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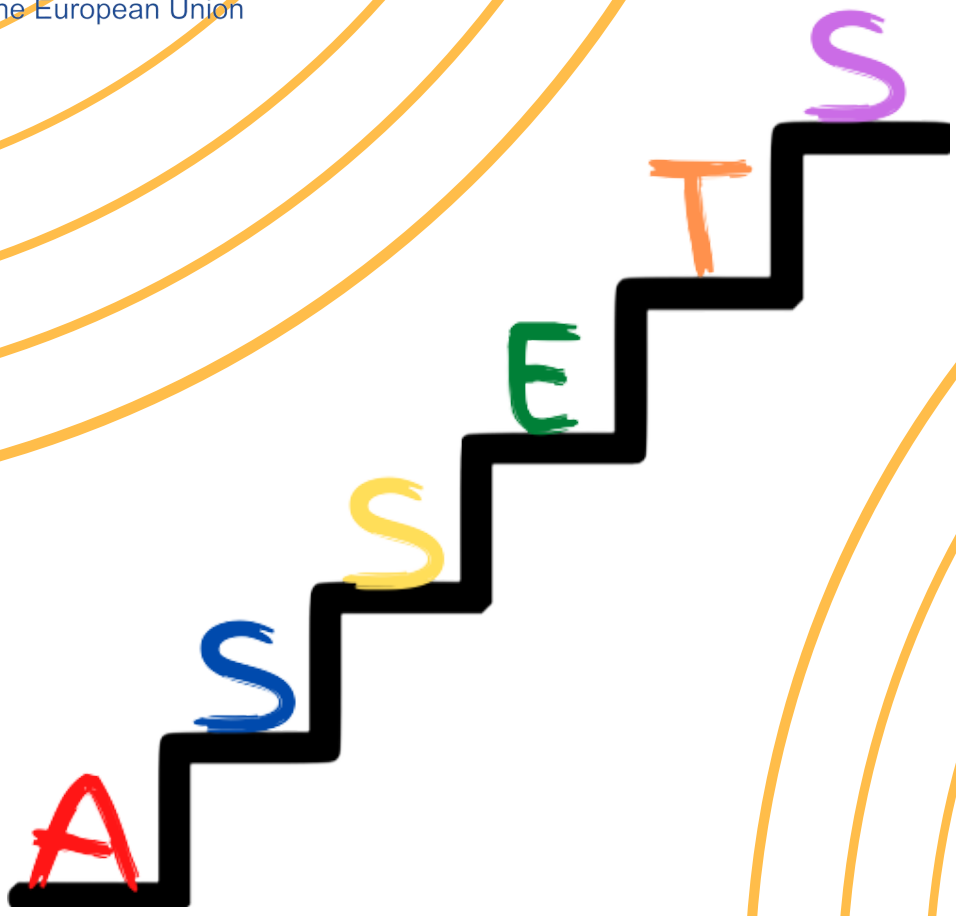

BASIC STEM COMPETENCES FOR MIGRANTS

TRAINING CURRICULUM

COOPERATION FOR INNOVATION AND THE EXCHANGE OF GOOD PRACTICES STRATEGIC PARTNERSHIPS FOR ADULT EDUCATION

2020-1-SE01-KA204-077926

Mine Vaganti NGO

COMPARATIVE RESEARCH NETWORK

Innovation Frontiers
Mind is the limit

ArtSmart
Creative Space for Public and Private Development

AFRICAN-EUROPEAN DEVELOPMENT AGENCY

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INDEX

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INTRODUCTION TO THE PROJECT

"bASic Stem compETences for migrantS" (ASSETS) is a 24-month Strategic Partnership in the Field of Adult Education that aims at promoting and developing relevant and high-quality skills and competencies related to STEM (Science, Technology, Engineering and Mathematics) for migrants, who pursue to promote their career in relevant job positions, either as employees or self-employed. Moreover, ASSETS promotes the social inclusion of migrants in EU countries by empowering them to enter the job market through newly acquired competencies.

The project **topics** include:
-Social inclusion: to support migrants and help them overcome their daily social exclusion.

-Supporting the setting up of and access to upskilling pathways. In this regard, migrants will have the opportunity to watch videos of the best practices of other migrants who have developed a career related to STEM and who have been recruited, using the online training program as a first step to building their careers.

The project **target groups** are:

- *Direct target group:* Adult educators, trainers, and social workers working with migrants;
- *Indirect target group:* migrants (aged 21+) who face difficulties accessing the job market.

Talking about the **methodology and the approach** adopted by the project, it consist of developing innovative ups-killing paths in STEM for both target groups involved, using an interdisciplinary approach.

INTRODUCTION TO THE TRAINING CURRICULUM

The aim of the present material is to provide STEM competencies to migrants. The Training Course was modulated on the educational needs and on the peculiar profile of a target composed of low-skilled migrants. The main objective of the Curriculum was to explain the different professions related to STEM with videos or role model testimonials and provide some basic modules on the basic principles of science, technology, engineering, and mathematics to transmit STEM skills to migrants, thus improving their employability in the labour market.

The content of the ASSETS Training Curriculum was designed for three targeted implementations, dedicated respectively to:

1. Increasing motivation: "ASSETS Motivational Content". This aspect takes as a starting point the motivation of the target group, reinforced by watching videos offered on the project's website, which show adult migrants who have worked and are working in STEM-related professions and who were interviewed as role models such as migrants who have made progress in their career, focusing on their testimonies.
2. Raising awareness about STEM-related professions: "ASSETS mapping of STEM-related professions": STEM-related professions were introduced and mapped according to the target group's needs. Some examples are available on the website.
3. Increased STEM skills and knowledge: "ASSETS content knowledge". Starting with the fundamental science, mathematics and engineering concepts content, continuing to move the target group to guidance for the open-online STEM degrees and lifelong learning training programs on STEM. This included WBL activities oriented toward a STEM-related career. Thus, the migrants can get motivated, find a STEM-related job to get oriented and learn how-to-learn STEM through the content developed by STEM experts of the consortium and the STEM-related open online training programs which may be suitable for them.

