REPORT ON THE EVALUATION OF THE PROJECT
Regional Science Centre for STEM education in primary schools- LORI – LORI

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| Contract number: | 04-UBS-Š-0620/22-05 | | | | | | |
| Project title: | Regional Science Centre for STEM education in primary schools- LORI | | | | | | |
| Project promoter: | City of Ludbreg | | | | | | |
| Project partners: | Ludbreg Elementary School, Veliki Bukovec Elementary School, Varaždin County, First Scandinavia, Međimurje Polytechnic, Sveti Đurđ Elementary School | | | | | | |
| Eligible amount: | 2.950.302,10 EUR | | | | | | |
| Start / End date of the Project: | DD | MM | YYYY | to | DD | MM | YYYY |
| | 01 | 08 | 2022 | | 30 | 04 | 2024 |

## 1. Were all project activities implemented in line with the Annex I. of the Project contract?

All planned project activities were implemented in accordance with the Project Contract, Annexes I and II, and Addendums I and II, with minor time deviations and adjustments made during project implementation in agreement with the Programme Operator and recorded in 11 Notices on minor amendments.

These activities are as follows:

Activitiy 1. Development of STEM teaching skills for teachers and other educational workers.
Activitiy 2. Development of IT and entrepreneurial skills for teachers and other educational workers in primary schools.
Activitiy 3. Development and enhancement of STEM skills for primary school pupils.
Activitiy 4. Development and implementation of extracurricular activities for primary school pupils in the field of IT and entrepreneurship.
Activitiy 5. Implementation of practical teaching models in education and other pedagogical activities.
Activitiy 6. Reconstruction and equipping of the Regional Science Centre for STEM education in primary schools- LORI.
Activitiy 7. Establishment and operation of the Regional Science Centre for STEM education in primary schools- LORI.
Activity PM: Project management and Administration
Activity I&C: Information and communication

The implementation schedule had certain changes, for several reasons, e.g. in order to adjust to the workload of teachers and pupils during the school year, delays within activity 6 Reconstruction and equipping of the Regional Science Centre due to obtaining permits and approvals for the reconstruction and equipping of the Center. Deviations from the plan did not affect the achievement of the planned results.

Due to the alignment with professional terminology, target values of indicators 2.3.1 Number of educational programmes (TOT) for STEM skills, ICT, entrepreneurship and active citizenship for professionals implemented and 2.3.2 Number of educational programmes for STEM skills, ICT, entrepreneurship and active citizenship for pupils implemented were changed in a way that new targets were programs containing modules. Instead of the previously defined 22 programs as target values of indicator 2.3.1, a correction was made to 4 programs with a total of 23 modules. Instead of the previously defined 33 programs as target values of indicator 2.3.2., a correction was made to 4 programs with a total of 35 modules. The change from programmess to modules had no impact on the content, all planned content was included in the new format. Therefore, the aforementioned change did not have an impact on achieving the project results.

## 2. Were all planned project results achieved within the project implementation period?

Planned project result "Enhanced STEM skills" was fully achieved. Through Activities 1–5 and 7, 31 teachers and 423 pupils improved and enhanced their STEM skills. All planned indicators were achieved during the project implementation, as evidenced by the documentation provided within the project framework. According to the achieved results, STEM skills were significantly improved among both teachers and pupils in primary schools.

From the reports on surveys conducted, it is evident that the educational programmes were highly effective, demonstrating the achievement of the anticipated project results. Teachers developed critical thinking and learned to use assistive technologies, drones, renewable energy, and 3D pens in their STEM teaching practices.

Through participation in four study visits to Norway, teachers attended professional conferences, visited Newton rooms and universities, and exchanged experiences with Norwegian Newton teachers. This exposure enabled them to learn about Scandinavian practices and advanced STEM teaching methodologies. The implementation of Newton modules into school curricula as supplementary education has encouraged the exchange of best practices. It has also strengthened teachers' abilities to integrate innovative techniques and technologies into teaching, thereby improving pupils' STEM competencies.

The transfer of knowledge, information, and best practices from Norway has provided teachers and pupils in Ludbreg and Varaždin County with opportunities to acquire new skills and knowledge in STEM fields. Representatives of First Scandinavia conducted extensive training for teachers at the LORI Center based on the Newton concept, ensuring the successful implementation and adaptation of new educational approaches to the local context.

