

DRAFT



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

LAB4STEM COUNTRY REPORT

LITHUANIA

Intellectual output 1

Implementation: 01.10.2020-31.12.2020

Responsible partner for activity: LINPRA, contribute VJDRMC.

Contents

I.	Overview of the deliverable.....	2
II.	Needs of target groups.....	3
III.	Analysis of national general education curricula in STEM.....	11
IV.	Best practice of mobile laboratories related to STEM training in Lithuania.....	14
V.	Summary and conclusions of country situation in general education curricula....	16
VI.	Recommendations for modules (digital, interactive training materials) and their content.....	17
VII.	Annex I – questionnaires.....	18

I. Overview of the deliverable

The objective of the country report is to make an analysis of needs of target groups and general education curricula for acquiring STEM knowledge in Lithuania. The results of the analysis will be used to distinguish what training material is needed and ensure that the training materials for STEM, prepared in the project, will be in compliance within the general education curriculum and, therefore, can be successfully used as additional training materials in STEM related subjects.

The main target groups within the project are:

1. General education pupils (7-8th grade, in Lithuania, age varies from 12-14 years);
2. Educators (teachers of STEM subjects, career guidance and support specialists) of general education.

LINPRA will be responsible for preparation of the country report with support of VJDRMC. The country report will be composed of the following parts:

- Defining needs of target groups
- Analysis of national general education curricula in STEM
- Best practice of mobile laboratories related STEM training in Lithuania
- Summary and conclusions of country situation in general education curricula
- Recommendations for modules (digital, interactive training materials) and their content

II. Needs of target groups

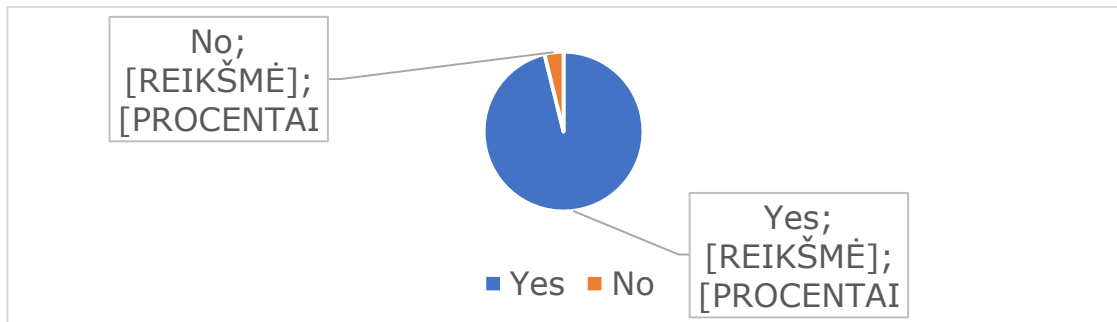
In order to define what training material is needed for teaching and learning STEM subjects, there were prepared two questionnaires: for teachers and for pupils. The questionnaires are attached to the report (Annex I). The questionnaires were sent to Lithuanian schools in different areas: large cities and remote towns, in order to reach a wider audience, which would have different experience in teaching STEM subjects.

Having received the responses (**26** responses from teachers and **102** responses from pupils), there was performed analysis and main needs were defined.

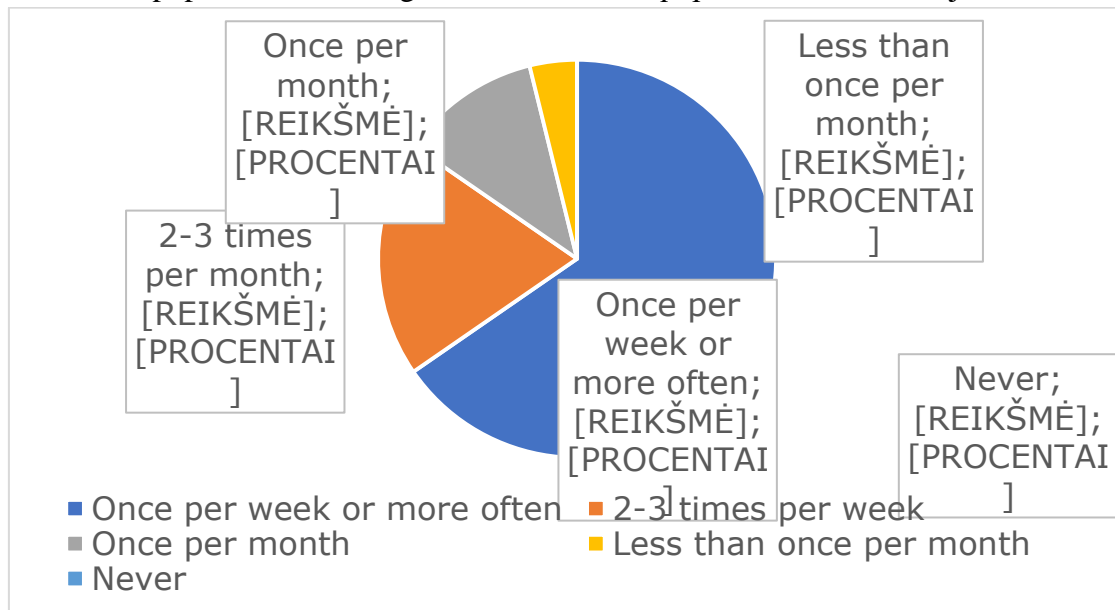
The diagrams at the bottom summarize the results of the questionnaires.

Teachers' responses

1. Is your school interested in additional training materials about science, engineering, technology, and math (STEM)?



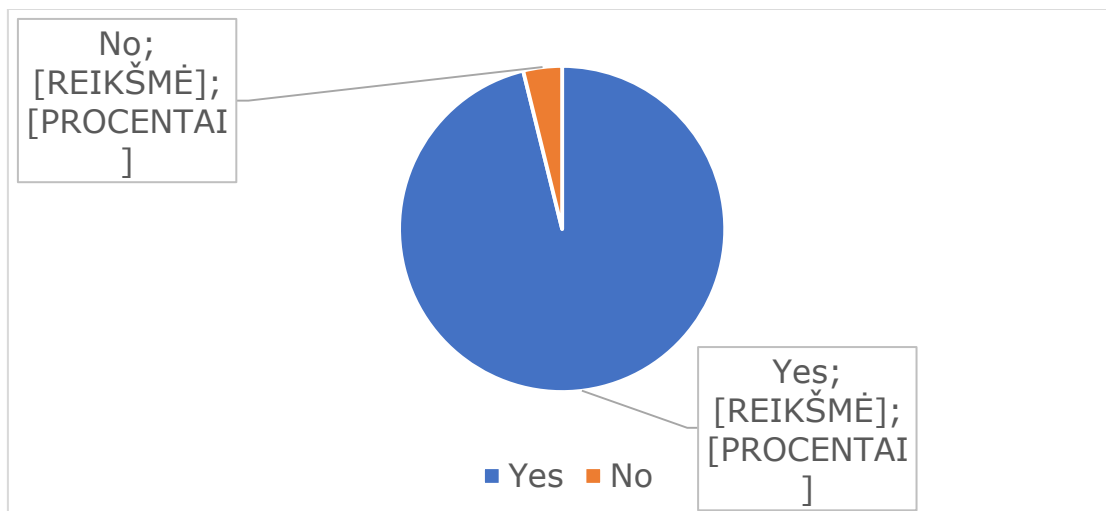
2. How often pupils use technologies and technical equipment in STEM subjects' lessons?



