
| * To improve quality of primary and secondary education provision and support to ITE, CPD and QA at primary, secondary and higher education levels. | * Educational achievement (outcomes) in STEM increased within 4 years | * TIMMS (2023) * PISA (2021) * Country reports |
| **Project purposes** | **Objectively verifiable indicators** | **Means of verification** | **Assumptions** |
| * To improve students achievement related to key competences for LLL and quality of work and teaching of primary and secondary education; * To improve quality assurance system at all levels; * To develop education and teacher professional competences both in initial teacher education (ITE) and continuous professional development (CPD) with regard to integration of key learning competences with particular focus on STEM disciplines. | * 80% of primary and secondary schools integrated STEM and other key competences * New standards and procedures for both internal and external QA for primary, secondary and higher education contain indicators about key competences approved and in regular use * ITE study programmes at the UoM containing modern pedagogy, STEM and other key competences approach approved and regularly delivered to students * 80% of elementary and secondary school teachers trained and regularly use STEM and key competences in teaching | * Country reports * MoE reports * External reports on QA of providers at all levels of education * Bureau for Education Services reports * Senate of the UoM decisions on approving new study programmes for ITE * Training reports * School reports (development plans, annual plans, pedagogic documentation) * Project Progress Reports | * Strategic and legal frameworks for various education levels are in place * The need for a learning outcomes approach in learning and teaching, and to the setting of attainment standards and examinations is widely accepted by stakeholders |

| **Results** | **Objectively verifiable indicators** | **Means of verification** | Assumptions |
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| 1. Developed a national key competence curriculum framework, with further focus on STEM, mobilised commitment and standards set for STEM; | * The national key competence framework document developed and approved; * The STEM implementation and monitoring plans together with standards and targets for STEM produced (e.g. in terms of teacher competences, instructional materials, programmes, equipment). | * Project Progress Reports * Montenegrin Key Competence Curriculum Framework * Roadmap for integration STEM key competence | * Competent experts are engaged/ recruited as service providers * Education faculties accept the need for reform of pre-service education programmes for primary and secondary schoolteachers |
| 1. The sustainable process for analysis of inputs, outputs and effectiveness of STEM education established; | * National Research: Produced analysis of educational achievement (outcomes) in STEM based on TIMMS, PISA and Montenegrin assessment data; * Produced review of science, maths, engineering and technology primary and secondary school curriculum, resources and teaching methods and workforce competences; * Produced review of CPD and initial teacher education in STEM; * Established process for regular evaluation of processes and outcomes in STEM, through internal and external inspections, international and national assessment. | * Project Progress Reports * Four catalogues with assessment items, in line with STEM and other key competences, for mathematics, physics, biology and chemistry * Study on national testing for II and III cycle of primary education for mathematics, physics, biology, chemistry * Report on analyses of educational achievements for II and III cycles of primary education in STEM disciplines * Report on present state of using cross curricular approach and key competences in Montenegrin education system * Report on review of CPD and initial teacher education in STEM * Report on review of science, maths, engineering and technology primary and secondary school curriculum with focus on education programmes for mathematics, physics, biology, chemistry and informatics (with technics), resources and teaching methods and workforce competences * Three sets of QA standards for STEM * New documents related to QA of processes in primary and secondary education * New documents related to QA of processes in higher education * 10 self-evaluation and 10 external evaluation QA from primary and secondary education |
| 1. Systematic implementation of the STEM implementation plan leading to improvements in STEM inputs, processes and outcomes. | * Education programmes for mathematics, physics, biology, chemistry and informatics (with technics) for primary and secondary schools revised and approved in light of national and international standards; * The HE study programmes for ITE Mathematics (and for ITE study programmes for other STEM subjects if above reviews demonstrate the need) validated and/or revised; * Designed the CPD training modules for STEM and training of teacher trainers to deliver modules; * 960 STEM teachers trained (out of 1200 STEM teachers delivering STEM teaching in primary and secondary education in school year 2017/2018, 80%); * 900 ISCED 1 level primary school teachers trained for key competences; * Trained the BES QA officers for STEM in, for supporting the evaluation, monitoring and implementation of the STEM implementation plan in schools; * School managers and primary and secondary teachers trained to support implementation of the STEM primary and secondary education plan and carry out internal evaluation; * Academic staff of the Faculty of Philosophy, Faculty of Philology and Faculty of Sciences and Mathematics trained to implement and qualitatively assure new ITE HE programmes (including new pedagogies, technologies and learning modes). | * Project Progress Reports * Comprehensive guidelines for