The project included activities to strengthen both the competencies of educational workers and pupils (Activities 1, 2, 3, 4, 5, and 7) and the required infrastructure (Activities 6 and 7). Teachers, educational staff, and pupils participated in a variety of trainings, fieldwork, and practical lessons, as well as in knowledge exchange during four study visits to Norway (Bodø, Oslo/Nordre Follo, and Trondheim).

During these training courses, teachers and other educational staff gained knowledge and acquired skills in new teaching methods and the transfer of specialized knowledge in STEM fields. They focused on topics related to developing creativity and innovation through STEAM and STEM approaches and sustainable development. On one of the study visits to Oslo, participants learned about the Newton methodology and practices in STEM education, attended workshops, and visited LEGO educational workshops. Another visit included a trip to the Tekniskmuseum in Oslo to learn about integrating museum activities into school curricula. The third visit involved the Faculty of Science and Technology in Ålesund, where teachers explored laboratory work, tools, and machinery, and visited Atlanterhavsparken Aquarium to learn about practical work in STEM fields.

It is commendable that the project provided equal educational opportunities for all pupils. Specialized workshops were conducted for gifted pupils and pupils with special educational needs. These workshops enabled teachers and educational staff to acquire specific skills for working with diverse groups of pupils, while pupils with special needs gained STEM-related knowledge and skills.

Pupils' STEM skills were strengthened through participation in workshops, educational programs, field lessons, and STEM-related study trips. Field lessons, such as visits to the Nikola Tesla Memorial Center in Smiljan, the Nikola Tesla Experience Center in Karlovac, and the newly established Regional Science Center LORI, further motivated pupils to study STEM subjects. These activities helped pupils understand the practical application of scientific methods in daily life, fostered multidisciplinary thinking, and demonstrated the relevance of STEM in their everyday lives.

During these experiences, pupils developed programming skills through practical projects, learned teamwork, and acquired knowledge in exploring scientific concepts through experiments, engineering challenges, and mathematical tasks. These activities encouraged creativity, critical thinking, and problem-solving abilities. As a result, pupils expanded their practical skills, creativity, and the capacity to address challenges within STEM disciplines.

### 3. Was the planned contribution to the Programme results achieved within the project implementation period?

All the planned contribution to the Programme results were achieved within the project implementation period, from August 1, 2022 to April 30, 2024.

Through Activities 6 and 7 contributions to the following Programme results were achieved:

2.1. Upgraded infrastructure and equipment to create functional STEM classrooms - through the implementation of Activity 6, namely the reconstruction of two buildings with a total area of 489 m2, which house the Regional Science Center for Primary Education in the STEM field. The Center was equipped with specialized equipment, and two classrooms (Alpha and Beta) were established, enabling education in natural sciences, technology, engineering, and mathematics (STEM). These classrooms are designed for introducing and implementing specialized STEM modules in fields such as robotics, programming, mathematics, physics, chemistry, geometry, biotechnology, energy generation and transfer, scientific measurement, and experimentation. The procurement of equipment for a variety of teaching modules enabled active STEM learning, which fosters practical skills and innovative thinking.

2.2. Established Regional Science Centers - In addition to providing the infrastructure, through the implementation of Activity 7 the LORI institution was established and took over the management of the Regional Science Center. Business and Development Plan of the Regional Science Center Lori is created.

2.3. Improved STEM skills of teachers and other educational staff in primary schools

Participation in three study trips to Norway enabled 31 teachers to gain practical knowledge and insight into advanced STEM teaching methods, encouraged the exchange of good practice, and strengthened their ability to integrate innovative techniques and technologies into teaching, which will improve pupil competencies in the STEM field. Participation in six seminars and lectures enabled teachers and other educational staff to gain skills for new approaches of teaching and transferring specialized knowledge in STEM fields on the following topics: Development of creativity and innovation through the STEAM approach (methods and forms of work adapted to work with gifted children) (two seminars), STEM and sustainable development (possibility of integration into school projects) (two lectures), Gamification of STEAM learning and teaching (2 online seminars).

**B.**1. Supported bilateral cooperation - City of Ludbreg signed a long-term cooperation agreement with the organization First Scandinavia, which, in addition to the successful implementation of the project, also ensures cooperation and monitoring of the Center and assistance in its work in the future by Norwegian partners.

Under the agreement between the City of Ludbreg and the Norwegian partner institution First Scandinavia, the Regional Science Centre for STEM education in primary schools- LORI joined the multinational Newton network. This membership provides access to all designed and tested modules, continuous communication and support from First Scandinavia, and opportunities for sharing experiences and best practices.

### 4. Are all perquisites for the sustainability of project ensured in line with Annex I. of the Project contract, as well as Article 8.14 of the Regulation?

