Questionnaire for project partners: Hungary

Index

Co-funded by the Erasmus+ Programme of the European Union

Introduction STEM-sport clubs

STEM education represents all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupations. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaborate with other like-minded people in regular workshops or to participate in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develops new methods in STEM education.

The project targeting to new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organizations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and new created work materials are free available for any European organization that want to improve own STEM education with innovative new approaches on a local or regional level.

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system)

Special advices:

All questions are used to give you an idea of the necessary content of the answers. You can **add or leave special aspects** as you feel that it is helpful!

The Document is **fully opened** for your necessary changes. Please don't change the given structure totally!

Text boxes: You can widen/shorten/remove/copy text boxes as necessary for you.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches of STEM education. Finally, we hopefully get such **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may have shortened and edited. It's always the aim for any adjustments to keep all core messages!

Thank you for all your cooperation and all your answers!

Co-funded by the Erasmus+ Programme of the European Union

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview of you, your motivation to participate, the education system in your country and the existing STEM education activities besides the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** for your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

Kecskemét Piarist School from Hungary was founded in 1714. It offers education from the year 3 to 18, from kindergarten to the Matura, 3+8+4 years, 1000 children and students; for 80 Students aged 14-18 we are also a boarding school. Staff number: 160, 100 teachers among them.

What is most relevant to the project is our Student laboratory: http://ovegeslabor.piarista.hu, founded 2015.

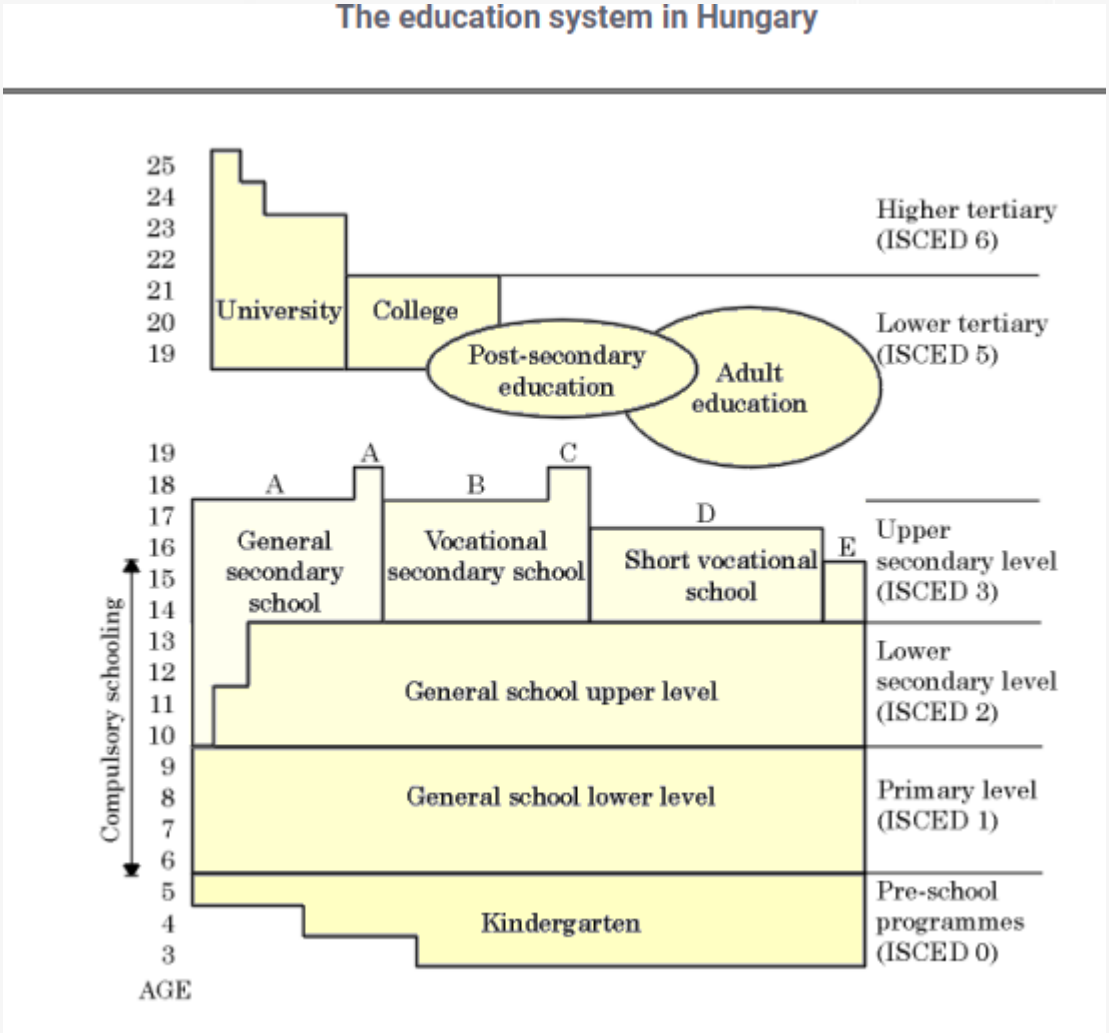
The laboratory offers laboratory programmes basically for the students of 11 partner schools (mostly students aged 10-14) and for the students of the hosting school (aged 3 to 18).

Actually the headmaster of the school is the answer for all questions, as he is the one who possesses all the information from each segment of the school and above.

Co-funded by the Erasmus+ Programme of the European Union

2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!



Co-funded by the Erasmus+ Programme of the European Union

3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regular take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regularly) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

Some universities organise summer camps to recruit students. During the school year, Erdős Iskola organises regular weekend sessions for gifted children in mathematics from all over the country.

In Kecskemét, the MATEGYE Foundation http://mategye.hu/ organises local maths workshops for pupils in grades 3-11, open to all school pupils.

Across the country, 66 student labs and a few Science centres or similar organisations run science activities for school groups. These student labs are mostly based in schools.

Preparation for the subject-specific science Olympiads is also available at national level with the support of professional associations.

Every year, the National Talent Programme funds a wide range of talent programmes, including the sciences, through a call for proposals.

The Hungarian Association of Student Labs occasionally organises professional programmes.

All these activities are partly linked to the national curriculum, partly go beyond it, or prepare for specific competitions.

Providing advanced chemistry - physics measurement exercises for graduating or newly graduated students in schools where the equipment is available. Students from other institutions without equipment will go to these institutions.

4. Visible weaknesses and possible adds for STEM education

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
    - available STEM contents and activities
    - educator and learner motivation for STEM and development of STEM enthusiasm
    - the addressed ages of the participants of any activities
    - target groups of the existing STEM offers
    - (long-term) process of STEM education
    - involvement of the local economy / authorities
    - lack of skilled workers for economy in your region
- Do you have recommendations for additional local STEM activities in your country?

Existing student labs were set up with grant funding, during and after the grant maintenance period, funding ceased and they are finding it difficult to raise funds. Several student labs are merged into the host institution and no longer provide outward services.
Science teachers are in short supply, and the economy is more appealing to them. Teachers' salaries are significantly below the average graduate salary (63.6%) and there is a high level of migration. Very few science teachers are trained in higher education, and the average age of existing teachers is high.
Industry is less involved in supporting science education. However it is more involved in vocational education through dual training, where it can more directly access labour.
The increased number of working hours also challenges science teachers (up to 26 hours) - besides this they are also involved in preparations before lessons or experiments.

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

National Talent Programme - state programme for talent management
Matthias Corvinus Collegium - an independent talent management network with its own programmes, funded by the state.
It is possible to finance specific science education projects with municipalities, based on individual requests.
Erasmus plus European projects also support cooperation between institutions in the field of science.
There is meaningful, regular sponsorship from the business community only in some specific cases, e.g. in Székesfehérvár, the operation of a digital experience centre, where groups of students from the city's schools visit. Most of it is funded by the municipality, but with strong support from the industry. They are typically part of a social responsibility rather than a labour market strategy

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are their special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Typically, students find out about opportunities through schools.

Science centres also reach students largely through schools, for example as part of class trips. But larger ones also advertise themselves, through billboards, press.

Part 3: STEM players - educators and participants

1. Who are acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

Science teachers from schools, staff of existing student labs, nature house

Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers?
- How long do learners take part in such special STEM education?

- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?
- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

Description of the participants in STEM education:

Part 4: Summary

Please summarize your given answers and intentions. We would like to fix your answer to a maximum of about 500 characters.

Short Summary of national / local STEM education:

Co-funded by the Erasmus+ Programme of the European Union

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

My further Remarks:

Co-funded by the Erasmus+ Programme of the European Union

Questionnaire for project partners

Index

Introduction STEM-sport clubs

STEM education represents all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupations. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaborate with other like-minded people in regular workshops or to participate in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develops new methods in STEM education.

The project targeting to new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organizations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and new created work materials are free available for any European organization that want to improve own STEM education with innovative new approaches on a local or regional level.

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system)

Special advices:

All questions are used to give you an idea of the necessary content of the answers. You can **add or leave special aspects** as you feel that it is helpful!

The Document is **fully opened** for your necessary changes. Please don't change the given structure totally!

Text boxes: You can widen/shorten/remove/copy text boxes as necessary for you.

Add new pages if necessary.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches of STEM education. Finally, we hopefully get such **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may have shortened and edited. It's always the aim for any adjustments to keep all core messages!

Thank you for all your cooperation and all your answers!

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview of you, your motivation to participate, the education system in your country and the existing STEM education activities besides the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** for your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

Short self-presentation:

"Dugo Selo" High School was established in 2002.near our capital city Zagreb, Croatia. We now have over 780 students and 79 staff members (67 teachers). 195 of those 780 students, who are currently involved in a non-vocational education, are preparing for the state graduation exams and, eventually, will enrol into a University of their choice. On the other hand, 315 of our students who are a part of the vocational education, also including students who are studying economy and who are studying to be computer technicians, will be prepared for an immediate employment after finishing their lectures or they could also take part in the state graduation exams and enrol into a University. There are 270 students who are taking part in the three-year-long education and are prepared to work right after high school, including; hairdressers, gas installers, electricians, electromechanics, mechanics, plumbers, heat and air conditioning installers. In addition to our broad educational program, we also offer senior education (education for adults) as well as training programs for electricians and engineering technicians. The teaching staff experiences daily professional training, in both professional and the scientific fields, which is mainly organized by the National Agency of Education. Our vision is that ''Dugo Selo'' high school becomes a modern school in the region which will be a measure of quality. With an innovative, creative, flexible and professional approach, we want our students to acquire knowledge and social awareness for a better quality of life.

The main facts about high school: http://ss-dugo-selo.skole.hr/.

The reason why my school participates in STEM projects is the desire to educate our students about renewable resources of energy. Through active and cooperative learning, we try to enable students to acquire knowledge, skills and competencies required for the labour market or for continuing their education.

2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!

Answer / Picture / Chart:

Croatian education system provides education services at pre-school, primary school, high-school and higher education levels, as well as for adult education, so as to enable every user to develop his/her potential optimally, aiming at their personal development and entry into the labour market, including their preparedness for lifelong learning.

Education in Croatia is available to all, under equal conditions, in line with their capabilities. Compulsory education is free of charge, as stipulated by law, while private schools and colleges/polytechnics can be established in accordance with the relevant legal framework.

Croatian education system is centrally managed by the Ministry of Science, Education and Sports (MSES). Besides MSES, other national public bodies involved in the regulation, development and quality control of the educational sector in Croatia are Education and Teacher Training Agency, Agency for Vocational Education and Training, Agency for Science and Higher Education, Agency for Mobility and EU Programmes and National Center for External Evaluation of Education.

In line with the aforementioned, Croatian education system consists of the following levels: early childhood and pre-school education, elementary education, high school education and higher education.

Pre-school education
Pre-school education in Croatia includes education and care about pre-school children. It is carried out through programmes of care, education, healthcare, meals and social care for children aged from 6 months to school age children. Early Childhood and Pre-school Education constitutes the first level of the educational system and, except for the pre-school educational program for children in the year prior to 1st grade of primary school, it is not compulsory for all pre-school children. It is divided into three educational cycles, based on the age of children: (1) from 6 months to one year of age, (2) from 1 to 3 years, (3) from 3 years of age to the start of primary education. Early education and child care is financed and managed by local authorities, while MSES provides central guidance, accreditation and control over the educational programmes which are implemented in organizations providing early education and child care.

Elementary (Single-Structure Primary and Lower Secondary) Education
Elementary education includes primary and lower secondary levels organised as a single structure system, beginning at the age of 6 and consisting of eight years of compulsory schooling. In elementary education segment, special care is dedicated to the possibilities for education of students of national minorities in their mother tongue. Besides the regular schools which provide tuition in Croatian, a number of schools – almost fifty - provide tuition in Serbian, Italian, Czech and Hungarian languages. Just as national minority students can, according to their own decision, enroll into regular schools providing tuition in Croatian, students of Croatian nationality can – and quite a few of them indeed do – enroll into schools providing tuition in some of the minority languages.

Answer / Picture / Chart:

The founders of elementary schools are: the Republic of Croatia, counties (20 counties) and the City of Zagreb, municipalities, towns, as well as legal and physical persons. Primary schools can be regular ones, with a general education program, special ones, with programs for children with developmental disabilities, art schools (dance and ballet), and schools in the language and writing of national minorities.

High school (Upper Secondary) Education
High school education is not compulsory in Croatia but almost all students do enrol into the general or vocational upper secondary courses upon completing elementary school. Following the completion of single structure education, secondary education (upper secondary and post-secondary non-tertiary education) enables everyone, under equal conditions and in accordance with individual capabilities, to acquire knowledge and competencies to work and/or continue education. High schools, depending on their program, are grammar schools, vocational schools or art schools. High school education enables students to acquire knowledge and competences for work and for continuation of education. Secondary education in grammar school programs is completed by taking the State Matura exam. In vocational and art education programs, lasting a minimum of 4 years, it is completed once a final paper is completed, submitted and defended, in a procedure organized and carried out by the school. If a student of art and vocational programs, lasting a minimum of 4 years, wishes to continue education at a higher education institution, he/she is obliged to take the State Matura exam.

Home education
Compulsory education can be provided at home in exceptional circumstances (because of health reasons). Teaching activity can be organized at home or in a health institution for students who cannot attend school because of severe motor disorders or chronic illnesses for a longer period of time. Ministry has to approve that the teaching activity is organized at home for specific students. Also, it is possible for students to write exams and the teaching activity can be organized as distance learning with the use of digital technology. Home education/distance learning and education in a health institution are defined by Regulations on primary and secondary education of students with developmental disabilities (Pravilnik o osnovnoškolskom i srednjoškolskom odgoju i obrazovanju učenika s teškoćama u razvoju, Official Gazette 24/2015) which refers to education of students with developmental disabilities and students with health issues. Ministry of Science and Education needs to give permission to the school to organize education at home or in a health institution for students who are suffering from chronic illnesses or severe motor disorders. Home education is allowed only for the students in question and only top level authority can give permission.