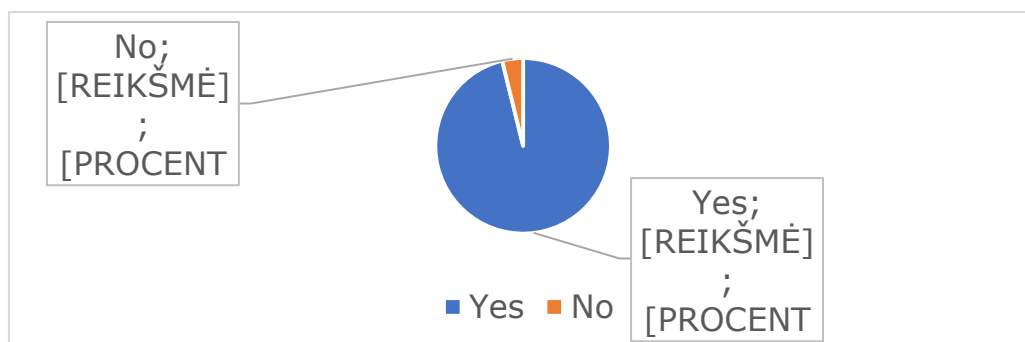
3. How to improve motivation of pupils to learn STEM subjects?

- To organize more practical activities related to STEM
- Showing more interesting examples, ways how to apply theory in practical activities
- More lessons should be conducted using technologies and additional equipment outside in nature or other environment, laboratories
- Lesson plans should be narrowed dedicating more attention to practical exercises
- Mobile laboratories
- Practical exercises scale up the motivation to learn
- Exact sciences should be linked with natural sciences as much as possible to ensure a 100% integration. Children should experience in practice; e.g. why do they need to calculate the areas of different figures or why do they need to know the main rule of fraction. If we show them the practical purpose of these “dry” subjects, there will be less rejection of mathematics and afterwards – physics and chemistry (which appears due to the lack of mathematical knowledge).
- To harmonize teaching programs or to renew them, so that there would appear an opportunity to apply STEM
- Theory matching practical activities
- To organize various trainings to pupils
- Involvement of pupils in interesting activities leading to meaningful/significant results
- The interest and motivation of pupils grows when they are allowed to practically „touch“ the STEM activities
- More experimentation and engaging exercises
- Bringing STEM equipment to schools and showing concrete technologies that children can use
- Getting pupils acquainted with the possibilities of STEM usage

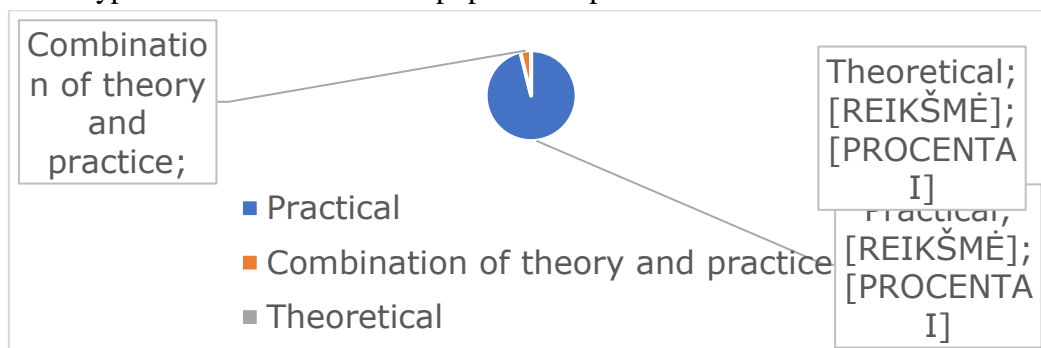
4. Would you need support (additional materials, teacher's' trainings) in teaching STEM?



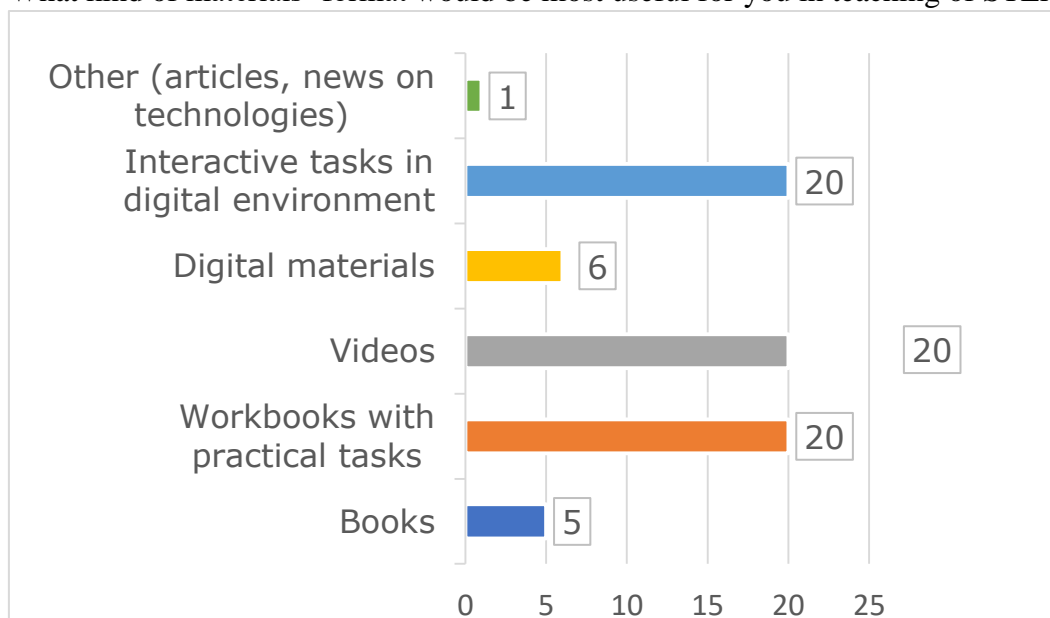
5. Would you be interested in organizing lessons in cooperation with a mobile laboratory?