The development of the Training Curriculum was carried out through the following tasks:

- Research phase: The research started with the needs analysis of STEM for migrants. Focus Groups with a total of 10 Adults (5 migrants and 5 Adult educators, trainers, and social workers who are working with migrants) were implemented in each partner country to collect migrants' specific educational needs in terms of STEM knowledge and awareness. The focus group was completed with a collection of the existing best practices in STEM education implemented through desk research. As a result of the research phase, each partner organization drafted a Report, with all Reports being compiled in a general Report. The training curriculum was designed based on the needs analysis.

Training content creation: Targeting the achievements as mentioned above, the content creation was implemented in three sub-tasks:

- Motivational content: Real-life examples and documentary videos were prepared by the partners according to the needs of the target group defined and the Curriculum provided in the research phase.
- Mapping of STEM-related professions and their introductory content: The mapping covered the STEM-related disciplines such as life sciences, ICT and computer programming, engineering, Technics, accounting, electronics, etc.
- STEM Skills and Knowledge: basic STEM content was prepared by the experts of the Consortium, completed with a list of open-online STEM degrees and open lifelong learning training programs on STEM and examples of WBL activities in STEM fields. This included simulation of work environments and implementation of tasks that can be faced in the STEM industry, one per STEM component.

RESEARCH REPORT: FOCUS GROUP

LATVIA

INTRODUCTION

Latvia's situation concerning the issue of migration shows how it actually is a country characterised by a strong external migration tendency, meaning that the number of people who have left the country exceeds that of those who have actually entered it since the restoration of its independence in 1991. On the 1st of January 2020, indeed, the migration rate for Latvia was -7.64 migrants per thousand population.

On the 31st of December 2020 there were in total of 98'328 migrants in Latvia (4.7% of all inhabitants of Latvia) of which 44'948 were with temporary permit (resident up to 3 years) and 53'380 were with permanent permits.

Out of above mentioned 98'328 registered immigrants, 80'199 (82%) were coming from countries located outside the EU and the EEZ countries.

The main reasons related to migrants' requirement for a residence permit are, based on 2016 study: 29% have made investments in real estate, 22% came to work and 15% came to study.

Every year on average only 150 – 350 persons (in year 2020 167 persons) loose their permits and received an order to leave the country (become an illegal immigrants, if they do not leave the country);

In 2020 there were in total 147 asylum seekers in Latvia, most of them from countries such as Belarus, Russian Federation and Syria.

The topic regarding the integration of migrants has to be primarly understood through a cultural lens which comprehend factors such as: national identity, language and culture. These are, indeed, the main issues that migrants should manage in order to receive a temporary residence permit and further on qualify for an offical working place.

In order to acquire information about the migrants situation in Latvia an interview with NGO "Droša Māja" which is host of central migrant integration point of Latvia. The interview can be found at this link: www.integration.lv.

FIELD RESEARCH: QUESTIONNAIRES

Information about adult migrant's situation in the labour market and the existing educational opportunities in the STEM field

The specific situation of Latvia in terms of migrant education shows that most of the people are already highly educated – so they are in Latvia to acquire higher education competencies- or act as investors. This shows how these people probably do not seek employability options or generally come to Latvia for a working position which has been found before their arrival (in many cases, these are different highly paid professional positions, e.g. in the IT field). As written before, these migrants make up in total of 66% of all who have registered in Latvia.

In order to officially apply for a job position in Latvia, a migrant has to acquire an official permit of residence: temporary or permanent. More specifically, to receive a temporary permit no specific requirements on training are required. On the other hand, to receive a permanent permit one should learn Latvian language at a defined level and demonstrate knowledge of the Latvian culture. Moreover, speaking of the maximum time requested for staying in Latvia with a temporary permit amount to 3 years. So, if the migrant is in Latvia for a longer term, they usually focus on local language and culture training.

According to the NGO Droša Māja experts, at present, there is a large demand of training for Latvian Language and culture as it is officially required by the government to receive permanent permits of residence. This further leads to a situation that specific STEM-related courses are not highly demanded, as they are not officially necessary to apply for a job position.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

The main principle of labour regulation in Latvia is that migrants should compete with local inhabitants for job positions in Latvia, which means that in case the employer wants to employ a person with a migrant background, he should anyway have a job advertisement published in an employment agency for at least one week to give to locals as well the possibility to apply for the position.

When it comes to job positions that require STEM training or understanding positions these could be divided into two groups:

- positions where a basic knowledge of STEM is required and where local employees can also apply (STEM education at all levels are strongly developed in Latvia) thus, they are in a better competitive situation with migrants, as they know the local language and culture and are already integrated into the local society
- positions where advanced STEM knowledge is necessary – in these cases if migrants are employed, they have previously acquired their knowledge in their home country and basic training on STEM would not be enough (e.g. specific fields of IT, communication, etc.).

Another challenge regards the fact that migrants, as we mentioned before, should follow the national rules of getting permits for permanent residence, where they have to learn the Latvian language and culture. So generally, it happens that migrants are more motivated to learn the Latvian language than to apply for STEM related training.