Qualified teachers who are teaching at school are also teaching the students at home. For children in lower and upper secondary education, grades five to eight, home education is provided by their school teachers, but for children who are in one of the first four grades often a new teacher is employed working only with the child educating at home. If the latter is the case, education is provided in less instruction time than prescribed. The required level of education for teachers is ISCED 7 in the appropriate field and their professional competency needs to be confirmed after completion of ITE. The requirements are the same as for teachers in schools.

Answer / Picture / Chart:

There are no top level regulations defining specifically educational supervision/monitoring and assessment of the child's progress and frequency of exams in education at home, but in practice education at home or in a health institution is similar or the same with the one provided in school. The same educational supervision, monitoring and assessment of the child's progress as for children in school is in place, because the students after the period of education provided at home or in a health institution return to the school. Students do not lose their continuity of study, they do not have to compensate for the lessons learned at home and they do not have to write exams in school afterwards. Schools need to provide the conditions for students who are educating at home to write exams. Students who are healthy enough and able to take exams their knowledge is assessed in accordance with the curriculum. In order for the students to be transferred to the next class, their knowledge needs to be assessed and positively graded at the end of the school year.

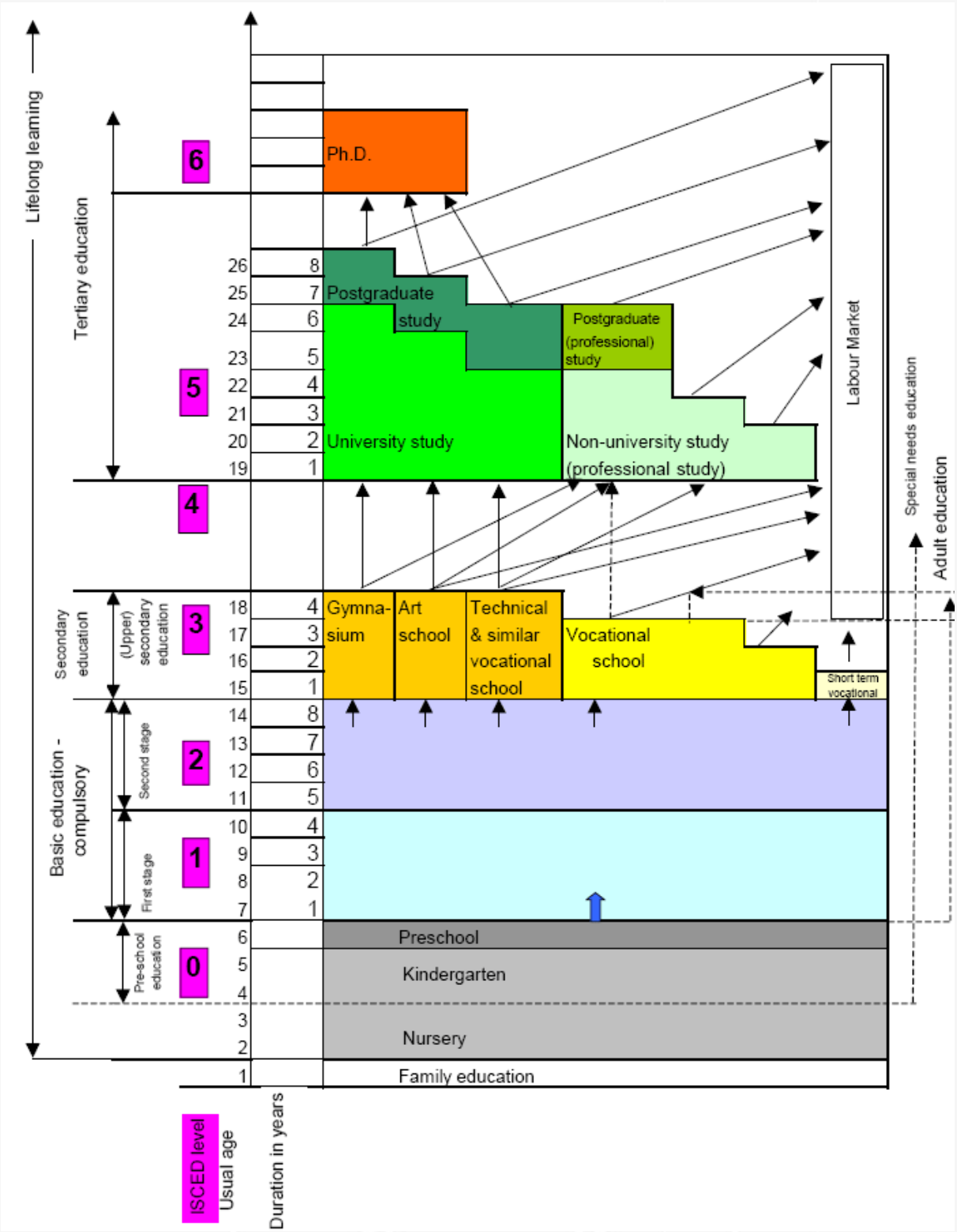
Higher education
The higher education system is twofold and comprises of university and professional study programmes of different duration. University study programs prepare students for scientific or professional careers in public and private sector. Professional study programs provide students with an appropriate level of knowledge and skills enabling them to work professionally and become directly involved in the working process. Higher education is provided by the universities - most of them public - whose organizational autonomy and academic freedom in teaching and research is guaranteed by the Croatian Constitution. Great majority of funding for higher education is provided by the state, covering such items as salaries for academic staff, capital investment and running costs for academic institutions, research funds, student subsistence and tuition fees and other.

Adult education
Adult education system is also an integral part of the Croatian education system. Adult education practices in Croatia, in many of its integral parts and characteristics, are aligned with those of the developed countries. Croatia has a network of institutions for adult education throughout its territory, as well as a large number of various institutions which, apart from their regular activities, carry out adult education program. The range of the programs, especially in non-formal education, is very wide and, as a rule, was created in response to the educational needs of citizens and legal entities.

Art education
Croatia has a well-developed system of art education, which is carried out in accordance with the Art Education Act and Primary and Secondary Education Act. Art schools are the music, dance, visual arts schools and other schools which carry out art education programs. Art education is available to everyone under equal conditions, regardless of race, sex, language, religious, political or other orientation, national or social background, property, birth, social position, disability, sexual preference or age, according to individual capability. The children of citizens of European Union member states are entitled to access art education under the same conditions as Croatian citizens, and enroll into Croatian art education institutions under the same conditions as Croatian citizens. The children of Croatian citizens that received education in one of the EU member states but want to continue their education in Croatia are entitled to art education in Croatia under the same conditions as Croatian citizens who attend art education institutions in Croatia.

Answer / Picture / Chart:

Education for pupils with learning difficulties
Education for pupils with learning difficulties is carried out in regular schools with complete or partial integration, depending on the type and degree of the difficulty, following regular, individualized or special programs or, exceptionally, if the pupils need additional health or social care, in special education institutions. The primary schools, the secondary schools, the high-school student dormitories and other public institutions carry out classes and other forms of educational activity in Croatian language and in Latin alphabet. Single structure and secondary education of the children of the members of national minorities is carried out according to the stipulations of the Act on Education in the Language and Script of National Minorities, the stipulations of the Act on Primary and Secondary Education and other legislation. Apart from classes in Croatian, primary and secondary schools can carry out classes in some of the subjects and contents in a foreign language, following an approval by the ministry responsible for education.



Picture: Croatian structure and organization of the education system

3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regular take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regularly) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

Existing STEM activities / contents IN or BESIDE the educational system:

In Croatia there is extracurricular STEM education activities on all levels (local, regional, national). Work market suffers from the lack of skilled workers and ones in STEM areas.

Some of the activities on local level are workshops, competitions and clubs organised by private or public organizations (schools). Most of these education activities offer only a special part of STEM education to a target group that is homogenous in their age, their level of knowledge and the size of the participating groups.

For example:
WorldSkills Croatia
WorldSkills Croatia is part of the Agency for Vocational and Adult Education (AVET). ASOO has many years of experience in organizing national competitions for vocational school students. The Agency is strongly committed to cooperation between the vocational education system and industry. Competitions of vocational school students have great potential to be a valuable tool in promoting and raising the attractiveness of vocational education in the Republic of Croatia.

The agency, under the name WorldSkills Croatia, represents the Republic of Croatia in WorldSkills International and WorldSkills Europe associations and organizes the selection and participation of the Croatian team in EuroSkills and WorldSkills competitions. They use membership in these associations and experience from international competitions to modernize national vocational competitions, which is recognized as a strategic priority in the development of the Croatian vocational education system.

Their mission is to promote the importance of vocational skills as a basis for the growth of the Croatian economy. They want to raise the attractiveness of vocational education and training and inspire young people to choose vocational occupations as a desirable career choice. Aim is to become a recognized place for cooperation between education and the economy.
It gathers more than 350 competitors who were to compete in more than 45 disciplines.

Existing STEM activities / contents IN or BESIDE the educational system:

Digital Academy
STEM extracurricular workshops for children where more than 3,000 elementary school students go through it each year. In 73 schools, more than 70 lecturers transfer knowledge using creative tools with which children learn about programming, the basics of robotics, project collaboration skills and the safe use of technology and the Internet. As of this school year, the Digital Academy is expanding to a total of 26 cities and almost a hundred locations throughout Croatia. It is important to mention that there is an Open Day with free workshops (robotics, coding, Minecraft). Workshops are free for all children (and parents because we also organize a special workshop for them), without any obligation to later enrol in the program.

Croatian Makers league
The CM League is a competition in robotics, automation and programming for elementary school children. The competitive league has been taking place for five years now with the help of the mBot educational robot, which offers a very easy entry into the world of robotics. CML is the first major project of the Institute for Youth Development and Innovation (IRIM) in which all involved institutions are donated 5 mBot of educational robots, provide training for mentors and organize and conduct competitions during the year.

Croatia creates
The project was presented at the beginning of 2018, and was created in the organization of the Programmerko Association, the Croatian Association of Technical Culture and STEMI. The aim of the project is to launch free trainings from the STEM area throughout Croatia, following the example of the international Code Club initiative. Under this initiative, volunteer networks of centers have been united, in which primary school students will be able to find themselves in their free time, learn for free and create new technologies. Anyone who shares the enthusiasm for digital creation with children has the opportunity to open new Code Clubs. There are currently 35 active clubs in Croatia.

Gradionica workshop
Gradionica is an association that organizes courses, seminars, workshops and educational events in primary and secondary schools, kindergartens, and similar institutions. Trainings include the areas of programming and information technologies, design with the help of 3D CAD tools and modeling with the help of 3D printers. In addition, they prepare members for competitions in robotics, mathematics, computer science and related disciplines. All their educations are supported by LEGO education sets, so there will be no shortage of fun elements.

Srednja škola Dugo Selo
Our school is a partner on 4 STEM based Erasmus+ projects. We have held an international competition in robotics; about which we are very proud. We have formed a STEM club in our school and are working with our students on weekly basis on educations about renewable sources of energy. We also have a robotics club which exists in our school since 2015. We are conducting questionnaires and research with regards the popularization of STEM in our community. Our target group are children aged 7-18 years, so since the earliest grades in elementary to high school graduates. For them we are organizing STEM workshops on monthly basis.

Existing STEM activities / contents IN or BESIDE the educational system:

Programerko
Programerko is an association that encourages the development of IT skills in preschool and primary school children. The association holds programming workshops where children, under the guidance of volunteer lecturers, have the opportunity to learn to make interactive stories, animations, games or music in the free tool Scratch, a MIT project, which provided free use of tools, and is specially designed for children and young. By programming in Scratch, children can easily learn to make simple computer games and programs on their own.

RoboCode
RoboCode is an operational program for designing and conducting Lego Mindstorms workshops with the aim of motivating children to acquire knowledge in the STEM field. Students are encouraged to program through play and stack blocks according to the program, so they are taught to think in a computer and logical way in a fun way. Ultimately, the purpose of the project is to motivate schools to understand the importance of informatics and for the project to support the introduction of compulsory informatics for 5th and 6th grades in primary school.

STEM revolution
Since 2017, STEM Revolution has been introducing micro: bit technologies in schools throughout Croatia. At the end of the campaign and the open tender, BBC micro: bit microcomputers were donated to all institutions in Croatia that passed the applications. Izradi! educational web portal has already published a part of adapted and newly complex materials that can serve both educators and students.

Tinker LABS
Tinker Labs is a creative extracurricular activity in which children learn about STE (A) M subjects in modern ways. The experiments are practical and fun to adapt to the age of the children. In the weekly classes, children learn about construction, engineering, archeology, biology and medicine through various projects.

Associations and societies
Bioteka
This association from Zagreb focuses its workshops on topics in the field of biology and related sciences: such as biochemistry, medicine, psychology, anthropology, agronomy, climatology, health and nature and environmental protection. The association is also involved in promoting the popularization of science, and to this end they cooperate with many scientists, experts, civil and public sector organizations and the general public. In addition to the workshops, there are also two portals, the scientific online magazine Biologija and the Bioteka portal with various readings about the areas they deal with. The program is intended for children from 6 to 12 years.

Existing STEM activities / contents IN or BESIDE the educational system:

Out-of-the-box education society
The abbreviated EVO Society brings together several experts who have experience in scientific research and education of young people and who are willing to transfer their knowledge and experience to the wider community. The projects the society is currently working on are aimed at improving scientific literacy, communication and culture. One of the well-known projects is the Summer Science Factory, which is held according to a customized international program.

FABLAB
FabLab was founded in 2013 and is part of the international association of FabLab organizations, based on an idea from MIT. Apart from the fact that their main mission is to popularize STEM education, and then to develop entrepreneurial thinking, they also paid special attention to the problems of the local community, ie all those whom technology can help in life. They are constantly working on international cooperation and project applications from various programs with partners across the EU. In addition, the association is working on domestic projects mainly with the aim of convergence and education in the field of digital production, 3D printing and other technologies.

Croatian Association of Technical Culture
HZTK is the umbrella association of technical culture in Croatia, which now has over 70 years of operation. In addition to the Nikola Tesla Technical Museum in Zagreb, the community today brings together several national associations and county and city communities of technical culture. The community, its members and associations pay special attention to extracurricular and extracurricular education of children and youth, as well as the popularization of technical culture. In their organization, competitions such as Robocop and various workshops, field classes and summer schools are organized throughout the year, for sure you want to check what options they offer in your vicinity.

#labOS
#labOS is a community of creatives whose main goal, as they say, is to make computer and electronic culture as accessible as possible, so their computer and electronic laboratory is open to everyone. They have worked on various projects such as IOT wristwatch, smart aquarium and modular desktop, but also on various 3D printers and robots.

Radiona
The association, which focuses on DIY, or "do-it-yourself" culture, was founded with the purpose of strengthening the visibility of open source culture and self-sustainable production, as well as with the aim of connecting the fields of art, science and technology. The activities of the Workshop include education, research processes, art projects, international and domestic collaborations, self-renewing systems and socially aware issues.