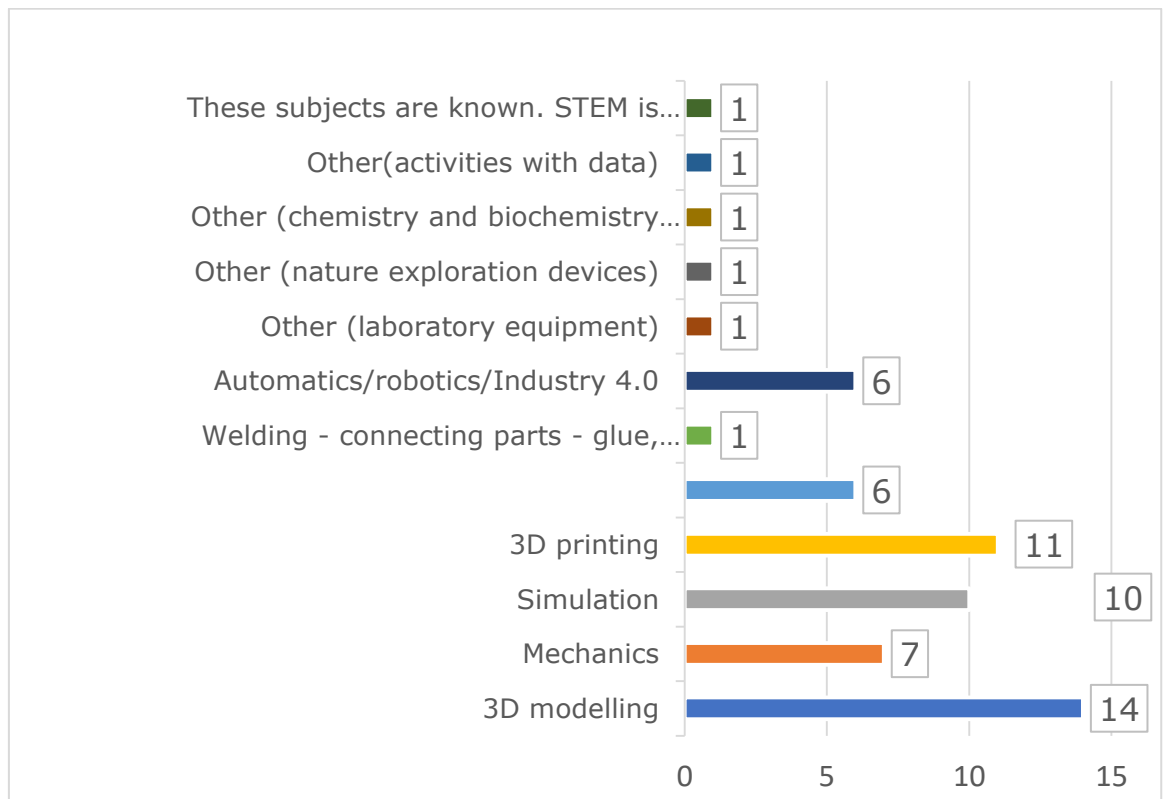
6. What type of lessons are best for pupils to improve their achievements in STEM?