CONCLUDING REMARKS

The context analysis for Latvia shows that the situation in this country is different than in most of Europe due to the following reasons:

1. Latvia it is more emigration than immigration country. More citizens of Latvia are moving outwards than those that are coming in.
2. Every year an average of only 150 – 350 persons lose their permits and receive an order to leave the country, becoming illegal migrants if they do not leave the country.

- Last three years (2018-2020), there were less than 200 asylum seekers per year; most of the migrants are officially registered and have a temporary or permanent residence permit.
- At least 66% of immigrants who were registered in Latvia as of 2016 are assumed to have basic STEM knowledge. More specifically, they are investors or came to Latvia for work or as students.
- Most of the immigrant people come from post-soviet countries, which means that they know the Russian language, which is widely spoken in Latvia, and helps them find job positions suitable for them. There are pretty few migrants from Africa.

GREECE

INTRODUCTION

In Greece, due to problems stemming from the increased migration flow, a significant number of relevant organizations and NGOs have been created. Migrants' active involvement in Greek society is very important, with the education framework being the first step to achieving that. At the same time, the focus has mainly been on underage migrants, with schools and basic education programs being widely available. On the other hand, adults' education is not at the same level yet, pointing out the importance of the implementation of the ASSETS project.

Due to the pandemic, the interviews were conducted through distance communication. The respondents have been found via social media and personal networking. The answers were filled in the word document, which was also translated into Greek and sent via email and social media chats to possible respondents. Then, the answer sheet was sent back to us. Some participants preferred to talk via phone, as they only possessed smartphones, which are not convenient for completing written surveys. Also, some participants wished to remain anonymous, fearing this might have some implications on their workplace.

The total number of respondents was 10.

FIELD RESEARCH: QUESTIONNAIRES

General Information about Respondents

Respondents belong to different age groups, varying from 27 to 51 years old. The respondents coming from migration backgrounds were 5 and much more challenging to reach, as the theme range of this survey is relatively narrow.

As mentioned below, the STEM field is rarely their first choice of education or career path. On the other hand, adult educators and people working with migrants were much easier to reach due to the increased number of relevant workers in recent years. The participants of each group had a lot of common characteristics regarding their careers, as it is natural. Most of the educators work in lifelong learning centres or organizations about migrants, while most of the migrants have managed to integrate into Greek society quite well.

Their field of work is mainly linked to the food industry and commerce, while most of them decided to work either in fields that they were familiar with before coming to Greece or on fields that would allow them to connect with people of their country of origin and would create a support network and financial stability.

Information about adult migrant's situation in the labour market and the existing educational opportunities in the STEM field

All respondents had a clear understanding of STEM terminology. It was overall described as a comprehensive, innovative approach to curriculum design and production, which aims to better prepare current learners for the needs, knowledge and skills of 21st-century society and the labour market. They agreed that the promotion of STEM education is directly applicable in various fields and requires a coherent and long-term strategy and not individual initiatives (mainly in the private sector), by adapting the curricula, strengthening STEM teaching in the initial and continuing education of adult educators, promoting educational excellence and business mobilization to support STEM training. Connecting the theoretical part of education with the practical application was also a feature of STEM that was mentioned.

The aim of STEM training was described as the development of a new approach to problem-solving using elements from all the sciences combined with each other so that people can respond in a meaningful way to the modern demands that are formed rapidly. The educators have contributed to such initiatives by incorporating in their courses interdisciplinary projects related to science. They also make sure that the structure of each unit of their courses consists of a mixture of the above (Science, Technology, Engineering, Mathematics), to use data from all these sciences to complete the approach.

It was highlighted that it should have had the learners' consensus for such a program to be successful. Some scientific issues may not be familiar to them and this may make them hostile towards such an approach. This is the reason why the instructor should bend their resistance and involve them in the learning process. Implementation of programs such as I.Ref.SOS which combines immigrant education, internships, and counselling/guidance, would be very useful for migrants to be able to integrate into the European labour market with cutting-edge knowledge.

An educator commented that they were unsure if migrants themselves could promote STEM education if they do not know about it. The educators are the ones who will bring the migrants in contact with this holistic approach so that they become familiar with the various cognitive objects. Understanding the process for joining and monitoring such a program was also mentioned as important. This requires familiarity with the language, access to well-informed scientific platforms and their work environment's moral and material support.

Several different future steps were mentioned. After their training, the overall opinion was that it would be helpful to participate in mixed groups (Greeks and migrants) and undertake the implementation of a project. They could then be subsidized to set up social cooperatives to set up innovative businesses. Therefore, for the promotion of STEM education in the study programs for immigrants, it is necessary to:

- Redesign the curricula of vocational education and training with the emphasis on STEM, create modern educational material, make use of technology, and modern logistical infrastructure, and upgrade Vocational Orientation.

- Make institutional arrangements for more flexible curricula to enrich the educational experience with parallel STEM activities. Introduce STEM promotion index and / or cooperation in the evaluation system of educational units and trainers. The current experience of distance learning would be good to use.
- Review the system of initial and continuing education of educators by strengthening the teaching STEM and promoting educational excellence.
- Adopt a more positive and active attitude by the educational community and mobilization of companies to support STEM education by promoting the STEM Alliance program and networking of companies to undertake joint STEM promotion actions in educational units.

It was also mentioned that the design and implementation of a national awareness campaign in favour of science, engineering and technology as attractive career choices would be beneficiary not just for young people and migrants but for society as a whole. One educator also commented that the issues examined in this survey do not concern just migrants but Greek youth as well. STEM is a field that is still treated with suspicion and most people don't have any confidence that they can advance in it.