Mentor Association
The Mentor Association implements most of its programs in cooperation with educational institutions in the area of the city of Split and the Split-Dalmatia County. Programs for children and young people are aimed at improving their quality of life through participation in interactive workshops aimed at strengthening social skills. The goal is to facilitate the learning process, thus reducing school failure as a risk factor, which is why children and young people can engage in risky behaviours. It is done in small groups under the expert guidance of the association's team (sociologist, social pedagogue, pedagogue, psychiatrist).

4. Visible weaknesses and possible adds for STEM education

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
    - available STEM contents and activities
    - educator and learner motivation for STEM and development of STEM enthusiasm
    - the addressed ages of the participants of any activities
    - target groups of the existing STEM offers
    - (long-term) process of STEM education
    - involvement of the local economy / authorities
    - lack of skilled workers for economy in your region
- Do you have recommendations for additional local STEM activities in your country?

Description of weaknesses and ideas for STEM education:

The rapid development of new technologies is a challenge for the Croatian education system. The main problem is the lack of staff in the STEM area and the lack of interest of new students in STEM.

In Croatia, there are institutions that implement STEM activities within projects but there is no unified policy on the national level that would encourage educational institutions to implement STEM activities. It is necessary to develop new curricula that would be interesting for new students and motivate them for STEM.

Educator and learner motivation for STEM is low. There is enthusiasm among a small number of teachers who try to pass this on to students. That needs to change and teachers need to be offered better options. Activities should be carried out from kindergarten age. Existing STEM activities are mostly conducted in primary schools. STEM education process must be carried out from an early age in order to acquire basic knowledge for STEM study through primary and secondary school. The involvement of the local economy / government is low. The reason is mainly the inability to finance.

There is a great shortage of skilled workers in the STEM area in Zagreb County. Schools can contribute to increasing STEM workers by introducing new STEM curricula, introducing STEM activities into existing curricula, organizing comeptition in STEM,…

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

Description of the resources:

Non-formal STEM education is funded mainly through projects of education institutions or civil society associations. Four years ago, the government introduced STEM scholarships for students attending STEM studies. Such a measure should contribute to the creation of new sources of competitive advantage and have an impact on a number of industrial activities. Support for studying in STEM areas through direct support consequently contributes to the economic and technological development of the Croatian economy by investing in human resources in propulsive economic sectors.

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are their special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Description of the access:

There are few different ways to promote and inform STEM activities. First and most important one is information and advertising on web pages and with social media. Second way is by promotional material in schools, local areas that target specific groups. Also there are teachers who will easily spread all important information to their own classes and pupils and will stimulate them to take part in good STEM education programmes.

Booking system are used only at private organisations, associations and societies. There is no single common or unique registration system.

Part 3: STEM players - educators and participants

1. Who are acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

Description of STEM educators:

Considering that the field of STEM in the Croatian educational system is represented in various general education and vocational subjects, the educators from these subjects also differ in their education, but also in their previous experience.

Namely, teachers who teach general education STEM subjects (mathematics, physics, chemistry and biology) are actually traditional teachers who acquired their pedagogical and psychological competencies during their university education. Engineers from these areas are also applying for these jobs. Engineers have the opportunity, after university education, to enroll in additional education in order to acquire pedagogical and psychological competencies and are then equated with candidates for the teaching profession. Otherwise, teacher candidates have an advantage in employment. In other words, engineers with acquired pedagogical-psychological competencies have an equal opportunity to be employed at the school. As for professional subjects (electrical engineering, electronics, mechanical engineering etc.) that cover the field of technology and engineering, they are taught by expert engineers who are obliged to acquire pedagogical-psychological competencies during the first year of employment at the school. This group of educators in most cases has experience working in the private sector and are more aware of the constant changes in the labor market, but also the various competencies that are only partially acquired during formal education. They are also more aware of the importance of lifelong learning for career development. This group is more willing to organize extracurricular activities and additional work with students.

Description of STEM educators:

In the last few years, the education system of the Republic of Croatia, including the Dugo Selo Secondary School, has increasingly lacked STEM teachers from both groups. There are several reasons why this is so. One of the main reasons is social underestimation, disparagement of the teaching profession, in general. Furthermore, a much lower material / financial status (salary) of teachers arises than in the same jobs in other state and public institutions, and the difference is even greater, in the private sector. Therefore, young professionals are reluctant to get employed in the education system. STEM educators employed in the education system are enthusiasts with high intrinsic motivation and pass on their love for the field to interested students. Although the shortage of STEM educators is growing, there is still no state-level strategy to attract professionals to the education system.

The areas most dealt with by STEM educators at Dugo Selo Secondary School are mainly related to robotics, artificial intelligence and ICT in general. They transfer their knowledge and fascination with these areas to students as part of regular classes, as much as the curricula allow, but still mostly, by organizing extracurricular activities, participating in various national and international projects and competitions. In their implementation, emphasis is placed on the interests and activities of students, and STEM experts are coordinators and moderators. The results that students achieve are presented and published on the school's website, school profiles on social networks, and are effectively used to recruit new students.

At Dugo Selo High School, STEM experts in the field of engineering and technology are the initiators of changes in the way the school functions, the organization of education for other teaching staff, the main promoters of the school and (co) holders of new knowledge applicable in the school environment. They are the ones who mostly cooperate with other educational sectors / programs and other teaching staff, with their examples of good practice they encourage more active participation, organization and design of various extracurricular activities and projects. Despite the great efforts of STEM educators, the local community still does not recognize their contribution and importance for the development of the community, but neither does the Dugo Selo Secondary School itself.

2. Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers?
- How long do learners take part in such special STEM education?
- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?
- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

Description of the participants in STEM education:

In Dugo Selo High School, the target group, ie participants in STEM education, are mostly students of the educational program Computer Technician and Mechanical Computer Technicians. STEM education is offered to all interested students, but still students of second (16 years), third (17 years) and fourth (18 years) grades participate and are more active in it. Namely, first grade students (15 years old) go through a period of adjustment to the way they work and live in high school and are more interested in successfully fulfilling their regular school obligations.

In the Croatian education system, students can gain their first experiences with STEM education while attending kindergarten. But it depends on the readiness of educators to deal with STEM and the environment in which they grow up. Children living in smaller communities have less access to such education. By continuing their education in primary schools, students are provided with education in STEM areas in regular classes. Also, various extracurricular activities are offered, participation in projects, but also extracurricular activities in which students can gain knowledge from the STEM area. The diversity and availability of these activities, unfortunately, also depends on the area / environment in which they grow up. There are fewer opportunities and availability for such activities, for children growing up in rural areas and smaller communities.

Younger students (primary school students) who have the opportunity to participate in STEM trainings, are very happy to get involved in activities due to their fascination with science and technology. At that age, most of them do not understand scientific methods, but they perceive science as a magic that has always been attractive and somewhat mysterious to children, and awakens their imagination and desire for innovation. The topics they deal with mainly take place in collaboration and teamwork. Group members are of different age groups, e.g. children of 1st, 2nd and 3rd grade of primary school. In such groups, older students help younger ones and have the opportunity to transfer their knowledge and experience and thus further work on their skills, abilities and knowledge.

Description of the participants in STEM education:

The goal is not for the older ones to perform activities instead of the younger ones, but to help the younger ones with their suggestions, instructions and suggestions. In this way, both younger and older people work on the further development of their competencies.

Both girls and boys participate in STEM trainings. Although the traditional STEM area has been intended for boys, in the last 10 years (or more, if you think) more and more girls are getting involved in education. Girls are showing more and more interest and breaking down stereotypes about the STEM area as a male area of activity. We are not aware that there are trainings that are exclusively intended for girls, ie boys / boys, especially not in STEM trainings.

Part 4: Summary

Please summarize your given answers and intentions. We would like to fix your answer to a maximum of about 500 characters.

Short Summary of national / local STEM education:

We would like to express our excitement in being part in such a movement; bringing technologies and previously extravagant terms to high schoolers and even younger students enabling them in creating their career paths from their early educational days. Our target groups are students aged from 7-18 years.

Our school is an organization which enables students into taking different learning paths; we have 4 and 3 yearlong programs either in VET or as a part of a gymnasium. There is always much to learn and our students have recognized that and have become a part of this journey both in the project but also as mentors to our younger participants.

Our teachers participating in this project are mechanical and electrotechnical engineers which have additionally attended lectures at university consisting of didactics, pedagogy, psychology, methodical of work. After that they have obtained the title of professor of mechanical subject group or professor of electrotechnical subject group.

We are proud to say that we do not segregate based on gender and everyone has equal rights to participate and learn. Our funding is primarily based on European Erasmus+ funding which is enabling us to come up with various inner-school projects such as STEM club or various competitions.

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

My further Remarks:

Questionnaire for project partners

Index

Introduction STEM-sport clubs

STEM education represents all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupations. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaborate with other like-minded people in regular workshops or to participate in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develops new methods in STEM education.

The project targets new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organisations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and newly created work materials are freely available for any European organisation that wants to improve its own STEM education with innovative new approaches on a local or regional level.

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system).

Special advices:

- ❖ All questions are used to give you an idea of the necessary content of the answers. You can add or leave special aspects as you feel that it is helpful!
- ❖ The Document is fully opened for your necessary changes. Please don't change the given structure totally!
- ❖ Text boxes: You can widen/shorten/remove/copy text boxes as necessary for you.
- ❖ Add new pages if necessary.
- ❖ If you mark questions "unanswerable", please give a short reason for that decision.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches to STEM education. Finally, we hopefully get such an **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may be shortened and edited. It's always the aim for any adjustments to keep all core messages!

Thank you for all your cooperation and all your answers!

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview of you, your motivation to participate, the education system in your country and the existing STEM education activities besides the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in a STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** for your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

Veneto Region (Italy) is represented by T2I.
T2i is the Italian Agency for Innovation promoted by the Chambers of Commerce of Treviso-Belluno, Venezia-Rovigo and Verona. T2i supports companies in defining and developing new and innovative services through technology transfer networks, added-value services and access to specific and cutting-edge training programs. About 50 people are working in the company, offering support in these areas:

1. Organisation and development of competencies, by seminars, workshops, learning/training paths by means of innovative methodologies and tools (also e-learning), consultancy, coaching focused on: company management, ICT, team building, marketing, eco/green/sustainable-design, soft & life skills. Collaboration with schools (VET, I grade and II grade secondary schools) and local training centres for vocational training courses and internships. Study visits for students in our incubator and in companies hosted there. The Education/Training Area is accredited by the Veneto Region for education, lifelong learning and vocational guidance activities
2. Support and development of business ideas. Business incubator in Rovigo provides dedicated training and coaching for start-ups aiming at fostering all necessary skills to develop a business idea and fostering entrepreneurial attitude in young entrepreneurs; organisation of new business ideas competitions to access incubation services. At the premise of Verona, dedicated service "New Enterprise" offering support to wannabe entrepreneurs, providing them guidance and assistance in the crucial phase of starting a new business. T2i is a Digital Innovation Hub recognised by the European Union.
3. Applied research, technology transfer and networking. Innovation auditing, technology intelligence and foresight, technology and know-how brokerage, IPR management (PatLib office) and competitive intelligence. T2i runs metrology, testing and user-centered design labs: cutting-edge laboratories to support acknowledgement and certification of products on domestic and international markets as well as development of new products through innovative technologies. T2I is enrolled in the National Research Register (code 61304BMV).

In our country, and in particular in our region, data show there is a **lack of STEM skilled labour resources**, which is shown both by a **vast Digital divide** in our society and by a compelling demand from our companies. This turns out as a result in an exclusion from the benefits of the digital society,

with socio-economic and cultural damage for those affected. Studies and scientific transnational analysis on it can help our VET system and our companies into dealing successfully with these issues, make our public decisors aware and give them concrete support.

The staff filling this questionnaire are made of senior project managers who have more than 5 years of experience in T2I. They deal with the development of competencies and favour the collaboration between the companies and the school systems.

2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!

In Italy compulsory education spans from 6 to 16 years of age and is free of charge.

It is coordinated by the Ministry of Education and Veneto Region.

***Pre-school education*:** Participation in three years of pre-school education (age 3 to 6) is non-compulsory for children aged 3 to 6 but very common.
Primary education (scuola primaria/elementare): for children from 6 years old, lasts five years and is compulsory.
Lower secondary education (scuola secondaria di primo grado/scuola media): it is compulsory to attend 3 years of lower secondary education, usually when the pupils are aged 11 to 14.
Upper secondary education *EQF 3 + 4* (scuola secondaria di secondo grado/scuola superiore). There are four institutional types of compulsory upper secondary education with different specialisations managed

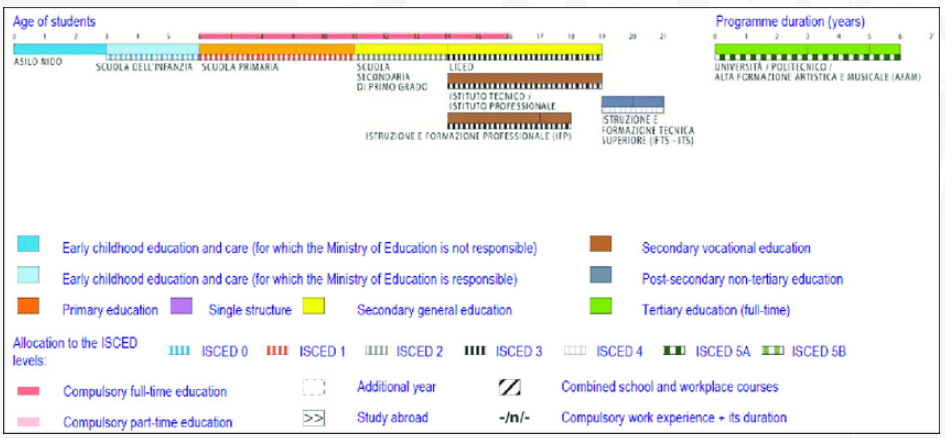
- Liceo (EQF 4), nationally coordinated
- Istituto Tecnico (EQF 4), nationally coordinated
- Istituto Professionale (EQF 4), nationally coordinated
- Istruzione e Formazione Professionale (EQF 3 and EQF 4), regionally coordinated

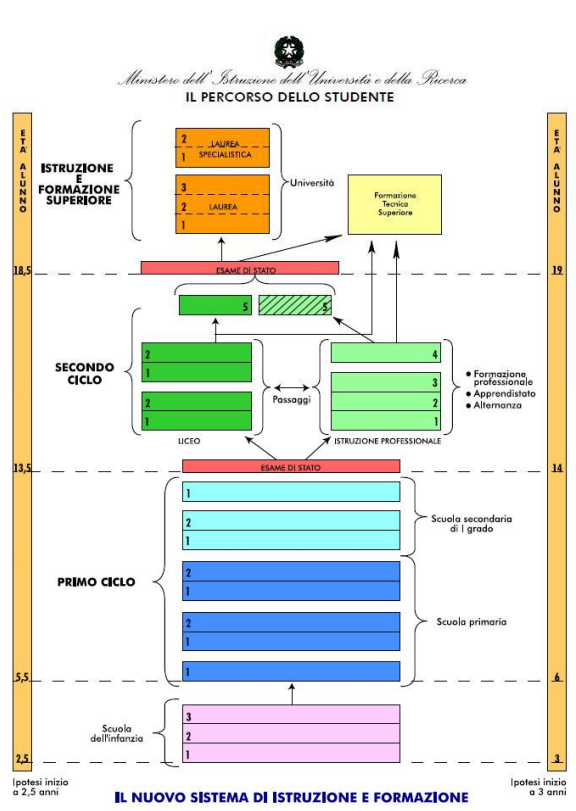
While the liceo has a theoretical focus, the Istituto Professionale is very practically oriented.