7. What kind of materials' format would be most useful for you in teaching of STEM subjects?

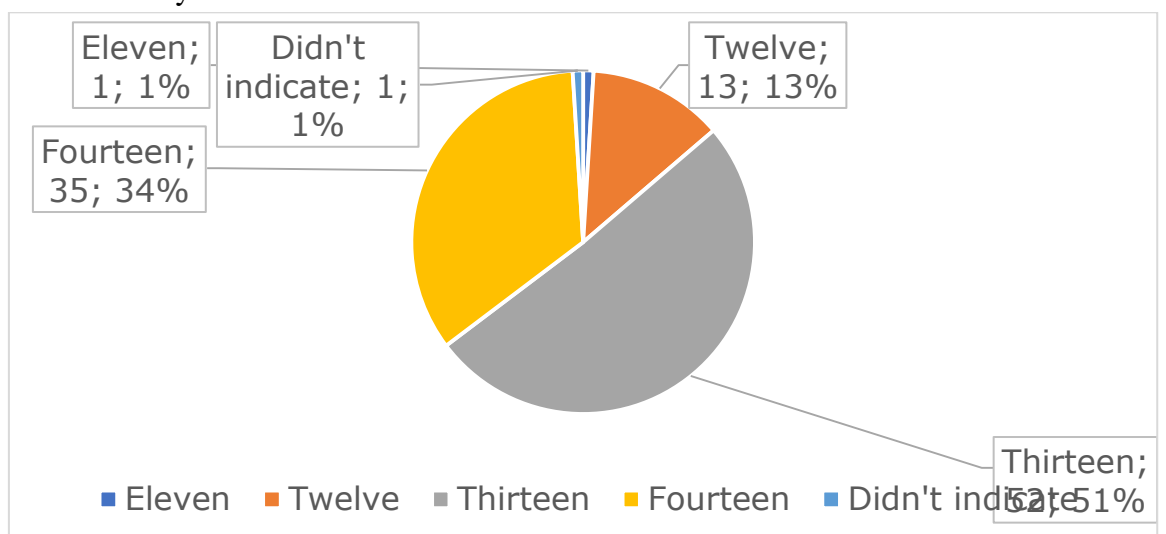


8. Please mark which content is most needed for pupils related STEM teaching?

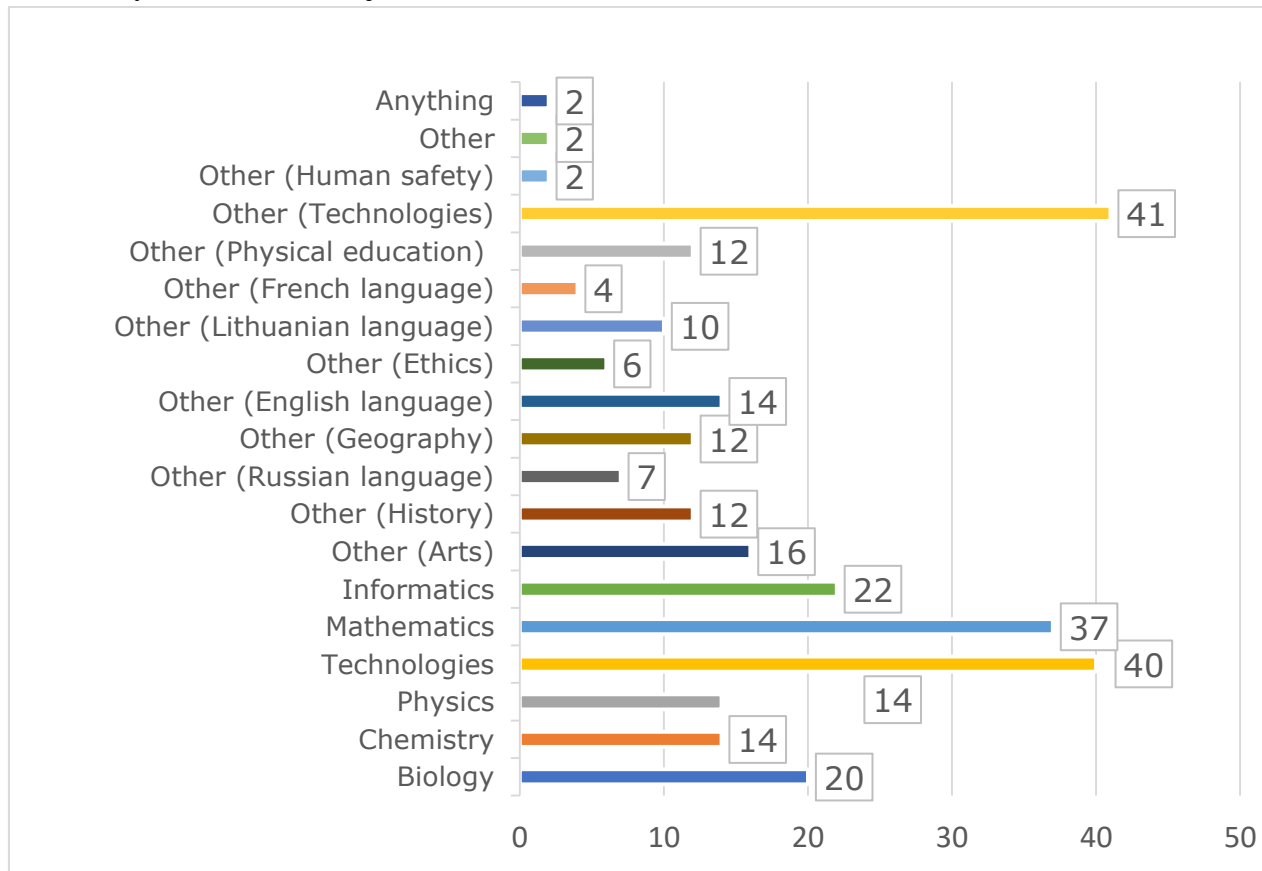


Pupils' responses

1. How old are you?



2. What are your favourite subjects?



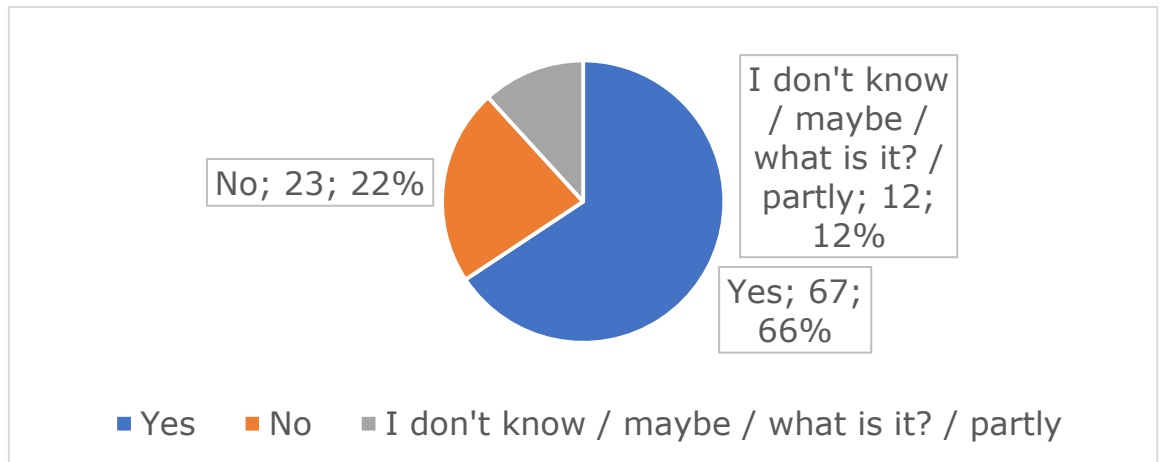
3. Why are you interested in these subjects?

**The answers include only subjects of the interest: technologies, mathematics, informatics, chemistry, biology, physics*

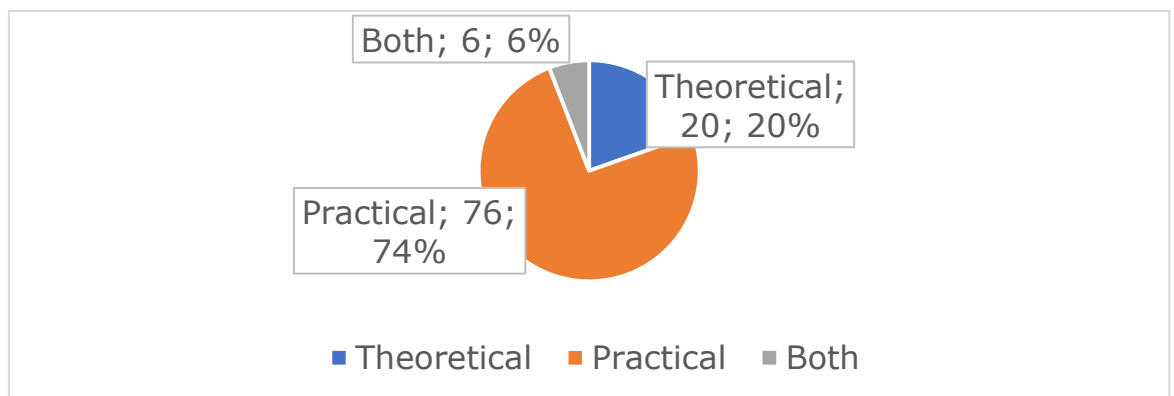
Most common answers:

- These subjects are interesting
- Good teachers
- Learning is easy and fun, action based

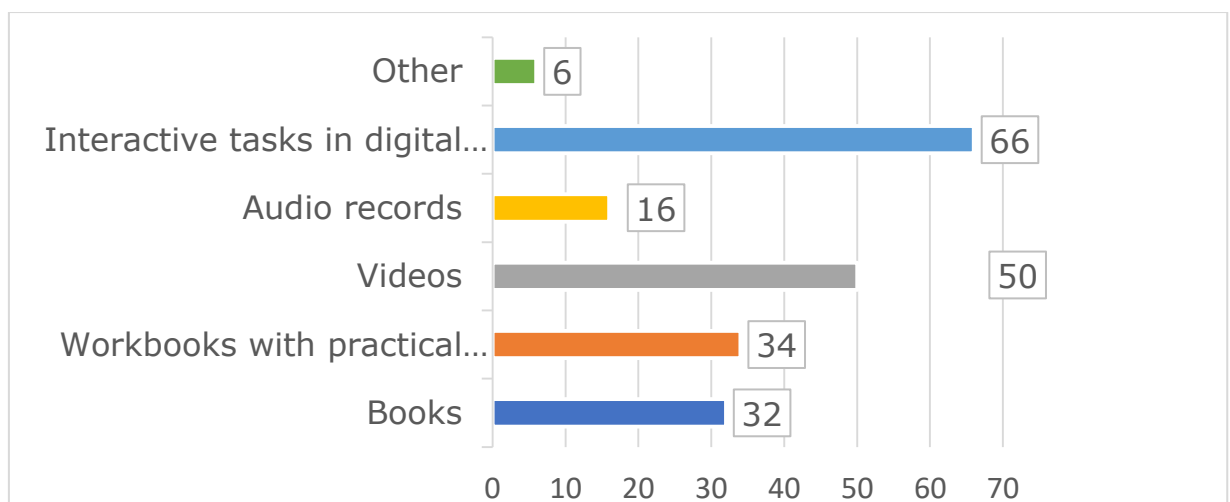
4. Would you be interested to practice the above-mentioned subjects in a mobile laboratory?