The overall gathered aim is to create a broader STEM ecosystem in which all stakeholders can cooperate and interact: the state, the competent Ministry, academics and researchers, civil society, parents, students, and the business community, as key players in the production and the labour market. A few more ideas that were presented are the following:

- Mobilize the business community to take initiatives to support STEM education in educational units (e.g. Vocational Education and Training). Beneficial initiatives can be developed in a wide range of STEM culture dissemination and enhancement activities, with varying degrees of difficulty and experimentation, depending on the capabilities and experience of the business. Examples include the reception of trainees in companies, the organization of educational projects or competitions, the donation of logistical infrastructure, etc.
- Participation of companies in the STEM Alliance Program to implement actions and projects that contribute to the development of STEM. The participation of companies in the STEM Alliance will facilitate the development of synergies and the cultivation of a culture of cooperation between the educational and the business community in the field of STEM while providing an organized support framework for organizations that will invest in the implementation of joint action (schools, businesses, social partners, etc.).

- Networking of companies to undertake joint actions to promote STEM in schools. Networking operations and partnerships between larger companies, with or without relevant experience, with smaller ones, facilitate pooling, resource savings and result optimization. At the same time, it strengthens the social profile of companies and promotes the change of culture within companies (innovation, extroversion, creativity, etc.).

Also, it was a common argument that people with a migrant background need to learn the Greek language well before moving on with the STEM education or career path. One educator mentioned that the B1 level must be conquered, at least. It would also be helpful to know the English language as well. Then, they can cultivate their skills with the scope to become more productive and efficient, which can be done through training programs before and during their employment. Seamless access to lifelong learning and having access to any information on any action that concerns them were also highlighted. All in all, communication is regarded as crucial for advancing STEM.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

The trainers' role was presented as crucial by the educators. First, migrant learners are adults; for this reason, educators should follow the principles of adult education when teaching. The approach should also take into account the needs of adult migrants as well as their experiences. It was highlighted that instructors should be well trained in such topics and participate in the program's design, as the trainer's role is the key to practical STEM training.

Maintaining and stimulating curiosity and enthusiasm should be considered basic tasks for the instructor, together with one's ability to design the lesson in an attractive, interdisciplinary, inquiry-based learning manner. Even today, teacher training does not provide the necessary supplies and experiential experience required by the modern STEM teaching approach. Initial and continuing education of adult educators should equip educators with the ability to adopt innovative methods and practices, both at the level of teaching and at the level of student evaluation. This is a problem observed in Greek learning STEM policies as well.

Another essential element that was mentioned as necessary to be integrated, both in education and training and in the daily professional life of trainers, is interdisciplinary cooperation. At the teacher education level, the promotion of interdisciplinary cooperation can be done by assigning interdisciplinary student projects or organizing joint educational activities for students of different scientific disciplines (e.g. Mathematics and Computer Science).

Similarly, at the level of educational activity, the education system - but also the educational units, as autonomous units - must support the systematic cooperation between the trainers and promote a comprehensive culture of feedback and feedback between them (e.g. jointly teaching a course, practical application activities with interdisciplinary content, support for new adult educators for immigrants and not only, through coaching-mentoring activities, etc.).

Educators commented that if migrants have not previously experienced similar teaching approaches, they are expected to be negative about STEM acceptance. Partnerships with the workplace could curb immigrant resistance. For example, through workplace visits (or virtual visits) they can become familiar with the use of new technologies in a business, realize that STEM is a "study" of everyday life and capture daily practices in terms of Science, Engineering, Technology and Mathematics.

Another point that was made in the survey is the limited resources available. It is essential to have the proper infrastructure, but the suitable materials are often costly, and usually, schools cannot provide them. Educators themselves are often responsible for their own supplies. Another obstacle that was mentioned is the prejudice that often accompanies people with a migrant background. This barrier, combined with language fluency problems and limited access to relevant information, is removed as immigrants integrate into the host society and to the extent that supportive environments (scientific, solidarity organizations, government agencies, education structures) without prejudice and bigotry manage to improve the climate. Lastly, it was mentioned that the needed collaborations concern educational policymakers, and private bodies that deal with it.

The group of migrant participants described their current work state. Most of them work in fields that involve people of their country of origin, as this helped them greatly in the start. Not only could they feel welcomed and part of a community, but this also offered them financial security. Some work in the food industry as owners or employees of ethnic food shops and restaurants. One participant is unemployed, educated in Math and hopes to be able to continue his education further, maybe by completing a master's degree. This person's main fear is that regarding career opportunities, as STEM jobs in Greece are harder to find. Another participant works in the real estate field, working closely with his country of origin. All of them aspire to get a chance to educate themselves further on STEM subjects, as this could help them succeed in their current job more and create opportunities for entirely new career paths. It was commented that STEM education is becoming increasingly important for everyone, not just migrants. The educators' group also mentioned this. This world is changing rapidly, and everyone needs to adapt.

It was commented that the most challenging thing about changing career paths is the general economic situation of Greece, as well as the pandemic, which makes it even harder to transition to a new field of expertise. In an era where expertise is required everywhere, going from owning a falafel cantine to teaching Math in a school, for example, is difficult. Employers do not trust people that recently changed careers that easily, as they do not yet have the experience necessary.

In question 2, describing a challenge they faced at work, the answers varied, as it is to be expected. One participant talked about the travel restrictions of his real estate client and how he had to come up with creative ways to complete the job. Other participants mentioned stories about racist clients and the support that other people around them provided. Another participant commented on the suspicion he faced from his own family when he announced that he wanted to continue his STEM education and not help with the family business. Lastly, a participant talked about his difficulties when he tried to complete the paperwork required to open his shop and how this almost made him quit. A common feature was the persistence that all participants needed to overcome their challenges.