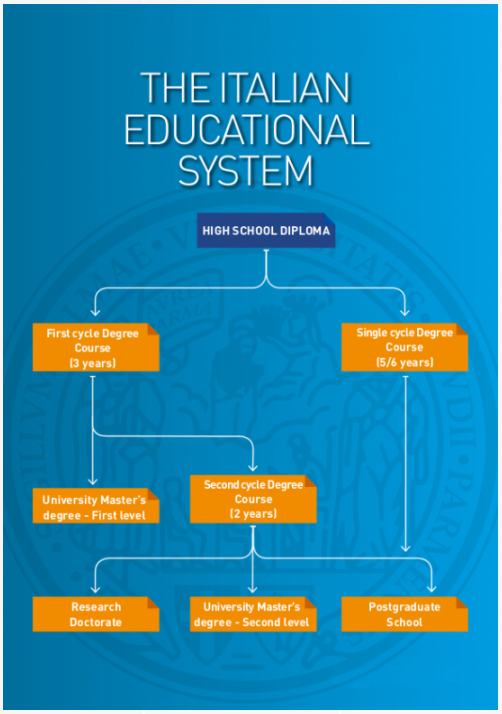
The upper secondary education lasts 3 to 5 years and is compulsory until the age of 16. Completing the final exam after 5 years grants access to university.

Higher education*:* There are various types of

- Universities (EQF 6 + 7 + 8), nationally coordinated
- Higher Technical Institutes (EQF 5), regionally coordinated
- Other Higher Education Institutions (EQF 6 + 7 + 8).




Ministero dell'Istruzione dell'Università e della Ricerca
IL PERCORSO DELLO STUDENTE
ETÀ ALUNNO
ISTRUZIONE E FORMAZIONE SUPERIORE
LAUREA SPECIALISTICA
LAUREA
Università
Formazione Tecnica Superiore
ESAME DI STATO
SECONDO CICLO
Passaggi
• Formazione professionale
• Apprendistato
• Alternanza
LICEO
ISTRUZIONE PROFESSIONALE
ESAME DI STATO
PRIMO CICLO
Scuola secondaria di I grado
Scuola primaria
Scuola dell'infanzia
18,5
19
13,5
14
5,5
6
2,5
3
Ipotesi inizio a 2,5 anni
Ipotesi inizio a 3 anni
IL NUOVO SISTEMA DI ISTRUZIONE E FORMAZIONE


THE ITALIAN EDUCATIONAL SYSTEM
HIGH SCHOOL DIPLOMA
First cycle Degree Course (3 years)
Single cycle Degree Course (5/6 years)
University Master's degree - First level
Second cycle Degree Course (2 years)
Research Doctorate
University Master's degree - Second level
Postgraduate School

3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regularly take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regular) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economies, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

Some examples, with a focus on the Veronese Prvince area, of regional educational STEM activities are: Olimpiadi della Matematica, Festival della Scienza, CoderDojo and We STEAM Verona.

Olimpiadi della Matematica (also called Giochi di Archimede / Archimede's Games) is a competition based on the ability to solve mathematical problems. This activity is developed and organised by "Unione matematica Italiana", which is a committee commissioned by the Italian Ministry of Education. The participants are high school students, who have to participate in addressing their school.
More info here: http://olimpiadi.dm.unibo.it/

The Verona Science Festival Association is a non-profit organisation created with the aim of promoting, enhancing and transmitting scientific-cultural knowledge with collaborative networks at national and international level, also through events, courses, awards, conferences, exhibitions and workshops on the territory of an interdisciplinary and multisectoral nature. Revolution and evolution are at the centre of the festival to reflect together on the footsteps of the past with a look towards the future. This event promotes scientific and cultural knowledge for everyone, as there is no age limit and the goal is to stimulate curiosity for the scientific subjects.
More info here: https://www.festivalscienzaverona.it/

Mrs. Caterina Lorenzetti (Owner & General Manager of the FESTIVAL SCIENZA Verona Project) with Mr. Marco Braga (t2i)

Another interesting example is proposed by CoderDojo, a computer club international net, where children and teenagers (aged 4-17 y.o.) learn to write and design websites and games. The CoderDojo Verona follows the Coderdojo philosophy based on the collaboration between people passionate about technology and eager to transmit this passion (the mentors) and young people (the ninja coders) eager to understand "what lies behind" the technologies they use every day[1].
More info here: http://www.coderdojovr.it/

[1] There is also the Verona FabLab with the Tech 4 Kids which includes a wide range of workshops and initiatives. The goal is to help take the first steps into the world of technology in a safe and controlled way. In addition to workshops for children, they also offer initiatives open to all: https://www.veronafablab.it/category/tech-4-kids/

We STEAM Verona[2] promotes STEAM discipline and organises a major event dedicated to Science, Technology, Engineering, Mathematics and Art in the name of comparison and involvement. Its name is “Technologies for humanity" and includes two weeks full of meetings aimed at different age groups, including teens and children, but also workshops, labs, conferences and meetings held in schools and dedicated to students.
Among the objectives of the event, the podium is to create a network between companies, schools, associations and foundations relating to the STEAM sector.
Thanks to the involvement of art they would like to make it clear that these subjects are not boring or difficult as they may seem. In fact, they foresee both meetings aimed at experts or passionate in the sector but also intended for those who do not have specific knowledge but only curiosity, so as not to exclude and above all "scare" anyone.
More info here: https://westeamverona.it/

Other regional initiatives are described here:

At regional level: https://www.fondazionecariverona.org/news/alternalab/
At national level: https://www.steminthecity.eu/

[2] We also suggest to read the following articles (the resource is in Italian):
https://www.cosp.verona.it/blog/245-discipline-stem-e-donne-luoghi-comuni-da-mettere-ko.html
https://www.cosp.verona.it/blog/235-verona-aperta-la-call-per-la-realta-steam-2.html

4. Visible weaknesses and possible adds for STEM education (For Italy: Sistema di Istruzione e Formazione)

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
    - available STEM contents and activities
    - educator and learner motivation for STEM and development of STEM enthusiasm
    - the addressed ages of the participants of any activities
    - target groups of the existing STEM offers
    - (long-term) process of STEM education
    - involvement of the local economy / authorities
    - lack of skilled workers for economy in your region[3]
- Do you have recommendations for additional local STEM activities in your country?

A general picture: some issues identified[4]

- Companies invest time and resources in the search for professionals in the STEM field, however the study of these disciplines is not yet widespread enough to satisfy the demand.
- Those who are already in the world of work find it difficult to reach effective tools to keep up with the constant changes in the STEM fields.
- In general, in Italy, STEMs are perceived in a positive way by students of Italian schools who believe that these are very important disciplines. However, at the same time, there are many students who claim that science subjects are rather complex to study. Although there are many children who are interested in Maths and Science, six out of ten find it difficult to study them and are against adding hours to science subjects.
- For some years the scientific high school has become one of the most chosen by adolescents in Italy. As for the University, there seems to be an ever greater increase in enrollments in faculties that include scientific subjects.
- Gender differences in the field of STEM are evident among younger children: it would seem that both in mathematics and in science, boys have obtained higher grades than girls. In Italy, in fact, boys obtained a score of 521 points while girls reached 509. In particular, in Mathematics, the males exceeded the girls by twelve points while the situation improved in the Sciences: in fact, here the children exceed the females by only eight points in both primary and lower secondary schools. Therefore, the overall score is still higher in boys than girls in Italy as regards STEM.
- In the University field, STEM graduates in 2017 were about 26.5%. Among these students the component of men is high above all for the fields that concern the engineering and the scientific sector. In the chemical, pharmaceutical, geo-biological and architecture fields, women seem to have a higher relevance. Furthermore, women undoubtedly have a higher degree grade than the average of men and complete university studies more regularly.

[3] www.oecdskillsforjobsdatabase.org

[4] https://www.scuola.net/news/261/i-ragazzi-italiani-e-le-stem-a-che-punto-siamo#:~:text=Le%20differenze%20di%20genere%20nel,bambini%20sono%20arrivate%20a%20509.

Weaknesses identified in the activities above described:

- WeSteam's weakness is the lack of everyday continuity, as at the moment it offers activities that last for a short period of time, that is why they are trying to collaborate with other initiatives, like Festival della Scienza, in order to create a whole month dedicated to STEM activities.
- The problem presented by both WeSTEAM and Verona Science festival is the lack of support by the municipal administration, as the municipality of Verona invests mainly in big projects and in art sites.
- From the point of view of the local authorities involved in the initiative, the greatest difficulty is that of finding local administrators who are really interested and motivated by the project. The lack of commitment causes the risk that this kind of initiatives are often sporadic and do not impact effectively the territory, and in the long term.
- Many of the initiatives involving schools or teachers in extra school programs encounter organisational and planning difficulties on the part of the teachers themselves. Sometimes also lack of digital skills in the school personnel
- An improvement in the orientation path by the school system is necessary. In particular, greater support is required from those who are still undecided about their future and those who realise they have chosen a faculty that is not suited to their needs.
- Furthermore, there are territories that are not touched by such initiatives because they are peripheral, far from the decision-making centres and to the interest of the public administration. These are the territories in which efforts should be concentrated to intercept young people and interest them in developing Stem skills.

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

Description of the resources of the initiatives above described:

While Olimpiadi della matematica is promoted and financiated by the Italian Ministry of Education, CoderDojo has private sponsors like *311 Verona* (profit) and Verona FabLab | Un laboratorio sperimentale per l'innovazione (no profit).
Verona Science Festival is organised by Associazione Festival della Scienza di Verona and has both public and private sponsors, like Patrocinio Regione Veneto, Confcommercio, Camera di Commercio, Consiglio Nazionale delle Ricerche, INAF, University of Verona and Trento; those are sponsors which help the festival from an economical, technical and collaborative point of view, but they still need an investor that could invest in the project in the long term.
WeSTEM finances itself, but it also looks up for businesses as future sponsors.

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are there special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Description of the access to the initiatives above described:

For the Olimpiadi della matematica, Italian high schools are automatically and periodically invited to participate in the competition, and they are in charge of communicating to students the opportunity to participate in this activity. Students may also find any information on a specific website.
Regarding CoderDojo, the families need to visit the website (but also the schools, when informed, encourage and inform the students); since the service is free, there are limited places and a waiting list.
We STEAM Verona and Festival della scienza have their own websites (WeSTEM Verona also has invested in panels). Festival della Scienza, in particular, is very inclusive, as it is open to everyone, it has no age limit.
Verona Science Festival has a very heterogeneous communication, as it includes websites, magazines, panels, newspapers (both physical and online), social media, newsletters, collaborations, as this activity is open to everyone and in that way they can reach every age group.

Part 3: STEM players - educators and participants

1. Who is acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

Description of STEM educators of the initiatives above described:

Olimpiadi della matematica: Professori delle scuole, gestito dall'Unione della matematica italiana
CoderDojo: *311 Verona*
Festival della scienza: contatti

We STEM doesn't have permanent educators, as this activity doesn't take place everyday. Their team is usually composed by people who organise events, trainers, school innovators.

Verona Science Festival team is composed of women who are experts in communication, education and management. They lean on external figures and experts, which usually come from associated Universities or schools and on a national scientific committee.

2. Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers?
- How long do learners take part in such special STEM education?
- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?
- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

Description of the participants in STEM education initiatives above described:

The participants can be high school students (Olimpiadi della matematica) or, in general, children and teenagers (CoderDojo and We STEAM Verona); Festival della Scienza is open to everyone and the team is considering to make it more inclusive by including also children with cognitive difficulties and to help them get closer to these subjects thanks to laboratories and a fun approach.
They participate for pleasure, for testing their abilities and they can work alone or in a team; that makes those experiences unique and educational, as participants have the opportunity to collaborate, learn from each other and compare with other people with the same interest.
Those activities are not addressed exclusively to males or females, but the majority of the participants are often composed of boys, maybe because of the myth which expects the STEM disciplines identified with the male sphere. That's why at the final conference We STEM Verona, for example, many prestigious spokeswomen attend; this association really cares about gender gap, actually their main focus is to boost female's participation in STEM activities.

Part 4: Summary

Short Summary of national / local STEM education:

Some figures to have a global picture[5]
To get an overall view of the level of digitization in Italy, it is sufficient to look at the Desi score of Italy[6]. In 2020 Italy was 25th out of the 28 EU member states, ahead of only Romania, Greece and Bulgaria.
About the gender gap: in the years 2020-21 the number of students enrolled in the 65 technical-scientific faculties increased, but this growth - especially among girls - is still slow. In Italy graduates in Stem subjects are 24.7%, less than in France (26.8%), Spain (27.5%) and Germany (32.2%). At a European level the technical-scientific path is chosen by 1 out of 3 women, in Italy only 1 out of 5 women.
Moreover, the labour market is still penalising women graduates in Stem. At a European level, 24 out of 1000 women specialise in ICT subjects, but only 6 then pursue a career in the related sectors; this means that a woman is eight times less likely to have a technical role in the digital sector than a man with the same level of education.

Digital skills are particularly important, since innovation now pervades every area. It is also important to make the technical-scientific fields more inclusive, starting with the elimination of gender stereotypes. In the Stem-club project, t2i intends to reach those territories that until now have remained on the periphery of initiatives such as those described in this document.

[5] Font: https://digital-strategy.ec.europa.eu/en/policies/desi-italy and https://www.assolombarda.it/media/comunicati-stampa/osservatorio-talents-venture-e-steamiamoci

[6] Desi is the digitalization index of the economy and society and consists of four dimensions: "Human capital", "Use of Internet services", "Connectivity", "Integration of digital technologies" and "Digital public services".

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

My further Remarks:

international stem awards: https://www.facebook.com/istemawards/

It collects the various competitions and experiences that can be capitalised on.

International opportunities for young people:
https://europa.eu/youth/solidarity_en
http://ilo.org
In Czech Republic:
http://ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=62165&p_count=96298&p_classification=22.10&p_classcount=6041

Questionnaire for project partners: NORWAY

Index

Co-funded by the Erasmus+ Programme of the European Union

Introduction STEM-sport clubs

STEM education represents all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupations. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaborate with other like-minded people in regular workshops or to participate in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develops new methods in STEM education.