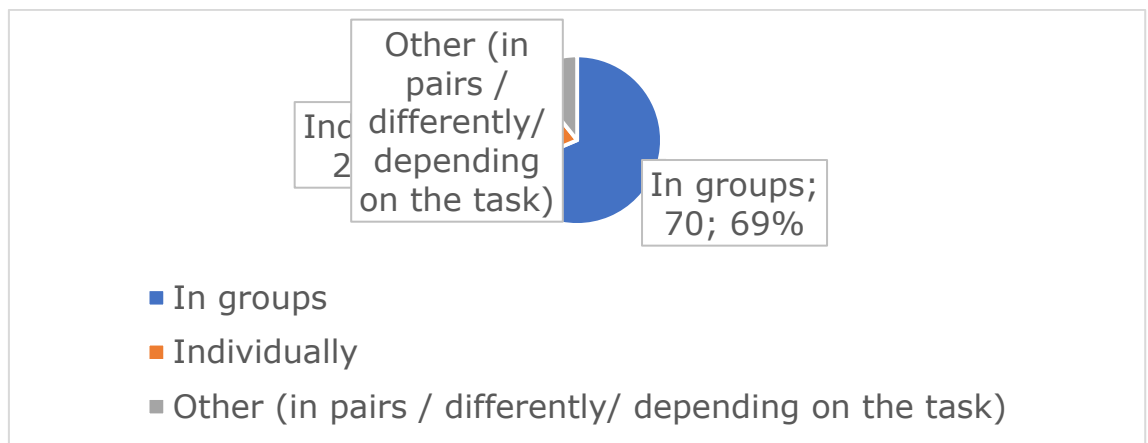
5. What kind of lessons would suit you most to improve your achievements in STEM (sciences, engineering, technologies and mathematics)?



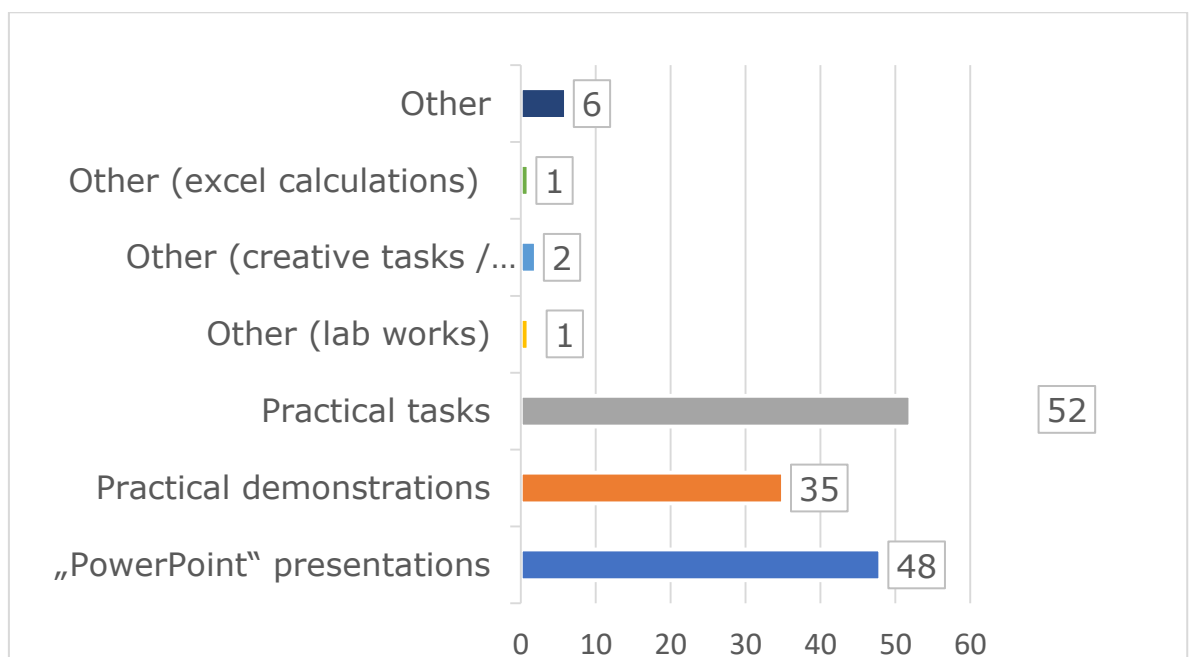
6. From what kind of materials, you prefer to learn best?



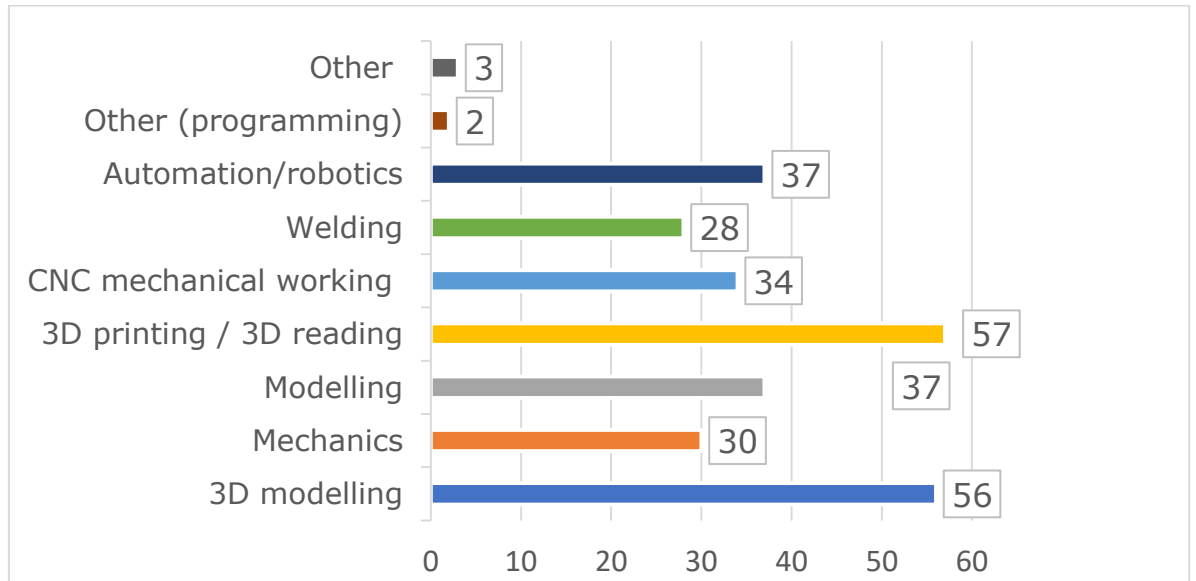
7. How do you like to perform the tasks?



8. What kind of tasks do you like most?



9. Which training material would be most interesting to you?



To conclude, there is an enormous need from teachers' side for additional training material that could be used while teaching STEM subjects and a great interest from pupils, who are interested in STEM subjects and who enjoy practical and interactive exercises. In addition, pupils are very interested in subjects that Lab4STEM project will offer: 3D printing, modelling, automation, mechanics, robotics, and this is a great advantage for the project.

III. Analysis of national general education curricula in STEM

The situation in Lithuania regarding STEM teaching is overcoming changes.