Adults with migrant backgrounds interested in training to develop a STEM-related career through STEM skills and competences

As mentioned above, it is widely accepted that STEM skills will soon be necessary for everyone, not just migrants. Acquiring different skills that match this highly changing and digitalized world while also dealing with climate change will be imperative not only to advance in the path one already follows but also to be able to adapt and follow a different path if needed.

Comments and personal opinion

Conducting this survey was an exciting task. It was not expected to find participants who were not only willing to share personal information but were also educated about STEM, as this is a fairly new topic. Educators were able to understand the migrants' needs and made insightful comments about the steps that need to be taken. At the same time, migrants had a clear view of their possible future choices, while they were also very open to change. Understanding that one's job may not be as efficient in the nearest future and being ready to follow a different career path is very important. The age of the respondents, in this respect, is not to be neglected because it was an indicator of the maturity of their answers: educators were very experienced in their field, while migrants have had the time to learn the Greek language very well, work or/and study in Greece and integrate into Greek society, while also forming bonds with their countries of origin.

CONCLUDING REMARKS

STEM is a field that needs to be more well-known and exploited by everyone in Greek society. There is the misconception that STEM is complicated and only addressed to a few people with relevant education, financial security, and low risk by changing their field of work. Actually, STEM is addressed to most people, as it combines innovative elements from all sciences that will be useful in the near future.

Educators made clear that the focus should be on the trainers, as they will be responsible for attracting interest to this new field and providing adult students with the resources necessary to advance in the modern world. This applies to everyone, not just migrants.

On the other hand, migrants may face more obstacles than Greeks, like the language barrier, financial instability, the need to integrate into society before moving any further and possible racist prejudices from future employers.

The steps that need to be taken were clearly presented: a holistic approach is imperative, with several stakeholders active in the process. More resources should also be allocated towards STEM education. Access to information is also vital, as migrants don't usually learn about the programs and projects being implemented.

Migrants themselves commented that STEM would be pretty helpful in the future, but it is not the best time to take such a big step due to several factors, like the economic crisis and the pandemic.

Moreover, studying something completely new takes much time that most of the participants cannot give, as they already work. The age of the participants is linked to this, too, as for younger migrants, it would be more probable to study for a bachelor's or a master's degree and then find work. Most survey participants have already established their businesses but recognized the need for further specialization. All participants from both groups realized the positive effects STEM can provide but were also cautious of our reality.

TURKEY

INTRODUCTION

Turkey continues to host the most significant number of refugees worldwide, as the number of people forcibly displaced worldwide due to conflict, violence and persecution hit record levels. Turkey currently hosts some 3.6 million registered Syrian refugees and nearly 320,000 persons of concern from other nationalities. The Republic of Turkey is a party to the 1951 Refugee Convention and 1967 Protocol, maintaining the geographical limitation to the 1951 Convention, thus retaining resettlement to a third country as the most preferred durable solution for refugees who arrived due to the events that occurred outside of Europe.

Turkey has been undertaking legislative and institutional reforms to build an effective national asylum system compliant with international standards. In April 2013, Turkey's first ever asylum law, the Law on Foreigners and International Protection, was endorsed by the Parliament and entered into force on 11 April 2014. The Law set out the main pillars of Turkey's national asylum system. It established the Directorate General of Migration Management (DGMM) as the main entity in charge of policy-making and proceedings for all foreigners in Turkey. Turkey also adopted Temporary Protection Regulation on 22 October 2014, which sets out the rights and obligations and procedures for those granted temporary protection in Turkey.

Straddling Europe and Asia, Turkey have historically been a country of origin, transit, and destination for migrants. With its geopolitical location on the route from the Middle East to Europe and open conflicts continuing in neighbouring Iraq, Iran and Syria, Turkey hosts one of the largest migrant populations in the world.

The number of migrants and refugees residing in Turkey now stands at 3.9 million, over 90 per cent of whom are Syrian and came to Turkey due to ongoing conflict in Syria. 3.6 million Syrians have registered for Temporary Protection in Turkey and other migrants of differing nationalities seeking asylum, international protection, or refugee status.

Turkey was also at the centre of the Mediterranean Crisis in 2015. Though the number of migrants arriving in Greece from Turkey has fallen in the past two years since a peak in 2015 of over 850,000 to 186,786 in 2017, figures remain substantial. Turkey is still facing some of the biggest challenges in terms of irregular migration by land and sea.

The sheer number and diversity of migrants and refugees in Turkey demand practical humanitarian assistance, migrant protection, and migration management strategies. In Turkey, governments, international organizations, and humanitarian organizations are working together to develop comprehensive policies and actions to manage migration and facilitate its potential positive outcomes sustainably.

The operating environment drastically changed in mid-March 2020 due to COVID-19. The Government of Turkey swiftly imposed restrictions to curb the spread of the virus but pledged that everyone, including refugees, had access to medical assistance related to COVID-19. UNHCR and its partners switched to remote working to keep contact with refugee and asylum-seeking communities and continued providing services and assistance, including outreach, counselling, education, and training. State registration services by the Directorate General of Migration Management (DGMM) re-opened as soon as feasible. The Ministry of National Education introduced distance classes as education facilities were closed. The digitalized outreach and services allowed for more comprehensive inclusive contact but highlighted the digital divide, with some people lacking access to online communications.

Refugees and asylum-seekers in Turkey include over 3.6 million Syrians under temporary protection and over 330,000 international protection status holders and asylum-seekers of other nationalities. Over 98% of Syrian refugees live across Turkey in 81 provinces, while 1.5% are hosted in seven temporary accommodation centres managed by DGMM.