school managers, ISCED level 1 class teachers and ISCED levels 2 and 3 subject teachers developed * Methodological instructions for curricula developers revised and recommendations to integrate key competences in curricula at ISCED levels 1, 2 and 3 formulated * Methodological instructions and guidelines for assessment criteria and their linking with education outcomes through formative assessment * Study programme for Mathematics revised * Recommendations and experiences from the study programme for Mathematics disseminated to other study programmes at the Faculty of Science as well as to programmes at the Faculty of Philosophy and the Faculty of Philology, training developed and delivered to academic staff * Recommendations to integrate key competences at all study programmes at the University of Montenegro, according to Montenegrin key Competence Framework Curriculum * Training programme for STEM primary and secondary school teachers to teach STEM and other key competences * Training programme for classroom teachers (ISCED 1) to teach STEM and other key competences * Training programme for school management to support STEM and other key competences * Training programme for curricula developers to support STEM and other key competences in curricula development * ToT programme * On-line platform for exchange of practice * Training programme for academic staff at UoM * Trainings programme for QA teams at the higher education institutions * Training reports * Capacity building report * Study tour report |  |

| **Activities** | **Means (inputs)** | **Specification of costs** | **Assumptions** |
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| **Inception phase**   * 1. Kick-off Meeting with the Contracting Authority   2. Setting up of the Project Office   3. Orientation meetings with beneficiaries and analysis of background documents   4. Establishment of the Project Coordination Group and commencement of the process for establishment the Project Steering Committee   5. Developing the work plan   6. Drafting and submission of the Inception Report | * KE 1: 240 wds * KE 2: 200 wds * KE 3: 150 wds * SNKEs: 250 wds * JNKEs: 250 wds * Office support staff – full time * Beneficiaries – as required * Contracting Authority – as required | *Available max. budget*  *€ 939,779.70*  *including:*   * *€ 251,764.70 – incidental costs* * *€ 10,115– expenditure verification* | * MoE and educational institutions have good cooperation in project implementation * Key stakeholders can be recruited to working group to develop and implement strategies and plans * Lessons learnt from previous interconnected projects |
| **Component 1:** **Development of key policy and framework documents**   * 1. Development of the national key competence curriculum framework (a comprehensive framework document)   2. Development of the implementation and monitoring plans for STEM setting out timelines and assigning responsibilities and functions to key actors, on the basis of the developed national competence framework   3. Development of quality assurance standards for STEM, to be integrated within national QA processes |
| **Component 2: Curriculum development - Development and review of education programmes, guidelines and assessment criteria**   * 1. Revision of science, maths, engineering and technology primary and secondary school curriculum, resources and teaching methods and competences   2. Revision of CPD and initial teacher education in STEM from the point of view of key competences   3. Organise customised study-visit to appropriate EU member state for policy makers to explore and verify proposals for curricula, teaching, learning and assessment methodologies   4. Development of teacher guidelines for teachers teaching STEM   5. Development of methodological instructions and guidelines for assessment criteria and their linking with education outcomes through formative assessment   6. Pilot revision of mathematics study programme with regards to pedagogy and psychology, didactic and methodology aspects and content, with focus on innovative teaching pedagogy and STEM competences |
| **Component 3: Teacher training (pre-service and CPD) for delivering key competences and STEM**   * 1. Development of teacher training programmes on key competences on the basis of the new key competence strategic framework, with particular focus on STEM   2. Delivering teacher training programme on key competences for 960 STEM teachers   3. Delivering teacher training for 900 ISCED 1 level primary school teachers for key competences   4. Support the trainings, develop and regularly maintain on-line platform to support teacher training and peer learning through exchange of practice |
| **Component 4: Quality assurance**   * 1. Development and introduction of key competence indicators in QA methodology and revision, and improvement of appropriate criteria and processes for internal and external evaluation   2. Consultations (training) of members of school internal evaluation team for internal evaluation in primary and secondary schools (12 one-day seminars, for approximately 360 persons)   3. Training and support to staff in the BES, the schools and HE institutions that are directly responsible for quality assurance (including internal and external evaluation) with respect to STEM |
| **Component 5: Analysis of inputs, processes and outputs of ST**   * 1. Carrying out national research for II and III cycles (ISCED 1 and ISCED 2 levels) for STEM disciplines (using representative sample) (develop a study)   2. Developing the new assessment items for testing student achievements in STEM disciplines   3. All activities under components should be coordinated with respect to timing and results |
| **Crosscutting activities**   * 1. Project monitoring and evaluation   2. Meetings of the PSC   3. Reporting the Project progress |
| **Closing phase**   * 1. Conducting the hand-over process and closing the Project office |