The project targeting to new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organizations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and new created work materials are free available for any European organization that want to improve own STEM education with innovative new approaches on a local or regional level.

Co-funded by the Erasmus+ Programme of the European Union

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system)

Special advices:

All questions are used to give you an idea of the necessary content of the answers. You can **add or leave special aspects** as you feel that it is helpful!

The Document is **fully opened** for your necessary changes. Please don't change the given structure totally!

Text boxes: You can widen/shorten/remove/copy text boxes as necessary for you.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches of STEM education. Finally, we hopefully get such **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may have shortened and edited. It's always the aim for any adjustments to keep all core messages!

Co-funded by the Erasmus+ Programme of the European Union

Thank you for all your cooperation and all your answers!

Co-funded by the Erasmus+ Programme of the European Union

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview of you, your motivation to participate, the education system in your country and the existing STEM education activities besides the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** for your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

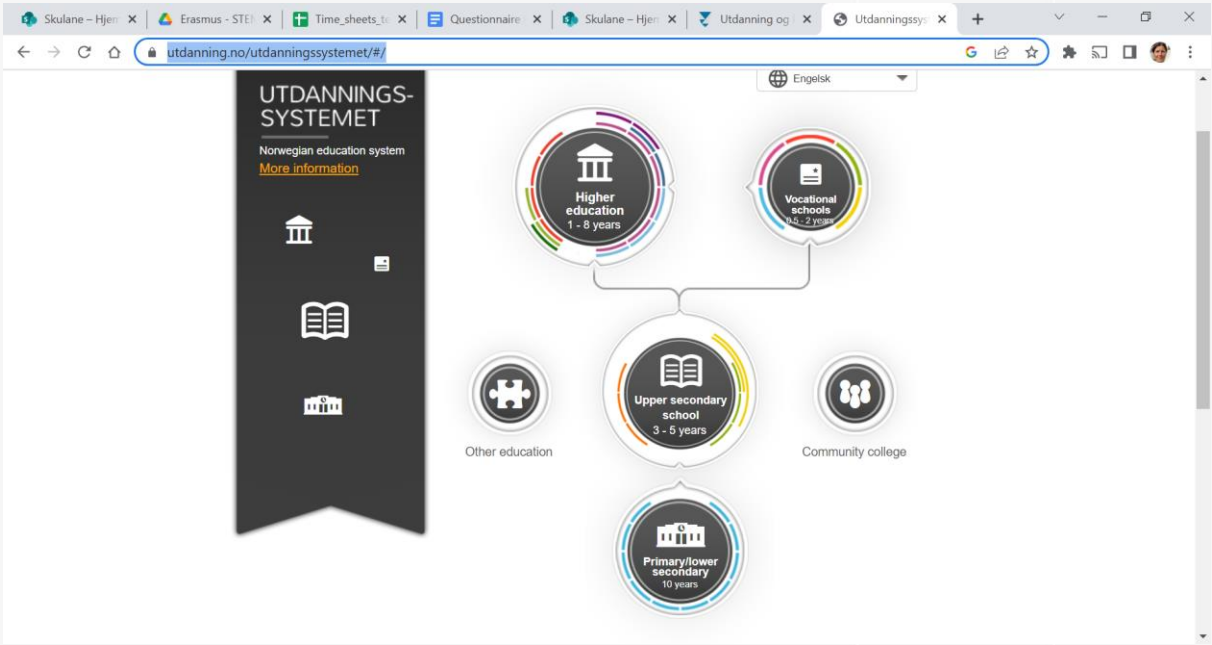
- Norway, Odda upper secondary school
- Our school is located in Odda a small town on the west coast of Norway. Approximately three hours far away from Bergen. The school has this school year 220 students, and they are spread out on general and special studies, sports (79 students) and different vocational subjects (tecnical, electrician, carpenter, health, 93 students)
- Our school was established as a to different schools, one for the general studies and one for vocational subjects, but in 199? the two schools became one.
- I am coordinator of the international projects that Odda upper secondary school participants in. I have worked for the organization for 5 years and I am 48 years old.
- We applied for the STEM-project because…….

Co-funded by the Erasmus+ Programme of the European Union

2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!

https://utdanning.no/utdanningssystemet/#/



3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regular take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regularly) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

- We do not have any existing educational STEM activities in our school that our students are participating in.

- This autumn 4 teachers participated as referees in "first lego league"that took part at the secondary school next by. "Lego league" involves mostly primary and secondary school in our region

- Roboting, programming

- Our school cooperate with local companies that are using robotic technologies, and that is a part of the regular curriculum.

-

4. Visible weaknesses and possible adds for STEM education

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
    - available STEM contents and activities
    - educator and learner motivation for STEM and development of STEM enthusiasm
    - the addressed ages of the participants of any activities
    - target groups of the existing STEM offers
    - (long-term) process of STEM education
    - involvement of the local economy / authorities
    - lack of skilled workers for economy in your region
- Do you have recommendations for additional local STEM activities in your country?
- We don`t have a STEM-club in our region/town. A challenge for us is that our school is closed from 15:15.
- We don`t have a activity to offer the students, therefore we don`t know if they are interested in a STEM activity as extracurricular or just as activity.
-

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

It is difficult to answer this question because we don`t have a STEM - club. In this project all the partners must establish at least one club, and we organize an event for our students and the community. To mangage to arrange an event we need financial support from the local community, sponsors (local companies) that need skilled workers and people with higher education. A STEM - club can be a motivation for them who not fit in in a ordinary sportsclub.

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are their special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Co-funded by the Erasmus+ Programme of the European Union

Part 3: STEM players - educators and participants

1. Who are acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

We can't make a description of the STEM-educators because we don't have any club. We will have a STEM-event, and the euducators will then be ordinary teachers, and persons that are working in technical fields.

We are living in a area where it is necessary to develop new technologies considered to the climate change, and sustainable development.

2. Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers?
- How long do learners take part in such special STEM education?
- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?
- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

In our STEM-event the target group will be students at our school, and they are in the age of 16-19. We will also invite Odda secondary school, and other primary schools in the district so the can experience what STEM can be.

Part 4: Summary

Please summarize your given answers and intentions. We would like to fix your answer to a maximum of about 500 characters.

Co-funded by the Erasmus+ Programme of the European Union

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

Co-funded by the Erasmus+ Programme of the European Union

Questionnaire for project partners: CZECH REPUBLIC

Index

Co-funded by the Erasmus+ Programme of the European Union

Introduction STEM-sport clubs

STEM education represents all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupations. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaborate with other like-minded people in regular workshops or to participate in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develops new methods in STEM education.

The project targeting to new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organizations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and new created work materials are free available for any European organization that want to improve own STEM education with innovative new approaches on a local or regional level.

Co-funded by the Erasmus+ Programme of the European Union

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system)

Special advices:

All questions are used to give you an idea of the necessary content of the answers. You can **add or leave special aspects** as you feel that it is helpful!

The Document is **fully opened** for your necessary changes. Please don't change the given structure totally!

Text boxes: You can widen/shorten/remove/copy text boxes as necessary for you.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches of STEM education. Finally, we hopefully get such **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may have shortened and edited. It's always the aim for any adjustments to keep all core messages!

Co-funded by the Erasmus+ Programme of the European Union

Thank you for all your cooperation and all your answers!

Co-funded by the Erasmus+ Programme of the European Union

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview of you, your motivation to participate, the education system in your country and the existing STEM education activities besides the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** for your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

Co-funded by the Erasmus+ Programme of the European Union

The South Bohemia Company for the Development of Human Resources (hereinafter JSRLZ) is a professional and non-profit organisation focused on the implementation of activities in the area of human resources development and the processing of analyses and investigations related to this issue. JSRLZ was founded in 2005 by the South Bohemian Chamber of Commerce (JHK) to ensure communication and cooperation between regional labour market actors in the area of human resources development and to ensure the implementation of specific activities that will be in line with the needs of the South Bohemian Region (The Czech Republic).

The mission of the South Bohemian Company for the Development of Human Resources is to act as a professional platform with a high informal authority linking the perspectives of regional actors and contributing to the strategic orientation of the activities of these actors involved in the development of human resources together with the stimulation, preparation and implementation of activities fulfilling key priorities in the region.

We see the lack of skilled workers for the local economy in the field of technic therefore we want to support the STEM activities already by the children and to start with the education by early age to attract them to choose and study the technically focused school.

My name is Michaela Rychnavská (37) and I have been working as a project manager for the last 3,5 years for both of the companies (JSRLZ and JHK). My role, during the several projects I was a part of, was focused on education, increasing the VET education in the region, popularization of technique, IT and the other sectors which have lack of employees on the labour market in our region.

The second partner for this project coming from CZ is Upper secondary school of chemistry Pardubice (hereafter SPSCH). SPSCH is one of the biggest (1050 students) VET technical state school focused on 4 main branches of study: Applied chemistry, Security and Law, Fire Protection and Hairdressing. The school has a long history starting in 1946. New branches like Fire Protection, Security and Law and Hairdressing started roughly 10 years ago. School has a very long experience with Erasmus programme and previous programmes like Comenius or Leonardo Da Vinci. SPSCH was rewarded with sustainability award and has the right to use Responsible Care logo (responsible behaviour in chemistry). The Pardubice region is rich in chemical companies which has an advantage for school to have strong partners in chemistry and a great chance to fill the local labour market with skilled workers. The SPSCH was already a part of previous project within this consortium (CoCo+). The previous project was focused on methodology how to attract young people to start study technical-scientifical schools. After the success with CoCo+ the consortium started to think about follow up project, which would hopefully, keep the students coming for VET, technical education (STEM education) long time motivated. To keep anybody motivated in anything for a long period is always difficult, therefore the consortium decided to take example from sport clubs where long time membership and enthusiasmus take place. School is motivated to establish new nontraditional-technical clubs and create fruitful environment to motivate students for a long time (even after they finished their studies). This is not only important for the school - its attractivity, exclusivity, prevention of dropouts, etc, but also for the chemical companies and labour market in general which suffers from lack of skilled technically oriented and motivated workers
My name is Jakub Návesník (36) and Iam working as project and PR manager and teacher of chemistry at SPSCH Pardubice for 7 year now.

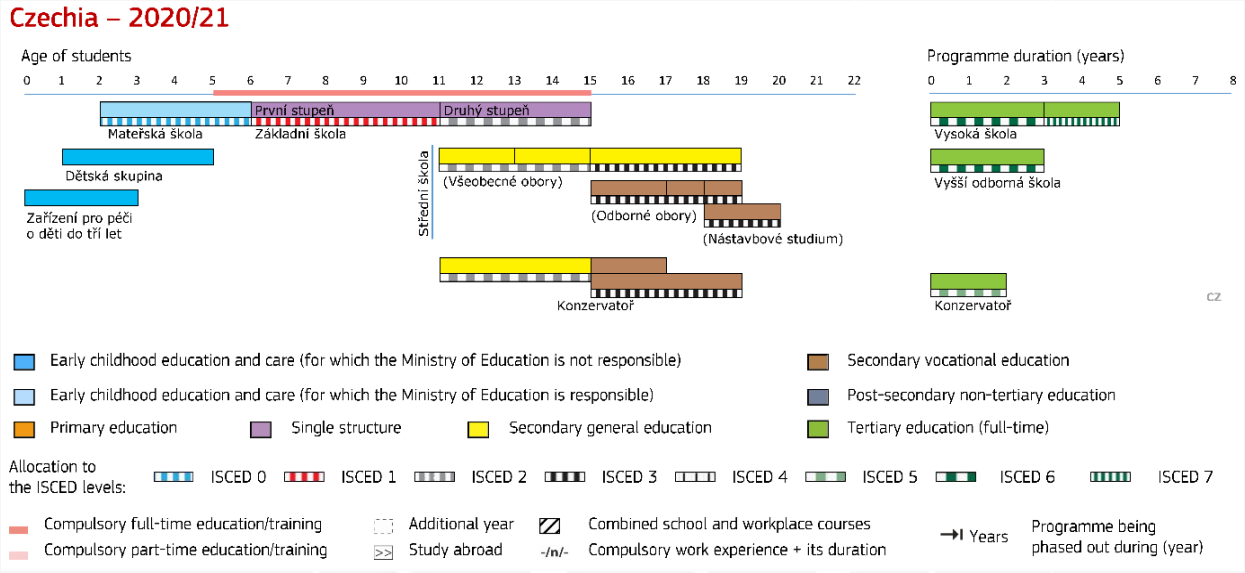
-

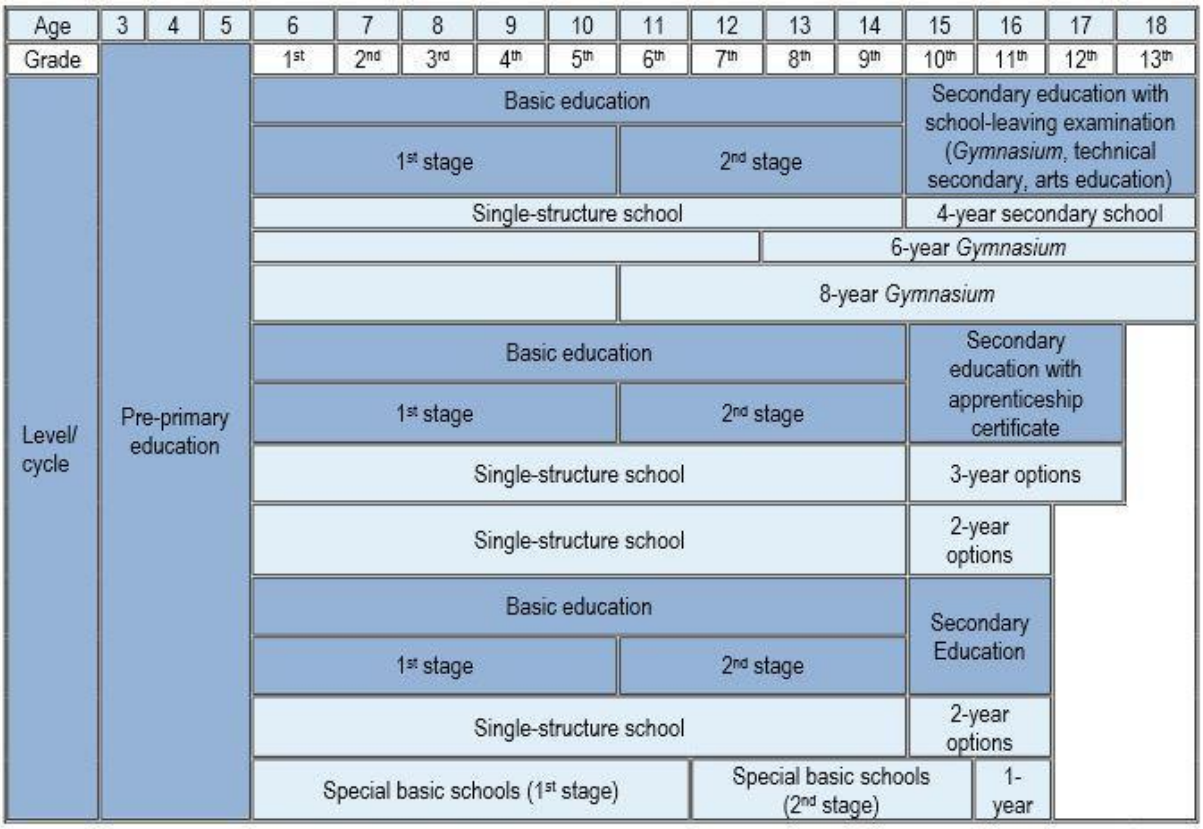
2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!