The municipalities are strengthening cooperatives and social enterprises and presenting recommendations to increase refugee participation in the initiatives. The importance of municipal support in strengthening cooperative activities and enabling refugee participation was highlighted; as was evident through presentations given by the Istanbul Metropolitan Municipality and the municipalities of Sultanbeyli and Kucukcekmece on their collaborations with cooperatives. The meeting is part of a series of regional meetings within the larger context of self-reliance and the socio-economic inclusion of persons needing international protection.

Turkey's operations during this period focused on supporting individuals and families affected by COVID-19. Multi-sectoral support for vulnerable migrants, refugees, and host communities included multi-purpose cash assistance, hygiene and non-food items (NFI) distribution, Protection, and Mental Health and Psychosocial Support (MHPSS). IOM also supported local authorities' response to the COVID-19 pandemic by prioritising areas related to multi-purpose cash assistance, distribution of hygiene and non-food items (NFI), Protection and Mental Health and Psychosocial Support (MHPSS).

Additionally, IOM's municipal migrant and community centres continued to operate face-to-face and online and continued to be relied upon for accurate information, legal and medical referral, and counselling for specific needs in social support, livelihoods, and legal cases.

Readmitted Migrants and Refugees to Turkey On 18 March 2016, the EU and Turkey agreed on the
readmission of migrants arriving from Greece to Turkey after 20 March 2016. In this regard, according to DGMM reports, 2,139* migrants and refugees have been readmitted to Turkey from Greece between 4 April 2016 and 31 March 2020. The main points of return from Greece include Lesbos, Chios, Kos and Samos, while the main readmission points to Turkey include Dikili, Çeşme, Bodrum and Adana airport. However, since March 2020, no migrants or refugees have been readmitted from Greece to Turkey, according to DGMM, as the EU-Turkey Agreement remains suspended.

According to the Turkish Armed Forces (TAF) daily figures during June 2021 at Turkey's border lines with the Syrian Arab Republic, the Islamic Republic of Iran, Iraq, Bulgaria and Greece, 7,036* persons were intercepted and handed over to Turkish law enforcement forces. The figures presented by TAF don't refer to the nationalities of the intercepted persons at the border lines. Irregular exits were mainly at Turkey's western borders (with Europe), and the border with the Syrian Arab Republic is the main entry point into Turkey. In comparison, the total number of intercepted persons on land was lower in June 2020, when 1,054 persons were intercepted. Meanwhile, the number of intercepted persons during attempted exit out of Turkey was highest at the border with Greece. During June 2021, the highest number of interceptions by TAF at entry and exit took place at the border with the Syrian Arab Republic, with a total number of 6,798* intercepted persons. Compared to the previous month, there is an increase in the interceptions from the Syrian Arab Republic to Turkey. In May 2021, 6,718 interceptions of individuals were recorded at this border.

Known Entry and Exit Points:

- Known entry points by land: Hatay, Kilis, Şanlıurfa (from the Syrian Arab Republic), Silopi, Çukurca (from Iraq, Şemdinli, Yüksekova, Başkale, Ağrı, Doğubeyazıt (from the Islamic Republic of Iran).
- Known entry points by air: Istanbul, Istanbul Sabiha Gökçen, Antalya, Esenboğa Ankara (from third countries).

- Known exit points by sea: Çeşme, Ayvalık, Didim, Bodrum, Küçükkuyu (Locations close to Lesbos, Samos, Chios, Symi, Kos and Rodos).
- Known exit points by land: Edirne (to Greece and Bulgaria), Kırklareli (to Bulgaria).
- Known exit points by air: İstanbul, İstanbul Sabiha Gökçen (to certain EU MS).
- Per nationality breakdown of readmitted migrants is shown. The top nine nationalities are included in the graph. In contrast, the "others" category includes migrants from the Democratic Republic of Congo, Cameroon, Nigeria, Palestinian Territories, Sri Lanka, Ghana, Nepal, Guinea, Myanmar, Congo, Senegal, Tunisia, Lebanon, Côte d'Ivoire, India, Sierra Leone, Haiti, Mali, Togolese Republic, Gambia, Somalia, Jordan, Yemen, Niger, Dominica, Burkina Faso, Comoros, Uzbekistan, Sudan, Uganda, Zimbabwe and stateless.

Resettlement of Syrians from Turkey

The 18 March 2016 EU-Turkey Statement aims to replace disorganized and irregular migratory flows by facilitating organized and safe pathways to European countries. Specifically, the statement stipulates that for every Syrian returned to Turkey from the Greek islands, another Syrian will be resettled directly to Europe from Turkey. According to DGMM data released on 30 June 2021, 29,328 persons have been resettled under this instrument, with primary resettlement destinations being Germany, France, the Netherlands, and Finland.

FIELD RESEARCH: QUESTIONNAIRES

General Information about Respondents

The interview structured by ASSETS was the primary tool for collecting data from immigrant youth on the National context focusing on the STEM field. While doing this, we took the participants' demographic profiles, including their age and gender, as a basis. In addition, this structured interview form was aimed at investigating why these young immigrant people interested in STEM chose STEM and the career paths they consider following.

The survey showed that participants were interested in STEM disciplines such as Mathematics, Technology, and Engineering. Meanwhile, three of the participants expressed an interest in general science. These participants said that they have been interested in general science since their Primary School days and gained their interest in general science while still in Primary School.

One of the participants said that he is more interested in Information Technology. It shows that although we are in the age of new technology, there is only one participant who wants to pursue a career in IT. IT discipline, indeed, is an important field of study, especially at the beginning of STEM Education.

The result of this research shows that young immigrants are more pragmatic when it comes to their future plans. When choosing their future career, they consider choosing a career that suits their strengths and interests.