All perquisites for the sustainability of project are ensured in line with Annex I. of the Project contract, as well as Article 8.14 of the Regulation.

Through project activities aimed at strengthening the capacities of primary education, both sustainability and long-term effects of the project were achieved. Additionally, a synergy was established between enhancing teacher and educational staff competencies and upgrading STEM infrastructure. This was accomplished through the reconstruction and equipping of two buildings in Ludbreg according to the Newton concept and standards (Activity 6) and the establishment of the Regional Science Centre for STEM education in primary schools- LORI, managed by the newly established institution LORI (Activity 7).

The prerequisites for project sustainability have been established by developing a structure that enables the continuation of activities after the project's completion. These include professionally trained teaching and non-teaching staff, the future development of their professional knowledge and management skills, developed and tested new educational programs for primary schools, newly created and applied interactive content for pupils in STEM, ICT, and entrepreneurship in both curricular and extracurricular activities, upgraded infrastructure and procured equipment, as well as the establishment of two equipped STEM classrooms.

The project’s sustainability has been ensured primarily through the establishment of the Regional Science Centre for STEM education in primary schools- LORI, owned by the City of Ludbreg. The city has transferred the management of property and equipment intended for STEM education to the Center through a formal agreement. An institution to manage the Regional Science Center has been established, with political support secured at the local and regional levels (City of Ludbreg, Varaždin, Međimurje, and Koprivnica-Križevci Counties). According to the terms of the agreement, the Center is authorized and obligated to manage, maintain, and use the entrusted assets according to their intended purpose.

Business and Development Plan of the Regional Science Centre for STEM education in primary schools-LORI 2024-2027 is created, which details the method of ensuring the sustainability of the Center for the period after the project implementation period, and it will be renewed successively. The Statute of the Regional Science Center Lori and the Agreement on the Management of Real Estate and Movable Property Intended for STEM Education ensure the sustainability of the project during the period defined by the Project contract.

It is commendable that the plan provides for monitoring the activities and interest of the Center's users and for adjusting activities and increasing the quality of work in accordance with the needs of users.

Financial sustainability provides City of Ludbreg financing salaries and material costs of employees, as well as programs and regular performance of activities, while at the same time, it is expected that Center will generate its own financial resources by providing services from its activity and other permitted legal sources.

5. **Are all mandatory requirements involving ownership of project results met, in line with the Project contract, Partnership agreement(s), as well as the provisions of the Article 8.3. of the Regulation?**

The City of Ludbreg, as the Project Promoter, owns the property and parcel where the Regional Science Centre for STEM education in primary schools- LORI is located. The City established the institution LORI to manage the Center and appointed a director, with a Management Agreement for the Center signed.

According to the terms of the agreement, the Center is authorized and obligated to manage, maintain, and use the entrusted assets according to their intended purpose. This includes organizing educational activities, promoting STEM education, and ensuring the assets remain aligned with the project's goals for at least five years after its completion.

In accordance with Article 8.1 of the Special Conditions of the Contract, the Project Promoter and Partners retain ownership of assets and other rights related to the project results and do not transfer ownership rights to third parties.

In accordance with Articles 8.2 and 8.3 of the Special Conditions of the Contract, the Project Promoter retains ownership of all properties reconstructed through the project, as well as the equipment financed by the project, and continues to use the reconstructed properties in line with the project's objectives. Furthermore, the properties and equipment are properly insured as part of the city's assets, and the municipal budget ensures the necessary resources for the maintenance of buildings and equipment.

In this way, all mandatory requirements related to the ownership of project results are fulfilled, in line with the project contract, partnership agreement, and the provisions of Article 8.3 of the Regulation.

6. **Has the project achieved the planned contributions to the horizontal principles (good governance, sustainable development, long-term economic growth, social cohesion, environmental protection) in accordance with the Agreement?**

The project has made notable contributions to the horizontal principles.

**Good Governance**

The LORI project adhered to the principles of good governance through transparent decision-making, active collaboration with local and international partners, and effective resource management. Regular communication with stakeholders, including schools, municipal authorities, and partners such as First Scandinavia, ensured that project goals aligned with broader community needs. Procurement processes were conducted with full transparency, while regular progress updates ensured accountability at every stage of the project.

**Sustainable Development**

Sustainability was embedded throughout the project's design and implementation. The renovation of buildings to house STEM classrooms included the use of energy-efficient materials and designs, ensuring long-term environmental and financial benefits. Additionally, educational content developed within the project introduced pupils and teachers to topics such as renewable energy, resource

efficiency, and climate change, equipping them to contribute to sustainable practices in their future careers and daily lives.