Children start with preschool, and continue on to elementary, secondary, university, and post-graduate education. The classification system used in the Czech school system consists of a scale from 1 (best) to 5 (worst) that is used to evaluate the students' work. Report cards (summary classifications) are given for each subject halfway through and at the end of the school year.Children may enter **preschool** before they begin compulsory elementary education. **Preschool enrollment is guaranteed for children in their last year before entering elementary school**, but they often attend as early as 4 years of age. Preschool institutions are intended to encourage early learning habits and facilitate social contact among peers, both of which are instrumental for a child's smooth transition to elementary school. In cooperation with parents and teachers, children learn to think logically, training their memories and exercising their imaginations. Concurrently, these skills help to evaluate their intellectual and educational levels before entering elementary school. Czech **elementary education** takes nine years, usually from the ages of 6 to 15. In contrast to the United States, children can obtain their elementary education at a variety of different schools that can also utilize different types of educational programs. Most commonly, children attend a regular 9 year elementary school, which is divided into two stages: a primary and lower secondary stage, where the primary stage encompasses grades 1-5, while the lower secondary stage is grades 6-9. In addition, children have the oCption to apply to 6 or 8-year gymnasiums either after their 5th or 7th year of elementary education. Gymnasiums are schools targeted toward a specific area of study, but still provide pupils with their elementary education. Additionally, students may choose to attend a conservatory, for example an 8-year dance conservatory, and some students with disabilities will be placed in special schools to accommodate their needs. All of these different types of schools provide students with an elementary education that allows them to continue on to pursue a higher education at the secondary and university level. **Upper secondary education** can be either general or vocational, is generally four years in length (grades 10-13), and is not considered mandatory. At this level, vocational education is much more common than the general secondary education. Students who graduate with a vocational certificate often do not continue in the classical education system, and instead pursue a career in their chosen area of study right away. The secondary level of education is not attended by a great number of students, since the majority attends 8-year gymnasiums after 5th grade, which leads them all the way up to their 13th year of education. **Tertiary or university education**, includes all studies following the completion of primary and secondary education with a successful final examination. Final examinations consist of several smaller exams; an exam of the Czech language, several exams in the student's area of specialization, as well as an exam on a

topic of the student's choice. After 2008, these exams consist of two parts: a common (state) exam and a profiling (specific for individual schools) exam. This measure was implemented in an effort to provide better comparability of the final examinations across different schools. University education is available to all applicants with a completed secondary education (i.e. final exam) who successfully pass the entrance exam. The system of entrance exams is designed specifically by each individual college, and serves for testing the knowledge and skills of applicants. Most universities offer accredited bachelor's, master's, and engineering degrees. A bachelor's degree is usually a three-year course of study in which students receive an elementary survey of highly specialized areas. Students can either leave their studies after these three years, or they can complete it by means of a final exam including the defense of a bachelor's thesis, or may continue on to the master's program, where they can achieve a narrower specialization. A master's degree consists of either a five or six-year study program, or as a two-year program following the completion of a bachelor's degree. In obtaining a master's degree, students gain both a basic survey of highly specialized subjects and a certain grade of specialization. The program culminates with students taking required state final exams and defending their thesis. Finally, an engineering degree can also be obtained, which pertains mainly to technical and economic fields. After students pass these types of university studies, some continue their specialization through doctoral programs. Passing this program is often conditioned with certain published work and sometimes also by training. In college, students can study either in attendance form (formerly daily study), distance form (formerly extramural studies), or a combination of both (combined study). Besides standard types of study, colleges also offer other forms of education, including retraining study, university for seniors, studies oriented toward pedagogical qualification, and others. Study at public universities is free, provided that students qualify through entrance exams. However, after age 26 the attendant will no longer be eligible for student status under state social services and will not receive student benefits including health insurance while he/she studies.





Co-funded by the Erasmus+ Programme of the European Union

3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regular take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regularly) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

Co-funded by the Erasmus+ Programme of the European Union

Existing STEM activities / contents IN or BESIDE the educational system:

EDUCATION OF INTEREST
Interest education, as well as non-formal education, form an integral part of the lifelong learning process. Interest education is legally enshrined in Act No.561/2004 Coll., on pre-school, primary, secondary, higher vocational and other education (School Act) and is defined in Section 111 as an education providing participants with leisure activities with a focus on different areas. Interest education is carried out in educational establishments for interest education, especially in leisure centres, school clubs and school clubs. Leisure centres also participate in further care for gifted children, pupils and students and, in cooperation with schools and other institutions, also participate in organising competitions and parades of children and pupils. Interest education clearly helps to meet the educational objectives set by the Education Act.

Interest education does not provide a degree of education, but it deals with activities necessary for the development of personality, compensates for unilateral burden from school, ensures mental hygiene, has a function of education, educational, cultural, preventive, health (relaxation and regeneration), social and preventive, develops abilities, knowledge, skills, talent, strengthens social relations.

Educational establishments for interest education and Implementation Decree No. 74/2005 Coll., on Interest Education
Educational establishments for interest education are part of the education system of the Czech Republic and are centres of leisure time, school clubs and schools. Educational establishments for interest education provide educational activities for the purpose for which it was established, educational, educational, interest or thematic recreational events, providing awareness-raising activities for pupils, students and pedagogical staff, as well as other persons.

They promote equal opportunities, are not selective, because they accept candidates regardless of racial origin, nationality, gender, religion, etc. They also play a significant role throughout society as a means of protecting against the spread of social pathological phenomena and risky behaviour among children and young people, which allow meaningful use of leisure time. Educational institutions for interest education also play an irreplaceable role in the discovery, capture and development of the talents and talents of children and young people.

Qualified pedagogical staff work in educational institutions for interest education according to Act No.563/2004 Coll., on Educational Workers and on Amendments to Certain Acts (teachers, teachers, leisure teachers), which is a guarantee of quality and expertise in the field of leisure time.

The implementing legislation of the Ministry of Education to the Education Act No. 561/2004 Coll. for Educational Facilities for Interest Education is Decree No. 74/2005 Coll., on Interest Education, as amended, which sets out details of the content and scope of their activities, organisation and conditions of operation, the conditions of admission and the conditions of payment for education services.

Educational establishments for interest education are:
a leisure centre
the school club
a school group

Apart from the activities organized regularly and modified by national law, schools themselves organize science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools and institutions.

Possibilities and offers for children and students of any age are wide in our region, on the other hand most of them are focused on sport and art and there are only minimum of regular education of interests in the field of STEM. STEM activities are mostly organized by companies, BSO´s and non-profit organisations, and they are organized in one time. Usually those activities are for pupils from 6 to 15 years.

The main body of the CZ regarding national structure of STEM curricular and extracuricular education is Czech ministry of education. This ministry runs National institute for kids and youth which further organize so called „DDM“ (Dům dětí a mládeže). These last organisational units represents different clubs and free time activities including STEM activities accross the whole Czech Republic. There are several other subjects running further extracuricular activities except above mentioned organisational structure. Those subjects are rather regional and nonsystematic. Among them we can mentioned national and regional competition such as „Hledáme nejlepšího mladého chemika“ finding the best young chemist, math, fysics, biology and chemistry olympiade, math Klokan, competion and asociation for technical youth called „AMAVET“ and many others. Very important role also plays regional and local authorities and schools (all levels). There are many different iniciatives (very often driven by EU support for VET and technical education) coming from municipalities, regions schools, non profit organizations. Beside above mentioned, companies case by case, also provides some activities (ex: Contipro – summer camp and workshop called FyBiCH). Moreover science centres and polytechnical workshops are also part of the extracuricullar activities in CZ. There is a very broad number of different „STEM extracuricullar education“ providers with different focus in all sciences and technical fields that is impossible to idicate regurality or main topics or even target group. In case of existing STEM clubs, they very often take place once a week with duration about 1 – 2 hours. What is also possible to see in CZ is that as older the student is as less oportunities for taking a part in STEM oriented club have. There are many different clubs for kids from elementary schools, much less oportunities have students in upper secondary level and there is a very limited number of activities for older.

Co-funded by the Erasmus+ Programme of the European Union

4. Visible weaknesses and possible adds for STEM education

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
    - available STEM contents and activities
    - educator and learner motivation for STEM and development of STEM enthusiasm
    - the addressed ages of the participants of any activities
    - target groups of the existing STEM offers
    - (long-term) process of STEM education
    - involvement of the local economy / authorities
    - lack of skilled workers for economy in your region
- Do you have recommendations for additional local STEM activities in your country?

Co-funded by the Erasmus+ Programme of the European Union

Description of weaknesses and ideas for STEM education:

Teachers are not motivated enough

Pupils are not motivated at all

VET students are not attracted, they don´t want to substitute their leisure time for another education

Legacy is too strict and it is hard to establish new STEM club – no money no funny

Generally there is no interest in VET education,

What to do:

to make it attractive

to convince parents and children that the general education is not enough and that not everyone must be a manager

we must show them that those STEM clubs could give them such an advantage for the future professional career

we must strenghten the cooperation with the Representation offices in the region to support STEM clubs providers and schools

to educate teachers in the technical field

Weeknessess/cons:

Week structure, poorely organised from national point of view, rather decentralized (hardly to reform)

Still low collaboration with companies (influencing both directions)

Lack of financial support (state, region, municipality, companies and other STEM players)

Long lasting issues (extracuricullar STEM activities are hard to maintain for long period)

Loosing the motivation of participants, mentors, trainee, etc. Especially in long time period

Lack of interest in general

Opportunities/pros:

New, modern and exciting technologies, industry 4.0

Increasing sysytematic support from CZ and EU – importance of STEM is clearly obvious and readiness for new era is crucial, STEM is No 1 to have better future all over the world.

Already existing structure can be strenghtened and broaden

Highly educated population with many professionals, specialists and enthusiasts

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

Description of the resources:
Funding organizations in the South Bohemian region:
Jihočeský kraj (South Bohemian Region)
Erasmus+
Ministerstvo školství, mládeže a tělovýchovy (Ministry od Education, Youth and Sports)
Nadace rozvoje občanské společnosti (NROS) (Civil society Development Foundation)
Dům zahraniční spolupráce (Czech National Agency for International Education and Research)
Fondy Evropské unie (European Union Funds)
Interreg Rakousko Česká republika (Interreg Austria-Czech Republic)
Přeshraniční spolupráce Česká republika Svobodný stát Bavorsko (Cross-border cooperation Czech Republic-Free State of Bavaria)
International Visegrad Fund
Fond malých projektů, spolupráce Jižní Čechy, Horní Rakousko, Dolní Rakousko (Small Projects Fund, Cooperation South Bohemia, Upper Austria, Lower Austria)
Nadace Neziskovky (Foundation of Non-profits)
Nadační fond Jihočeské naděje (South Bohemian Hope Endowment Fund)

The funding is mostly provided for specific occasions or projects and it is quite difficult to reach it, therefore there are not many activities in the region. In general the school groups and clubs are funded by the representatives offices in the regions, church, cities/towns, For the attendance the children usually must pay some fees.

As we are state school – financing is delivered from CZ government (Ministry of education, regional councils for education) However extracurricular activities are usually co-financed from different projects, EU, state, regional, municipal or by partner companies. There is also a possibility to have a membership fee for participants (not usually used in schools). All the organization mentioned in the part 1 have different financial sources. Usually in order: state, region, EU, membership fees, companies.

Co-funded by the Erasmus+ Programme of the European Union

The target „why“ is usually to promote STEM activities for future skilled, technically educated work force, researchers, innovators, inventers and better future with sufficiently prepared generation.

Co-funded by the Erasmus+ Programme of the European Union

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are their special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Description of the access:

There is no general registration system or any special platform, where to find any STEM club or specific group. When you are looking for any STEM activity, you need to search on internet, usually on specific web pages. The activities are usually widespread through:

- schools, webpages, social media, friends, teachers.
- no activities to attract any interested parties
- there is very important role of educators and parents in attractivity of any club, children nowadays tent to have no much interests apart from social media, TV and internet, therefore it is very important to cooperate with children and educator

The situation in CZ as described previously stating that there is rather poor structure and week crosslinking between variety of STEM education providers causes non-systematic approach and maybe worse promotional impact. Most of the STEM players promote their own activities online on web, fb, instagram profiles, with paper leaflets, posters or via schools communication channels, rarely with radio or TV. Time by time an open physical activity is organized to tease kids to try out. Schools and parents play important role to inform the kids about possibilities nearby. Some of the organizations have booking system for different activities – not that usual neither centralized.

Co-funded by the Erasmus+ Programme of the European Union

Part 3: STEM players - educators and participants

1. Who are acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

Description of STEM educators:

Existing STEM clubs (activities) are leaded by proactive people (teachers) usually with technical education who enjoy their job and want to share it with the young generation.

Specialists with university education, with years of practice in particular fields, teachers or enthusiasts are STEM educators in general. Those people share usually theoretical knowledge even practical skills. Their backgrounds differ with the field focused on. This part is particularly hard to answer. If we would like to have relevant information we would need to do national wide survey reaching most of the STEM educators in CZ. Now we would be capable to answer this part regarding our organisation.

2. Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers?
- How long do learners take part in such special STEM education?
- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?

- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

Description of the participants in STEM education:
This is the same situation as previous part. We can say something about our school. If needed more in deep, detail then enormous survey is neccessary (There is no organization in CZ which would gather such information)

Co-funded by the Erasmus+ Programme of the European Union

Part 4: Summary

Please summarize your given answers and intentions. We would like to fix your answer to a maximum of about 500 characters.

Short Summary of national / local STEM education:

Co-funded by the Erasmus+ Programme of the European Union

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

My further Remarks:

Questionnaire is rather for partners where centralized STEM educational system exist. In many questions were not easy or able to answer for CZ because of the absence of systematic state-centralized STEM education approach and statistics. This fact can resulted in non-specific, generic answers which are rather a list of different possible options.

Co-funded by the Erasmus+ Programme of the European Union

Questionnaire for project partners

Research and answers of the German partner

Index

Co-funded by the Erasmus+ Programme of the European Union

Introduction STEM-sport clubs

STEM education represent all **Science, Technology, Engineering and Mathematics** subjects.