Our focus group consisted of 5 Syrian migrants young people aged between 20-30 years old. In this ASSETS survey, we tried to gather information about the perspectives of young immigrants interested in STEM. First, we collected data from this focus group through one-on-one interviews. Second, we analyzed and interpreted this collected data. In response to this research, the participants sincerely answered these questions in the interview. Therefore, the collected information is considered valid and reliable.

The other focus group comprised 5 people: English instructors working as full-time academicians at Ege University. Ege is a state university located in the west of Turkey. Their department provides one-year preparatory language education for students before they proceed to their chosen faculties. The participants of this interview have teaching experience of above 20 years, and all of us are involved in youth work as trainers, facilitators, and volunteers.

The answers collected show that respondents are aware of what STEM education is, namely the set of disciplines for developing learners' skills in specific fields of science, technology, engineering, and mathematics. Of course, this is a very broad definition and we needed to focus on participants' specific knowledge and skills components to gain a better understanding. STEM involves many higher-order thinking skills like critical thinking, research and inquiry skills, problem-solving competences, creativity, engineering and design thinking, and individuals' being flexible to work in groups developing team working skills. These are the 21st century skills individuals need to develop to fully function in the global economy.

As for the instructors, their target is made up of adults over 17. The primary aim of their school programmes is to help people improve their language communication skills to follow their academic studies in English. With respect to this overall aim, they claim to follow a skills-based curriculum involving relevant skills courses, namely reading, writing, listening, and speaking. Recently they have made several changes in their curricula of study to adapt them to the 21st-century dynamics and reshaped most of its components, basing them on STEM. For example, they have adopted task-based and project-based approaches as methodologies, which can encourage people to collaborate with others, make inquiries about specific topics, use digital tools to communicate their thoughts and analyze data samples for their projects. Also, curricula usually change over time and need to be implemented because it is hard to change the mindset and expectations of learners from an educational program.

Another aspect of educators' job regards providing training facilities for their language courses to equip these with pedagogical content and tools to transition into STEM. This is a very challenging task because structural changes begin with a mindset change. In this regard, instructors claim that they must work hard on how educators perceive the learning phenomenon and are aware of the needs of the youth today. To ease this transition process, they seek to use professional tools for development workshops, conferences, expert talks, incident analysis sessions, etc. In this way, they contribute to STEM disciplines and approach dissemination.

According to the data collected, the first step of STEM education for adult migrants should be building strong communication skills. This is because language is the primary tool for understanding and communicating messages. The a priori tool allows space for all the other skills to develop subsequently. For example, to develop problem-solving or collaboration skills, people must interact with one another. As for the majority of cases, international collaboration in STEM contexts requires individuals to learn the English language to be able to communicate with people worldwide.

As for the barriers and obstacles regarding implementing STEM Education strategies, educators mentioned: managing the "change" in institutions. This, indeed, involves a lot of challenges and effort. In this regard, spreading STEM education requires educators and learners to adopt a new stance and methodology towards learning.

It loads more responsibilities, yet more autonomy, onto the learner while placing new roles for the educators in classroom environments namely: facilitator, coach, designer, and mentor. So, regarding the relationship between "learner and teacher" as "receiver and giver" of education poses problems in our efforts to promote the notion of an "active, autonomous learner with strong metacognitive awareness".

Another barrier the respondents identified is related to digital literacy skills. Both educators and learners must develop essential digital literacy skills to function effectively in the fast-changing world. Lack of digital literacy skills, such as storing data, using LMS effectively, presenting information, creating digital products, etc., might damage educators and learners. This is a crucial problem when we consider that STEM is paramount to technology. In cases where educators might feel weak about using technology, they might avoid setting learner tasks that involve digital tools, or learners might avoid taking risks in their attempts to try out new digital tools. The development of digital literacy skills is thus fundamental and must be prioritised in STEM education.

While these obstacles concern all STEM learners and educators regarding migrant learners, the survey also showed how cultural barriers must be considered. Migrants' attitudes towards scientific approaches (inquiry, critical thinking, problem analysis and solving, etc.) should also be considered carefully. Especially individuals with traditional solid, conservative backgrounds might find the idea of individualized, learner-based approaches very challenging. The traditional teacher-centred approaches, where learners expect the teacher/leader to deliver the educational content directly, might be complicated for people with this kind of background who find it hard to approach more liberal, student-centred approaches where learners are expected to create, think critically and have autonomy over their own learning. One solution to these challenges might be to promote metacognitive thinking (planning, monitoring, evaluation) processes in education so that learners gain awareness about their learning methods, strengths and weaknesses and can actively work on them.

In this regard, STEM education must pay special care to develop language and digital literacy skills, as well as metacognitive thinking skills, especially in the context of migrants.

This empowerment process must begin with educators' gaining skills in the related areas so that they can set tasks to promote creative, tech-based, productive, interactive learning and critical thinking, etc. Collaborating with the business sector might also allow adult migrants to gain practical hands-on experience in relevant fields, adapting themselves to the workspaces in their new society.

The steps to take to reach integration of adult migrants into the labour market must begin with a needs analysis for the economy. What sectors need further labour power, and what are the priorities? After determining these, it is possible to consider questions concerning what space can be created for migrant adults to contribute to the economy and which skills must be prioritised. This will be like a skills match process. Businesses can allow traineeship for migrants as a support mechanism, maybe with a mentoring system that could help to ease the adaptation process. Besides, big companies could be consulted to provide internship opportunities to these groups. If this is achieved, the projects could be disseminated on social media to reach larger groups. Also, experienced youth workers (preferably young immigrants) can carry out further projects to disseminate STEM skills which will help them enhance their skills.