Drafts of updated curricula have been prepared. Following the broad agreement in the education community on the essential principles for the renewal of education and the adoption of the Guidelines for the Renewal of the Framework Programs, the updating of the curriculum is underway, involving more than 120 researchers, scientists and teachers. Renewal of curricula follows the direction of competence-oriented education, which not only provides knowledge, but also develops the student's social and emotional, cognitive, creativity, civic, cultural, communication competencies. The main objectives of renewed curricula are to strengthen children's qualities and values by revealing their creativity and talent, and creating conditions for each student to achieve higher learning outcomes by providing a solid and sustainable knowledge base. The first drafts of the updated primary and basic education curricula have been prepared and submitted for public discussion. It is expected that the draft framework programs to be renewed in the 2021-2022 school year will be tested in schools. Schools are equipped with STEAM science equipment and information technology tools. Several hundred schools with students in grades 1-8 have received science and technology tools, and laboratory equipment for science. For organization of distance learning, 35 thousand laptops and tablets were purchased for schools, another 2.8 thousand were purchased for teachers. An e-learning resource base has been created, dozens of in-service training events and consultations have been organized. An action plan for the digitization of education has also been prepared, which will include long-term measures to maintain the level of computerization of schools, ensure access to digital learning content and improve teachers' digital competence. In order for schools to continue to be able to provide information technology tools and curriculum in accordance with their needs, 14 million euros has been allocated to schools from the DNA plan – this is 8 times more for the purchase of digital content, computer equipment, and strengthening the digital competence of teachers, than it was allocated for the information technology needs of schools so far.

This analysis of national general education curricula in STEM was made from several perspectives, in order to evaluate different approaches to teaching STEM subjects.

Firstly, were interviewed school teachers of exact sciences, like mathematics, physics, chemistry, information technologies. The purpose of interviews was to find out, how do they manage practical exercises, do they have any exercises on STEM subjects, what equipment they have for practical activities, what is the policy of their schools regarding pupils' involvement in STEM subjects. In addition, there was also need to learn, whether they would be interested to have an interactive teaching material for STEM subjects and whether they would like to participate in the piloting activities and give their feedback on the material prepared in the LAB4STEM project.

Secondly, the interviews were arranged with the representatives of the Ministry of Education, Sciences and Sports in order to find out what is the national policy regarding teaching of STEM subjects. Furthermore, there was a need to define, whether practical activities are included in national general education curricula and if there are any governmental recommendations/legislation for schools regarding practical activities related to STEM.

Thirdly, the interview with the main coordinator of regional STEM Centre in Šiauliai city (Lithuania) was organized to see what capabilities these regional STEM Centres have, do they need interactive teaching materials, would they be interested in piloting LAB4STEM material, what programmes for informal teaching of STEM subjects they have and what future activities they plan.

Fourthly, the analysis of legal acts and other official documents on teaching STEM in general education schools was performed to find out what is missing and what should be improved to scale up pupils' achievements in STEM.

Hereinafter, is provided approach from these different stakeholders (teachers, national education system representatives, coordinators of regional STEM Centres) who are actively involved and concerned to improve pupils' knowledge of STEM subjects and raise their interest in exact sciences.

Teachers' Approach

Lithuanian teachers are interested in practicing STEM subjects, they think of their own activities and tasks to engage pupils in practical exercises. Teachers share their experience between schools, arrange various consultations and competitions to raise children's interest and scale up less experienced teachers' competences.

Some schools even have equipment, but do not have any teaching materials, so they only rely on the teachers' good will to think of practice and involve pupils in STEM activities.

In the national general education curricula, it is stated, that there should be implemented practical activities/experimentations, preferably, outside the school premises. This is a great opportunity for STEM mobile laboratories to invite pupils and offer interactive teaching exercises.

National authorities' approach

From the point of view of representatives of the Ministry of Education Sciences and Sports, practicing of STEM subjects is extremely important nowadays. Public bodies and schools are putting great effort to raise teachers' competencies in this field. This is being done through various national and international projects/initiatives, like "Ugdymo sodas"¹, "STEM School Label"².

The good news is, that teachers are extremely interested in development of their competences in STEM and are very much willing to introduce their pupils to STEM activities. They share the good practice among themselves, but they do not have any unified practical activities for their laboratories. The amount and quality of practical activities depend on the teacher and his or her ability to create attractive exercises.

As concerns national general education curricula, it is being improved and more attention is laid to encourage schools to dedicate more teaching time to research, exploration and practical activities.

In addition, they have notified, that 10 new STEM Centres, which should start their activities the next year, will also contribute to promotion of STEM subjects. These STEM Centres will be open both, for formal and informal teaching.

STEM Centres' approach

There is a national initiative to have 10 STEM Centres in Lithuania, which could accept pupils from schools and give a possibility to have some practical exercises there as a part of general education curricula and as some after-school training. The STEM Centre in Šiauliai city is planning to start its activities, when teaching in schools will be made available (teaching went virtual due to COVID-19). For the moment, they plan to have formal (adapted to general education curricula) and

¹ <https://duomenys.ugdome.lt/?tinklai/steam>

² <https://www.stemschoollabel.eu/home>

informal teaching activities in the Centre. The interest in STEM activities from the city schools and regional schools is huge. However, they do not have training material yet and, therefore, support the idea of LAB4STEM project. The interactive training material would be beneficial not only for mobile STEM laboratories, but also to STEM Centres in Lithuania.

Documentation and legislation

In 7-8th grade pupils only start learning STEM subjects, like chemistry (from 8th grade), biology and physics (from 7th grade), therefore, their knowledge is quite limited. At this age they only get to know main principles. They are taught the main measurements, reading the data of various equipment, performing experiments and evaluating results. Pupils are being accustomed to using basic units of measurement for a variety of tasks, especially in physics. They do experiments to see, how the laws of physics work.

They also start learning Information Technologies. The main things they learn here are: how to manage information with the computer (Microsoft Word, Excel, PowerPoint programmes), how to draw, how to create/format/print texts, how to use internet, how to calculate and draw diagrams, etc. Some of the activities (like drawing, using internet) are also integrated in other subjects (mathematics, language learning). Construction activities, like making animated projects, construction of items start only in the 9th grade.

They also have such a subject as Technologies, where they are taught some practical activities in several fields. In the field “Work Equipment”, they do copying /drawing /writing; work with maintenance chemicals; learn selection of work tools and equipment and their interchangeable elements (needles, drills, etc.) for performing work operations; learn adjustment and maintenance of work tools and equipment; safe and correct use of work tools and equipment.

In the field “Construction materials” they also have drawing / sketching / drawing / writing / computer work; selection of work equipment; measurement, construction, workpiece selection, copying of tiles on the workpiece, cutting, drilling, grinding, varnishing, waxing, polishing, painting, turning, soldering, riveting, abrasion, varnishing. Pupils also make tests: cutting, drilling, grinding, polishing, painting, turning, soldering.

In the fields of “Electronics” and “Home electronic appliances” they draw with computer, model simple schemes and read technical schemes; prepare technical tasks, they do alignment, soldering, joining.