Most European regions face a lack of skilled workers for their local economy. STEM education is a basic necessity for most skilled occupation. For that reason, enthusiasm for all sciences and STEM themes should be developed for young people starting in early childhood. Growing children should participate in a few STEM education activities to enrich STEM knowledge and competences in a process, always appropriate to their age and the reached education level.

STEM education is part of the approach to many fascinating themes, technologies and research possibilities. The fascination for STEM themes can stimulate young people to collaboration with other like-minded people in regularly workshops or to participation in special STEM competitions for young researchers, scientists, technologists and even entrepreneurs.

The European project **"Clean green future through STEM-sport clubs"**, co-founded by the ERASMUS+ programme of the European Union, develop new methods in STEM education.

The project targeting to new STEM activities in addition to the regular curriculum of the national school systems. It also analyses parts of the structural background of the regular sporty training system and wants to adapt it for new STEM learning approaches (STEM training). Some partners in the project are experienced in such new approaches for education, other partners want to have access to such ideas and to adapt it for their own educational work.

The following questionnaire is a main part of the activities to examine the current status of STEM education from the perspective of those educational organizations which are project partners in the participating European countries (Croatia, Czech Republic, Germany, Hungary, Italy and Norway).

Some answers of the questionnaire and all other results of the "STEM-sport clubs" project will be published on the project website in future. The results and new created work materials are free available for any European organization that want to improve own STEM education with innovative new approaches on a local or regional level.

General instruction for the questionnaire

This questionnaire is used to **explore an overview** of the national environment of STEM education in the participating countries. It's the fundamental research for project progress and basis for new methods / approaches defined in the project.

Please fill carefully and take time for necessary own research work to answer the open questions. The details you figure out will help you and all partners in STEM-sport clubs project and will ensure the progress of the project. Other experts beside you can add details to the questionnaire. **We finally need only one filled and possibly summarised document from each project partner!!!**

Please have in mind that STEM education covers a wide range of all Science, Technology, Engineering and Mathematics subjects. Against this background all answers and related STEMsport club activities could also represent a very broad spectrum of contents.

For the questionnaire we have included three topics:

- **STEM content**: Which main STEM activities are available currently? Who are the existing STEM players and what are existing STEM structures?
- **STEM organizational issues**: What are the used resources right now? Which financial, organizational and structural background exist?
- **STEM players (learners and educators)**: Where could you search for any new players? How could you find, activate and motivate them? What would be reasons for participation and collaboration?

If necessary, please divide answers into the part of STEM activities related to curriculum / education system (**within** the system) and additional STEM initiatives (**beside** the system)

Special advices:

- All questions are used to give you an idea of the necessary content of the answers. You can **add or leave special aspects** as you feel that it is helpful!
- The Document is **fully opened** for your necessary changes. Please don't change the given structure totally!
- **Text boxes**: You can widen/shorten/remove/copy text boxes as necessary for you.
- **Add new pages** if necessary.
- If you mark questions "**unanswerable**", please give a short reason for that decision.

Please have in mind for all descriptions that we want to get an overview about your national and local approaches of STEM education. Finally, we hopefully get such **overview** for the different systems in the participating countries.

It's planned to publish answers in parts, summaries or details. For that purpose, your answers may have shortened and edited. It's always the aim for any adjustments to keep all core messages!

Thank you for all your cooperation and all your answers!

Co-funded by the Erasmus+ Programme of the European Union

Part 1: Contents of STEM education

This part of the questionnaire should give us an overview over you, your motivation to participate, the education system in your country and the existing STEM education activities beside the regular curriculum of any STEM subjects.

1. Who are you and why do you participate in STEM-sports project?

- Which European **country** do you represent?
- What's the name of the partner **organization** you're working for?
- Please give us some **main facts** of your organization (location, size, main activities or branches, founding year, owner etc.)
- Just one sentence: What's the **reason** of your organization to take part in STEM project?
- Who is the **person** behind all the answers? (NOT the name please – more important is the role in the organization, how long do you work for the organization and probably what's your age at present)

Germany

Solaris Förderzentrum für Jugend und Umwelt gGmbH ("solaris support centre for youth and environment") is a private German non-profit and non-governmental organization. It's further only called "solaris".

The organization is situated in the south-eastern part of Germany in the City of Chemnitz. That city is part of a region with a long mining and industrial tradition and culture of about 400 years. The region is sometimes called the "Cradle of the German industry". The city was selected to be the "European capital of culture 2025". All regional economy is based on the curiosity and competences of scientists and engineers. Many inventions and worldwide acting companies have their roots here. The labour market regularly faces a lack of skilled workers especially in higher education and in all professions with STEM profiles.

Solaris was founded in 1992 as a private owned organization of youth welfare and is part of a group of companies. Step by step a lot of different parts were added to. Today solaris is the employer of about 100 workers – mostly educators and social workers – and it regularly advises more than 50 volunteers in different places of the City of Chemnitz. They all work in different social and educational facilities like kindergartens and public schools or run special places like a multi-generational centre, an art factory or a space centre. Activities are mostly focused on growing children and young people but target groups are also people of all other ages.

One of the places belonged to solaris are the "solaris workshops for young people and environment". Growing children get additional STEM skills here beside the regular school system. The workshops use age related education methods and provide different STEM related themes as electronics, robotics, sustainability, mobility or renewable resources. The workshops are designed for different ages and already start in early childhood. The methodology is based on the

natural curiosity of all children. In a long-term process of extracurricular education special STEM interests are awoken and held on a high level.

As earlier children are in touch with the “fascination of STEM”, as longer they keep and canalize their own curiosity and as better are the chances that they will once choose a STEM career in future.

A few reasons to take part in STEMsport project are:
- to exchange own educational competences with like-minded other organizations and educators
- to raise the level of competences of own educators regarding STEM education methods
- to help to fulfil regional economical, educational and socially challenges
- to transmit findings and outcomes to other interested parties
- and to cultivate an intercultural European exchange

There is not only one person behind the answers. It's a mixture of the answers of some involved persons: scientists, engineers and educators, female and male, younger and older as well as with

2. Main facts of your national education / school system

- Please give us a very **short overview** of the main parts of your national **school system**. If available a picture / chart may fill this task completely!

Germany

The German school system mostly contains the primary school (up to grade 4) and secondary school with two levels (up to grade 10 as well as above). Another part of the German school system are the vocational schools.

A special aspect is the federal system of Germany. Based on that system Germany doesn't have a consistent education. The responsibility for education is on the level of the 16 German states. For this reason, each of the German states ("Bundesländer") has an own "Ministry of education and the arts" and defines the general conditions of all schools under its responsibility. The ministries cooperate under the umbrella organization of the "Standing Conference of the Ministers of Education and Cultural Affairs" and define for example the common educational standards.

Solaris is based in the Free State of Saxony. For that reason, all educational aspects are under responsibility of the "Saxonian ministry of education and the arts". The chart on the next page allows an overview of the Saxonian school system.

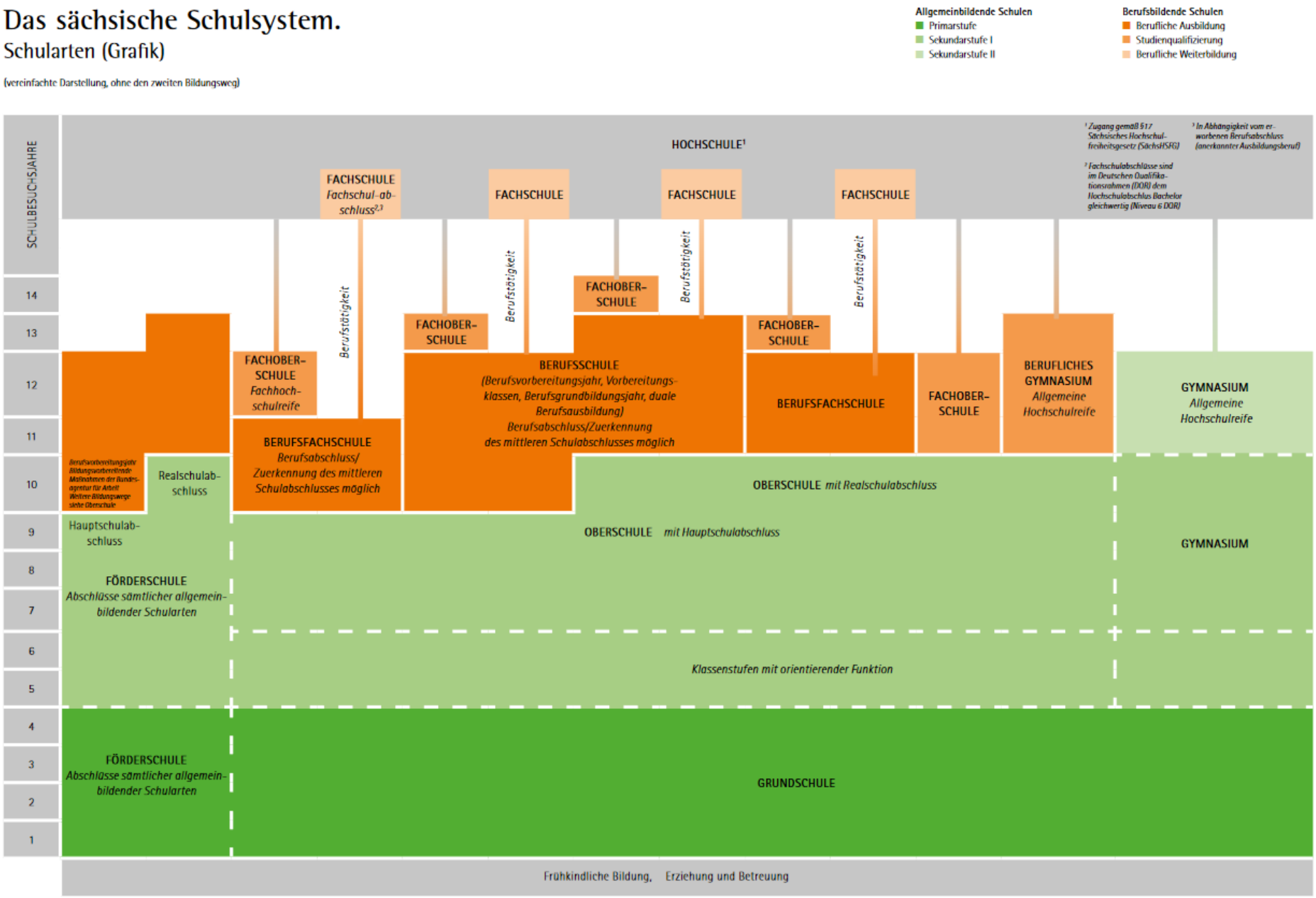
Simplified description of the chart:
The left column (grey) shows all grades starting in primary school. The lowest row (grey) symbolizes early education in kindergarten. First part of school system is primary school (dark green). Light green represents secondary school (both levels). All orange fields symbolize different parts of vocational education. Top row (grey) shows the higher education (university). As showed in the chart, with rising age of pupils different options of vocational education are offered. Most of these options also allow access to higher education level of university. Also high school ("Gymnasium") provide access to higher education.

Basic STEM education is part of the whole German / Saxonian school system. But only some schools are able to awake and hold curiosity for STEM fields on a sustainable level. They mostly have only basic equipment and teach mainly the themes given in the curriculum. For that reason, extracurricular places of learning and wider non-formal education is also an important part of the education system.

Das sächsische Schulsystem.

Schularten (Grafik)

(vereinfachte Darstellung, ohne den zweiten Bildungsweg)



Co-funded by the Erasmus+ Programme of the European Union

3. Existing national, regional and local STEM education activities

- Please describe **existing educational STEM activities** that regular take place on national, regional or local level. We're NOT asking for the basic curriculum of any subject – we are asking for any special additional activities.
- It may include for **example:** additional (regularly) science workshops, technical or science competitions or Olympiads, science fairs, holiday camps, exhibitions, special STEM projects / project days, collaborations with local STEM economy, universities or with other schools etc.
- Please describe single activities as well as **regular** activities (weekly, monthly).
- What are the main **themes** and **targets** of the described activities?
- Do those activities somehow **address** parts of the regular curriculum?
- Which (special) **target groups** are addressed (different age or gender, special interests, etc.)?
- Please divide in activities **IN the system** e.g. organised by the schools / administration and **BESIDE the system** e.g. organised by companies, community, private initiatives, local enthusiasts, museums or other players.

Germany

On all levels (local, regional, national) extracurricular STEM education activities are provided in Germany. The lack of skilled workers as well as of well-studied engineers and scientists create a high number of activities of companies and umbrella organizations, universities, research institutions and education promoters.

Based on political or economic decisions a lot of resources are spent for extracurricular STEM education. With a wide bunch of methods organizations promote STEM activities to attract young people and to inspire them for special STEM themes. New themes of the society, for example regarding climate change, renewable energy, mobility, environment protection and also media, robotic or aerospace are some of the new and changing labels of modern extracurricular STEM education.

Most of the STEM education activities are somehow connected to the regular education system and the schools. They are advertised mostly in schools, they are based on parts of the curriculum or they work with whole classes and teachers for STEM subjects.

Some promoters offer flexible programs bookable for schools / classes as a part of the regular school education. Such promoters bring their STEM education equipment into the schools. Other promoters invite classes to their own premises, mostly good equipped areas for the placement of special STEM themes.

Most of these education activities offer only a special part of STEM education to a target group that is homogenous in their age, their level of knowledge and the size of the participating groups.

The programmes address different ages of learners, some start in early childhood.

Co-funded by the Erasmus+ Programme of the European Union

Some of the activities – workshops, competitions or STEM camps are combined with vocational orientation by presentation of special professions, a visit in a company or university or a discussion about the possible future of the participants/learners.

On local, regional as well as national level a lot of STEM competitions – Olympiads as well as other competitions are popular. They prepare children for special STEM subjects as biology, physics, math or chemistry or address more specialised themes as technics, technology, robotics, environment, engineering or computer sciences. On German level a pedagogical institute for education of sciences advises a few of such national competitions and observe the content and the quality. The institute also prepare the national winners for further international activities.

In a special system of all-day-school the schools can invite local promoters of non-formal education (sports, culture, STEM, other) to implement their own regular education (e.g. weekly workshops) for a whole academic year. Educators are paid for their services in such period.

In STEM education as well as in the STEM economy woman are represented on lower level than man. For that reason, it is agreed that the potential of woman in STEM professions is not fully used and it is expected that it can grow for the future. For that reason, a few initiatives address the target group of girls and young woman to open up such good career chances for them.

A few organizations address the whole society and try to give STEM education a higher importance. Such organizations also address multipliers as well as educators and teachers and organize multiplier events, workshops and further education to improve the quality of STEM education.

For the last decades a lot of new STEM education activities / places were established by mostly non-profit and non-governmental organizations beside the regular school system. They all develop STEM competences of growing children but address different target groups.