**Long-Term Economic Growth**

By enhancing the STEM skills of teachers and pupils, the project directly contributed to the region's economic potential. Teachers were trained in advanced methodologies, enabling them to deliver high-quality education that prepares pupils for careers in STEM-related fields. This improved workforce readiness is expected to boost the region's competitiveness in science, technology, and innovation sectors. Moreover, the project fostered entrepreneurial thinking among pupils, further promoting economic growth.

**Social Cohesion**

The LORI project prioritized inclusivity by addressing the educational needs of diverse pupil groups, including those with disabilities and pupils from economically disadvantaged backgrounds. By providing equal access to STEM resources and programs, the project reduced educational disparities and strengthened community bonds. The active involvement of parents and the wider community in the educational activities of the Center and the implementation of the project helps to create a shared sense of responsibility and support for education. Special attention is paid to encouraging girls to participate in STEM fields, thereby reducing the gender gap in education and future careers. Collaborative workshops and activities brought together pupils, teachers, and families, fostering a sense of unity and shared purpose across the region.

**Environmental Protection**

Environmental protection was a central element of the project, reflected in both its infrastructure and educational programs. The project emphasized sustainable building practices during renovations, ensuring that the STEM center minimized its ecological footprint. Additionally, the curriculum included modules on environmental awareness and sustainability, such as exploring renewable energy and conservation practices. These efforts not only enhanced pupil knowledge but also encouraged environmentally responsible behaviors within the community.

## 7. Conclusion and recommendations

The project successfully achieved all planned contributions, including both direct and indirect results. These contributions significantly strengthened the capacities of primary education institutions in Croatia for STEM teaching. Immediate contributions include improved skills among teachers, educational staff, and pupils in primary schools in STEM, ICT, entrepreneurship, and active citizenship. The upgraded infrastructure and equipment further support the development of functional STEM classrooms and the establishment of the Regional Science Centre for STEM education in primary schools- LORI. Human resources for managing the Center were strengthened, a network of collaborators and partners was established, and the necessary human and material capacities were secured for cooperation with relevant stakeholders in the education and entrepreneurial sectors related to STEM fields. This provides a foundation for long-term economic growth.

Under the agreement between the City of Ludbreg and the Norwegian partner institution First Scandinavia, the Regional Science Centre for STEM education in primary schools– LORI joined the multinational Newton network. This membership provides access to all designed and tested modules, continuous communication and support from First Scandinavia, and opportunities for sharing experiences and best practices.

By adopting Norwegian STEM concepts, the LORI Center has ensured high-quality education through modern educational modules tailored to the needs of the local community. The agreement guarantees quality, continuity, and recognition of the Newton room methodology, while defining the responsibilities and rights of both contracting parties. Cooperation with the Newton network will continue beyond the project's completion.

This bilateral cooperation not only improved the quality of STEM education in the LORI regional center, but also enabled the creation of a knowledge and innovation network that will benefit the local community, educational institutions and stakeholders in Croatia in the long term.

The recommendations for the Center management are as follows:

- To strengthen management skills so that the Center ensures continuous quality planning and management, continues successful cooperation of all stakeholders and provides services focused on creativity, innovation, increasing interest in STEM and STEAM, ICT and entrepreneurship
- To organize study visit to Norwegian partner institution First Scandinavia for new teachers, keep on exchanging good practice, increase the number of teachers working with the Center
- To continue to monitor new successful practices and continuously improve teaching and professional staff to increase the quality of work with pupils
- To participate in new projects, both as a valuable partner with relevant experience, and as a leader in implementing new innovative approaches to teaching and learning

This model of establishing partnerships in STEM education in primary schools proved to be a successful one. Therefore, the recommendation is to apply to other cities and municipalities where local authorities have interest and motivation for active collaboration with local and international partners with an aim to provide pupils with new opportunities in education.

Recommendations for the possible continuation of funding of the center's activities in the next financial period:

- ✓ To organize training for teachers from other counties
- ✓ To establish a Newton network throughout the Republic of Croatia with central coordination at the LORI Center, include new schools and the local community as partners
- ✓ To equip Newton rooms with equipment as local centers in other counties
- ✓ To expand the program for high schools, pupils and teachers
- ✓ To establish programs and content for new professions and professions of the future
- ✓ To establish an organizational structure for transformation into a center of excellence.

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