There is not much legislation on STEM. Mainly, there are different analyses³ and recommendations, which state, that there is a very huge need from employers for specialists like production engineers, electro mechanics, electrical engineers.

The problem is that pupils are not so much interested in studying STEM subjects. This might be because of too theoretical teaching of exact sciences (the main tool for teaching being a book). Pupils need to realize, how theory can be applied in real life situations, how machines, materials and all other equipment function. Our pupils still lack such skills as analysis of information, interpretation and evaluation. They need to get self-confidence and apply critical thinking. This should be taken into consideration when creating teaching material.

³ <http://kurkl.lt/wp-content/uploads/2020/03/STEAM-esamos-situacijos-analiz%C4%97.pdf>
<http://kurkl.lt/wp-content/uploads/2020/03/STEAM-u%C5%B4sienio-praktik%C5%B3-analiz%C4%97.pdf>

IV. Best practice of mobile laboratories related STEM training in Lithuania

Info mobile is a dedicated bus, equipped with technology and engineering training equipment, a mobile technical science laboratory that introduces children and young people to the professions of engineering industry, learning, and practice and career opportunities. The info mobile was developed in cooperation with German employers' associations of the metal and electronics industry, taking into account the combined mobile STEM (Science, Technology, Engineering, Mathematics) laboratory and career guidance models, which allow students to try out simulations of a wide variety of professions.

The mobile laboratory is designed for technical professional information and career opportunities. This is a great opportunity to see and test the latest technologies and devices, learn about the studies in the engineering industry and discover prospects. Visitors are given the opportunity to test machine tool management and production cycle simulation programme in computerized training areas and with modern software controls, learn how to operate machines.

The purpose of the professional knowledge lessons carried out in info mobile is to introduce the engineering professions. Take an interest in technical, technological, engineering sciences and career opportunities.

The info mobile is equipped with the latest equipment:

- Automated smart production lines;
- CNC milling;
- Welding simulator;
- 3D Printer (print 3D plastic shapes);
- Laser projector (with keyboard for typing);
- Educational kit: games, plastic for printing etc.;
- Educational hydraulic arms
- Safety system;
- Touch monitors;
- Tablets, Laptops, TV;
- Sound system;
- KNX training system with camcorders.

Various educational stands provide an opportunity to get to know the profession by testing it. Mobile laboratories equipped with modern technologies have successfully complemented the educational process by informing and demonstrating modern technologies, their capabilities and operational principles in general education schools. However, the possibilities of mobile laboratories are much wider and can be integrated into the general education process. And this contributes to the development of important STEM knowledge in real practice. Educational institutions invite us to enable students or future students to develop their cognitive abilities during technical lessons: creativity, entrepreneurship, the ability to develop independently. As a result, the motivation for learning young people is strengthened and the range of professions is presented, which will be useful in the future when choosing a future specialty.

We can adapt all available info mobile devices to the lessons taught in schools and enrich the lesson content with them.

In physics lessons we can study the properties of metals at certain temperatures with a Welding simulator; also Educational kit: games, plastic for printing etc. for gear activities and opportunities,

- Educational hydraulic arms for demonstration of hydraulic force.

Automated smart production lines we can use in **informatics lessons**, program robots and adjust various sensors. Touch monitors; Tablets, Laptops, TV; Sound system; KNX training system with camcorders. Laser projector (with keyboard for typing) can be used for Laser calibration and programming.

We can diversify the lessons of **mathematics, physics and informatics** by including CNC milling, turning and laser cutting machine - it can be used to write CNC programs, calculations of tool modes and analysis of various metal properties. As well as the 3D Printer (print 3D plastic shapes), which requires an assessment of plastic properties and print modes.

During the last 4 years, the info mobile has visited almost 30 events in various Lithuanian cities. For example, at KTU Panevėžys Faculty of Technology and Business, we participated in the "Mission - Career" information interactive event, the aim of which is to publicize career perspectives in the engineering industry, providing an opportunity to see and test the latest technologies and equipment and learn about engineering studies. One of the participants of the event thanked us: "The lessons were interesting, unconventional and very informative! A big thank you for the teachers of the info mobile". We also went to the Lithuanian Exhibition and Congress Hall Litexpo, where we participated in the international event of the most important year of the engineering industry in Lithuania, "Balttechnika". During the event, we presented the country's engineering industry companies, their achievements and potential, encouraged the establishment of cooperation between business and research institutions, and initiated a closer relationship between vocational schools and the business community.

The info mobile is full of equipment of various levels and complexity. But it can be observed that the object that attracts the most students is the welding simulator. As more sophisticated equipment requires a longer period of familiarization and learning, students are enthusiastic about demonstration tutorials and expert action. The welding simulator is simpler. They can touch and test the possibilities of this device themselves. Gave a couple of metal parts, protective equipment, and after hearing the instruction, they can try to weld them and see the final result of the joined parts.

The teacher of the students who attended the events was happy: "The children were extremely impressed - they really liked both inventive lessons and patient teachers." We also participated in the vocational guidance event "Knowledge Festival" organized by the city of Visaginas, during which the students had the opportunity to get familiar with a modern info mobile laboratory. Visaginas teacher conveyed his wishes: "I start with praise right away in the morning".

V. Summary and conclusions of country situation in general education curricula

The whole general education system in Lithuania is undergoing transformation. The first drafts of the updated primary and basic education curricula (paying more attention to experimentations and practical activities) have been prepared and submitted for public discussion. It is expected that the draft framework programs, to be renewed in the 2021-2022 school year, will be tested in schools.

It is unanimously agreed by all the stakeholders: teachers, government representatives, private enterprises, researchers that knowledge and practice of STEM subjects is extremely important and needed to improve pupils' achievements in exact sciences and to encourage them to proceed studying them in universities or VET schools.

Even though schools are now quite well-equipped with STEM tools, they need comprehensive curricula, which could give guidelines, what capabilities should be practiced, how to employ these tools, what activities may be performed with pupils. Teachers do not have much teaching material for these activities, they need to create it themselves. In addition, teachers themselves, need coaching on this subject. The coaching could be provided by more experienced teachers or lecturers from universities.

The good piece of news is that teachers and pupils are very much interested in the STEM subjects (Technologies, Mathematics) and would like to practice them in mobile laboratories. Most of pupils agreed, that these subjects are interesting. The survey has also shown that the vast majority of pupils would like to try digital and interactive training material, especially in subjects like 3D printing, modelling, and robotics/automation. Therefore, there is a big room for mobile laboratories to contribute to improvement of pupils STEM knowledge.

Summing up, the LAB4STEM project's objectives correspond the needs expressed by teachers and pupils. In addition, it complies with the present educational policy, which stresses the importance of the STEM subjects and now is concentrated on improving general education curriculum.