Two examples may allow an overview of the extracurricular German STEM education scenery for young learners and show the diversity of such activities:

(1) Laboratories for pupils ("Schülerlabore"):

- extracurricular STEM education beside regular school system, outside the schools
- Belonging to universities, research institutes, STEM economy, etc.
- Addressing of groups/classes
- offers for single workshops ranging from a few hours up to a week
- Wide range of very individual special themes or subjects (e.g. aerospace, physics, math, robotic, environment, technology, chemistry and a lot more)
- activities are regular offered, booked by teachers / educators for groups or classes
- more than 500 of such special places of education in Germany
- German umbrella organization ("Lernort Labor - Bundesverband der Schülerlabore")

Co-funded by the Erasmus+ Programme of the European Union

(2) Research centres for pupils ("Schülerforschungszentren"):
Research centres are comparable to laboratories for pupils but have a few important differences:

- regularly ongoing STEM education formats for longer periods are offered
- young people are individually supported
- research centre activities are bookable for single learners or little groups
- participants work on own research projects and own results
- it's one of the targets to present such results, e.g. in competitions for young researchers
- More than 80 of such special places of education in Germany
- German umbrella organization ("Netzwerk Schülerforschungszentren")

In addition, other belonging activities support the process of STEM excitement. Science fairs and science centre show exiting experiments, show great new results of researchers and of STEM related projects and deal with complex scientific themes in a simplified way.

Co-funded by the Erasmus+ Programme of the European Union

4. Visible weaknesses and possible adds for STEM education

- Can you feel or identify weaknesses or do you have special ideas if you think about the existing STEM education in your country, for example regarding:
  - available STEM contents and activities
  - educator and learner motivation for STEM and development of STEM enthusiasm
  - the addressed ages of the participants of any activities
  - target groups of the existing STEM offers
  - (long-term) process of STEM education
  - involvement of the local economy / authorities
  - lack of skilled workers for economy in your region
- Do you have recommendations for additional local STEM activities in your country?

Germany

The fast and ongoing development of extracurricular STEM education and STEM activities as well as the sometimes rapid changes of such programs, contents and promoters cause new challenges for the education system:

1. A lot of extracurricular STEM education activities take place only once or participants take part only one times for a defined time of mostly a few hours. A coordinated and regular process of continuous learning and an individual ongoing focus on a special STEM field or target is missed for such short-time offers.
2. The individual support of children who are most interested is not part of most of the programs. A learning progress for a longer period and the development of competences in an accompanied process is not included.
3. Programs often awake curiosity for STEM themes but cannot keep it on high level.
4. Most promoters operate independent; in some cases, they are even competitors.
5. Regulation or coordination for the necessary structure of extracurricular STEM education exists only on a very low level
6. Beside school growing children spend their leisure time for sport, for culture, for friends and for family. They're often face the situation to decide among a lot of possible activities. Available time for individual STEM education beside school depend on the special interests of each individual child and is very limited.
7. Time for extracurricular activities (STEM or other) are also limited in school.
8. STEM education programs often require a lot of equipment and many financial and other resources.
9. STEM educators need specialisation for the selected STEM themes. Beside they need special knowledge, experience as well as special methods to awake interest and to impart the knowledge for the special themes.

Co-funded by the Erasmus+ Programme of the European Union

For such reasons, a more coordinated STEM education is important for the future. Some aspects may be:

- The collaboration between all STEM education promoters as well as the beneficiary organizations needs better local structures
- All promoter should be visible for young people and educators.
- The quality of content and education should be evaluated in a regularly process
- Better options of further training for educators in such special fields are recommended
- Resources should be planned and concentrated in a network of the local STEM economy including interested and participating organizations on local/regional level
- Recruiting processes for specialists are necessary. Such persons also need preparation to become effective STEM educators
- A local or regional umbrella organizations would for example allow
    - to develop stable local structures
    - to raise the visibility of the whole network and the education promoters
    - to develop the quality and the options for further training of educators
    - to address and activate funding of administration as well as supporters or donators in a structured funding process

Part 2: Organizational issues of STEM education

1. Financial issues and available resources

Please describe the responsible organizations of the financial resources for the STEM activities you have described in part 1.

- What's the name of the funding / sponsoring organizations and why are they engaged? What's their target to fund such STEM activities?
- Are the financial issues only parts of the finances of the education system or do you see and use any additional budgets of other sponsors?
- What kind of organization do your sponsors represent (governmental / non-governmental, profit / non-profit organizations, private organizations / local economy, foundations, etc.)?
- Do the sponsors finance STEM activities regularly or only project or program based?
- How are sponsors collaborating with your STEM promoters? Do they for example regularly disseminate calls for projects or do they offer special contracts / donations for promoters?
- Who calculates budgets of the additional STEM activities, how do the sponsors deal with it?

Germany

The funding of non-formal STEM education beside the regular schools is based on two main columns:

(1) Public funding:
Funding programmes on German level and level of the federate states have the aim of more well-educated and skilled workers for the economy in STEM fields. Some programmes focus on STEM education of special target groups (e.g. woman or migrants) or on further aims (methods, network structures, special themes/content of education, etc.). Promoters can apply for such funding programmes. In a selection process the educational concept as well as the MINT competences based on a regional network have to be proved. All Projects are evaluated in detail. The project promoters can finally implement the funded projects in a limited period of a year or sometimes more. Other partners are often required for implementation.

(2) Private funding
The lack of skilled workers in STEM fields is well-known in all German society and causes a few challenges in education and economy. For that reason, also a few private funding organizations support STEM education in different ways. They finance for example STEM competitions on different levels, special equipment for different STEM fields or the start-up of new research centres for pupils. Some funding organizations are foundations with targets in selected STEM fields, other ones are umbrella organizations of special economic branches (e.g. automotive, energy, Chemistry or telecommunication). They are driven by the idea to help their network to establish a continuous flow of new STEM workers for research and for their important economy branches.

Co-funded by the Erasmus+ Programme of the European Union

Most of the extracurricular STEM education activities are funded in projects. They are defined only for a period and need a regularly refunding. Only a few activities are based on a continuous funding process.

Besides the described funding options a few more possibilities available for financial support. Two examples:

(1) All-day school programmes:
Some German schools get financial resources to establish all-day school programmes beside the regular teaching. Different lessons or workshops take place on some days of the week – often in the afternoon – and include sports, culture, music or also STEM education. External educators including STEM specialists are allowed to teach interested / enrolled children. The schools who find such suitable candidates in their local environment can pay them by an hourly fee.

(2) Volunteer programmes:
A few volunteer programmes – on European, national and regional level exist for different purposes. Non-profit organizations can apply / accredit for voluntary services and search for suitable candidates – for example people who are interested or experienced in special STEM themes. For the duration of a year or longer such volunteers can support a STEM education process and help to establish and implement STEM workshops. Depending on the program volunteers receive pocket money as well as monthly funds for meals, accommodation or mobility by the public volunteer programmes. Volunteers are often young and take part in further education programmes during their voluntary service.

2. The access to STEM education

We want to know how interested young people get access to STEM education offers.

- How get young people information about the programmes / activities
- Do you have a special platform or information/advertising system?
- Are their special activities to attract any interested parties?
- Do you see a special role of the educators or the parents in the information and participation process?
- Do you have any registration or booking system for some STEM education offers?

Germany

A few different ways are used to manage the connection of STEM based offers to possibly interested young people. Most suitable is a good connection to local schools and teachers in scientific subjects. As better and longer such win-win connection is formed, as better the chance to catch the young target groups.

Beside personal exchanges dissemination activities take place mostly in media: information material, websites, social media – different channels are used to find interested children or teacher. As better STEM education promoters are linked to each other and as more they collaborate in a network as better all important information reach the target groups.

A special way of collaboration is by teaching of teachers in own further education programmes. Inspired and exited teachers will easily spread all important information to their own classes and pupils and will stimulate them to take part in good STEM education programmes.

Co-funded by the Erasmus+ Programme of the European Union

Part 3: STEM players - educators and participants

1. Who are acting in STEM education?

Please describe the people who work as STEM educators:

- Who is responsible for the practical parts of STEM education?
- Who are the persons engaged in the educational process?
- What's their own professional background and what kind of special experiences, skills and abilities do they have?
- Are they traditional teachers with special STEM education or STEM experts with pedagogical skills? Are they part of school system or do they teach in extracurricular workshops?
- Where do you see / can you find STEM educators beside the school system?
- How are STEM educators supported and motivated?
- Do you see special fields and themes STEM educators in your region fascinated in? Which themes they are dealing with? How do educators transfer their own fascination to learners?
- How do educators include upcoming new technologies, local economic themes or the ongoing development of all sciences?

Germany

STEM educators who are teaching in projects beside the regular school system are mostly not teachers and haven't studied this profession. They are mostly persons who are experienced in STEM themes and subjects. They are interested to transmit their own knowledge to a younger generation. They are able to spend a few hours a week for teaching – often not in a fully job but part time for a few hours – enough to fulfil their own regularly workshops. Some of such people are doing voluntary teaching for a few hours a week.

Who are could be such good educators and where they are available?

- Ask retired persons – engineers, scientists or teachers of STEM fields
- Ask experiences engineers or scientists – still in work processes – with own children / grandchildren who are interested to submit their experiences to them and their friends
- Ask Workers in STEM branches and STEM economy with employers who need new skilled workers in future

Beside experienced people young volunteers, students of sciences or pedagogic subjects may useful trainers. They are mostly self-interested in the themes and subjects, are able to spend more time for the trainings and willing to take part in some further education for themselves to enrich their own competences.

The best educators for STEM fields are exited themselves, are fascinated by sciences and natural phenomes, are interested in research and sciences themes and are able to transmit their own fascination to other people. Such exceptional people are rare but good and attractive STEM concepts may attract them.

2. Participants and learners of STEM education

We are interested in the target groups and the participants of STEM education now:

- Who are the participants / learners of STEM education offers?
- How old are the learners / participants of STEM education offers mostly?
- In which age / life period do they get first access to special educational offers
- How long do learners take part in such special STEM education?
- What are the reasons for young learners to take part in special STEM education offers? What's their motivation?
- Are their themes for single learners and also for team work provided?
- How do participants collaborate? Are there homogeneous target groups or is it a mixture of experienced and inexperienced learners?
- Can older students assist younger ones? How do experienced students assist the activities?
- How is the allocation of girls and boys for the activities? Do you know special offers for different genders?

Germany

Starting in early childhood, children have natural interests to discover the world and their environment. They are happy to check everything; they are fascinated by the phenomes that sciences as chemistry or physics can show them and they are willing to learn more about.

For that reason, STEM education is necessary from this early childhood. As more fascinated children are and as longer it is possible to keep fascination on high level as more intense will growing children turn towards sciences, research and engineering. Especially if children see and feel, that they are able to use their own hands to change, to produce and to improve things, if they get their own result after the lessons and workshops, they are very happy and satisfied.

If organized in an ongoing process – like sportsmen train for a few years for best results – this STEM learning would go on during all the school period of young people. The content and the level of knowledge and experience may change in the process. In the end of the process such children are well prepared pupils who are able to start their own career as young scientists, skilled workers, STEM teachers, IT specialists or engineers soon or even to start up with an own business.

Extracurricular STEM programmes are mostly organized in leisure time of the students. They spend time with like-minded friends and it's very recommended to work on projects in little workgroups. Social competences will increase by the time and the ability for teamwork will growth. Participants are able to organize knowledge exchange and they can specialise themselves for parts of a project based on their interests, abilities and experiences.

For a mixed group of younger and older students peer learning is recommended too. Older and more experienced learners can assist younger ones for their first steps of individual STEM education. They start to act as educators and get important competences for a possible career of a teacher. Girls and boys should take part in all activities in a natural balanced mix.

Part 4: Summary

Please summarize your given answers and intentions. We would like to fix your answer to a maximum of about 500 characters.

Germany

STEM education has high importance in Germany. The capacity of the formal education is limited and the STEM diversity is high. New extracurricular approaches are necessary to attract young woman and man and to equip them with the competences needed for a career of scientists, engineers, teachers or skilled workers.

With raising numbers of extracurricular STEM offers, it's a challenge to organize high quality education with good visibility, collaboration and further development on local level.

Co-funded by the Erasmus+ Programme of the European Union

Part 5: Further remarks

Finally, we want to ask you for any **further remarks** you want to leave for readers of your answers.

- Do you see any additional aspects you want to add?
- Is there any motivation you want to leave for interested educators in other countries?
- Do you want to provide a special quotation about STEM education?
- Anything else?

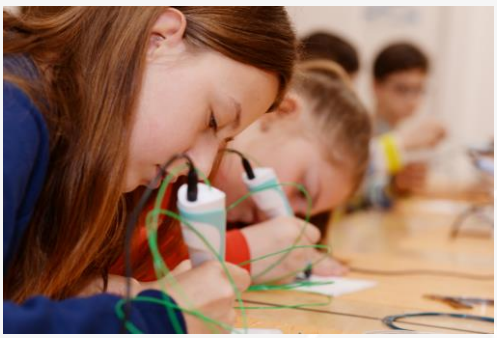
Germany

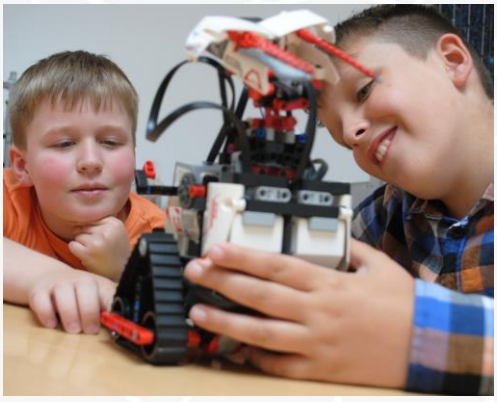
The research for this questionnaire is done by using the view, the experiences and the possibilities of only a single local German organization that offers and promotes STEM education on a local level in Germany.

For that reason, nobody raises a claim of completeness of the answers and written facts. The questionnaire may give readers some ideas and facts and allow an overview of the approach and the current development of STEM education in Germany, established beside the regular curriculum of the German school system.

Some additional **conclusions**:

- **Regular individual STEM education** in a longer process for different ages will improve the individual STEM competences of young people and keep their curiosity on a high level. As a result, the growing children by the time become specialists with competences for professional life. They can better focus on their own career as well as on businesses in STEM fields.
- The idea to organize STEM education as **STEMsports** on regional level like in sport clubs or music schools may allow a good structure, a good marketing for the providers and an official system of non-profit or administration funding and support in future.
- The **role of STEM education** will rise in all European countries and regions since the complexity of jobs, the quality of products and services and the technological development will play a more important role in future. Good STEM competences will allow advantages on labour market in future. For that reason, it's important to develop and keep a high level of STEM competences of workers in all European societies.
- Only a few options are useful to reduce the lack of STEM workers. The successful acquisition of more well educated young woman for STEM branches is one of these chances.





Co-funded by the
Erasmus+ Programme
of the European Union