VI. Recommendations for modules (digital, interactive training materials) and their content

1. Materials should comply with formal teaching curriculums, so that the basic theoretical knowledge they have, could be applied in practice
2. Materials should correspond pupils' age – 7-8th grade children are only starting to get acquainted with exact sciences
3. It should be clearly decided, whether we have the aim to teach pupil or to get them acquainted to working with the equipment. The duration of Module depends on this.
4. The theory should be explained through practical exercises.
5. Materials should encourage pupils to analyse the information, to interpret it and to evaluate it
6. The exercises should be related to experimentation with items they see around – daily objects
7. Materials should show real life situations, offer possibility to experiment and learn through empirical cognition
8. Materials should challenge pupils, trigger their critical and analytical thinking
9. Exercises in materials should lead to some real life, tangible products, e.g. 3D modelling could lead to 3D printing of a concrete item
10. Children like learning in groups – should be taken into consideration
11. To have a notice/suggestion in material to have not more than 8 pupils in a lesson
12. To have one day of teaching for one Module (Theme), around 4 academic hours.
13. If teaching material will be oriented only to mobile laboratories, the number of pupils and time dedicated to each model should be evaluated very carefully
14. The training and teaching materials could be uploaded on Google Drive.

Annex 1

Questionnaire for Teachers in Lithuania



Mielas Mokytojau,

Lietuvos inžinerinės pramonės asociacija LINPRA ir Vilniaus Jeruzalės darbo rinkos mokymo centras kartu su Latvijos ir Estijos partneriais įgyvendina „Erasmus +“ projektą „Mobilių laboratorijų STEM žinių tobulinimui (Lab4STEM). Jis skirtas sukurti interaktyvią, skaitmeninę mokymo medžiagą 7-8 klasių mokiniams, kuri padės vaikams geriau suprasti tiksluosius mokslus, o ypač inžineriją, technologijas ir matematiką (STEM). Kad sužinotume, kokių dalykų ir kaip nori mokytis vaikai, kokios mokymo medžiagos Jums reiktų, prašome Jūsų atsakyti į žemiau pateiktą klausimą.*

1. Ar Jūsų mokykla domisi papildoma medžiaga, skirta mokiniams tobulinti mokslo, inžinerijos, technologijų ir matematikos žinias (STEM)?

- Taip
- Ne

2. Ar dažnai mokiniai turi galimybę naudotis išvystyta mokyklos infrastruktūra: technologijomis ir papildoma įranga?

- Kartą per savaitę ar daugiau
- 2-3 kartus per mėnesį
- Kartą per mėnesį
- Rečiau nei kartą per mėnesį
- Niekada

3. Kaip manote, kaip galima būtų padidinti mokinių motyvaciją labiau domėtis STEM?

(Pateikti atsakymą)

4. Ar Jums būtų naudinga pagalba (papildomos medžiagos, mokytojų rengimo) mokant STEM?

- Taip
- Ne
- Kita (pateikti atsakymą)

5. Jeigu turėtumėte galimybę pamokas organizuoti mobilijoje laboratorijoje – ar būtumėte suinteresuoti?

- Taip
- Ne
- Kita (pateikti atsakymą)

6. Kokio tipo pamokos yra geriausios mokiniams, norint pagerinti STEM pasiekimus?

- Teorinės
- Praktinės
- Kita (pateikti atsakymą)

7. Kokio formato medžiaga naudojantis Jums mokyti būtų geriausiai?

- Vadovėliai
- Pratybos su praktinėmis užduotimis
- Vaizdo įrašai
- Garso įrašai
- Interaktyvios užduotys skaitmeninėje aplinkoje

8. Pažymėkite, kuri mokymo medžiaga Jums būtų reikalingiausia, susijus su STEM mokymu Jūsų mokykloje?

- 3D modeliavimas
- Mechanika
- Modeliavimas
- 3D spausdinimas / 3D nuskaitymas
- CNC mechaninis apdirbimas / pjovimas (lazeris, plazma, vanduo)
- Suvirinimas - jungiamosios dalys - klijai, pakrovimas, kniedijimas, prisukimas ir kt.
- Automatika / robotika / pramonė 4.0.



Questionnaire for pupils in Lithuania



Mielas mokinys,

Lietuvos inžinerinės pramonės asociacija LINPRA ir Vilniaus Jeruzalės darbo rinkos mokymo centras kartu su Latvijos ir Estijos partneriais įgyvendina „Erasmus +“ projektą „Mobiliųjų laboratorijų STEM žinių tobulinimui (Lab4STEM). Jis skirtas sukurti interaktyvią, skaitmeninę mokymo medžiagą 7-8 klasių mokiniams, kuri padės vaikams geriau suprasti tiksliuosius mokslus, o ypač inžineriją, technologijas ir matematiką (STEM). Kad sužinotume, kokių dalykų ir kaip nori mokytis vaikai, prašome atsakyti į žemiau pateiktą klausimą.*

1. Kiek tau metų?

2. Pažymėk mėgstamiausią (-ius) dalykus:

- Biologija
- Chemija
- Fizika
- Technologijos
- Matematika
- Informatika

3. Kodėl tau patinka būtent šis (šie) dalykas (-ai)?

(Parašyk)

4. Ar norėtum išbandyti anksčiau paminėtus dalykus mobiliose laboratorijose/ infomobiliuose?

- Taip
- Ne
- (Parašyk savo atsakymą)

5. Kokio tipo pamokos tau būtų geriausios norint pagerinti STEM (mokslo, inžinerijos, technologijų ir matematikos) pasiekimus?

- Teorinės
- Praktinės
- Kita (parašyk savo atsakymą)

6. Iš kokio formato medžiagos norėtum mokytis?

- Vadovėliai
- Pratybos su praktinėmis užduotimis
- Vaizdo įrašai
- Garso įrašai
- Interaktyvios užduotys skaitmeninėje aplinkoje

7. Kaip tau labiausiai patinka atlikti užduotis?

- Grupėse
- Individualiai
- Kita (parašyk savo atsakymą)

8. Kokio tipo užduotys patinka labiausiai?

- Pristatymai „PowerPoint“
- Praktinės demonstracijos
- Praktinės užduotys
- Kita (parašyk savo atsakymą)

9. Pažymėk, kuri mokymo medžiaga domintų labiausiai?

- 3D modeliavimas
- Mechanika
- Modeliavimas
- 3D spausdinimas / 3D nuskaitymas
- CNC mechaninis apdirbimas / pjovimas (lazeris, plazma, vanduo)
- Suvirinimas - jungiamosios dalys - klijai, pakrovimas, kniedijimas, prisukimas ir kt.
- Automatika / robotika / pramonė 4.0.



*Visa čia pateikta asmeninė informacija bus saugoma projekto *“Mobile laboratories for improvement of STEM knowledge (Lab4STEM)”* No. 2020-1-LV01-KA201-077502 vykdytojų laikantis ES duomenų apsaugos teisės aktų. Užpildydami šį klausimyną patvirtinate, kad pateikta informacija yra teisinga ir neprieštaraujate pateiktų duomenų saugojimo tvarkai.

Material is produced within Erasmus+ programme Strategic Partnerships for school education Project “Mobile laboratories for improvement of STEM knowledge (Lab4STEM)” (Project No.2020-1-LV01-KA201-077502).

The European Commission's support for the production of this publication does not constitute an endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.