Information about adult migrant's situation in the labour market and the existing educational opportunities in the STEM field

The development of Syrian refugees' skills is pressing because of a likely bottleneck in the labour market and because there is a risk of having a lost generation regarding access to education. The war disrupted the normal lives of many Syrians, including their courses of study. An example highlighting this disruption is the 70 per cent of Syrian children not attending an educational institution in Turkey (UNHCR, 2014), but children are not the only ones affected by it. Many students who should have finished their tertiary studies during the war could not finish them.

In this context, Turkey's capacity to effectively develop the skills and labour market perspectives of migrant youth can play an essential role in the education decisions of this migrant population. The employment opportunities of registered immigrants in Turkey increase with the level of STEM and vocational education.

Participation in adult learning can support migrant workers in adapting to changing economic conditions. Its institutions in Turkey host Continuing Education Centres that offer immigrants certified academic, vocational, and professional courses and seminars and conferences for all ages and subjects. Open and distance education plays an important role in expanding the scope of adult learning.

The Turkish Qualifications Framework creates a framework of standards to promote lifelong learning, interdepartmental permeability, and international mobility in general, integrating them into the job market for all education levels. It also works to combine quality-assured general, vocational, and academic qualifications to create employment opportunities for the job market. This way, Turkey has implemented the 'Skills of Specialized Vocational Training Centers' project to address high unemployment levels caused by the mismatch between skills supply and demand by involving employers in the skills development of the unemployed. For this purpose, Turkey realized the first Labour Market Needs to analyze and design vocational courses compatible with the results.

As for working children, one of the drawbacks is that the labour and education modules not targeting individuals younger than 15 years old. As a result, critical information on school enrolment and the number of working children is missing. Still, the small percentage of 15-year-old Syrians in education signals that many Syrian children might be out of school. For example, we find that only 29.4% of 15-year-old Syrian girls attend school, compared to 86.8 per cent attested among Turkish girls of the same age. An even more significant gap exists between 15-year-old Syrian and Turkish boys, with 12.9% and 88.4% attending school.

An interesting aspect of Syrians' labour market experience is the similar unemployment rates among adults (aged 30-65) at 13.3% and young people (aged 15-29) at 13.0%. This situation is not only rare in Turkey, where young people have historically endured much higher unemployment rates than adults (18.0% vs 8.1% in 2017), but also in most other countries of the world. The reason behind this oddity might be found in the fact that both young and adults start afresh in the Turkish labour market, i.e. with no recognition of prior learning and, in many cases, no professional networks to rely on.

In a sense, the Syrian experience in Turkey can be regarded as a natural experiment that tests whether adults have lower unemployment rates because they are more productive or just because they have spent more time in the labour market than young people.

It is estimated that 940,921 Syrians work in Turkey as of 2017,17, most of them men and some working from an early age. Of these, 862,039 (91.6%) do so informally, occupying low-skilled positions in sectors where productivity is relatively low. These facts raise questions with regard the quality of the jobs held by Syrians and the kind of industries that provide them.

The focus group generally call for providing migrants with vocational and STEM education with more formal job opportunities. They responded that this process requires eliminating some of the bureaucratic barriers that discourage migrants' formal employment. Streamlining the cumbersome process for obtaining a work permit for migrants would help: migrants are required to obtain employer sponsorship, among other steps. Another bureaucratic constraint is the quota on foreign employees: each firm can only hire one migrant for every ten Turkish citizens.

Regarding labour market transitions and employee turnover, Syrian refugees have experienced highly unstable labour market experiences by jumping from one job to another. However, as time passed, they learned their way in the Turkish labour market. In fact, the data reveal this; Year-over-year transitions for refugees have improved more than in previous years. For example, the rate of those unemployed in 2016 and who found a job in 2017 is higher among Syrians than among locals. Likewise, while the share of salaried workers in 2016 was similar to that in 2017 for both groups, it is lower for Syrians. These immigrants also think the Turkish government can expand their labour force participation incentives to businesses employing refugees. For example, they want incentives to complete an introductory program in STEM education along with state-sponsored vocational training. They believe this is a very important way to improve their skills to increase the quality delivery aimed at conducting vocational and STEM education in real work environments.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

According to the data we obtained from the Focus group, we faced the fact that integration problems continued as long as the language barrier existed. To overcome the language barriers of most of these immigrants, after applying to the language courses available all over Turkey for Turkish language courses and contacting the Centers such as NGOs and government agencies that advise immigrants, these people were provided with counselling services and the integration process of these immigrant families after overcoming these language barriers and employment opportunities have increased and the contribution of these immigrants and their household income has been increased. This integration and overcoming language barriers have greatly improved the living conditions of immigrants in our focus group, contributing to their employees and helping them find work quickly.

Learning the Turkish language for the integration of immigrant children also worries parents of children with immigrant backgrounds: they are worried that the children will not develop proficiency in their mother tongue and will have problems reintegrating into the Syrian school system if they return after the war. Considering the expressed preference of families, the Turkish Ministry of National Education is currently working on ways to ensure that children can maintain their Arabic language in public schools through optional and extra-curricular subjects. This is important for all Syrians attending Turkish schools. It will also comply with article 29(c) of the Convention on the Rights of the Child.

According to the data we get from here, overcoming the language barriers in this immigrant focus group made a great contribution to the integration process of these immigrants and the support of these immigrants' families greatly increased their disposable income and improved their quality of life.

Syrian migrant women, on the other hand, claimed that they want to feel satisfied with the local community and themselves. Their will to help the family by working and not by being just housewives shows their desire to be useful for their children's future and for others. It has to be said that the COVID-19 pandemic changed their lives: during this challenging period, these migrant women helped by producing facial masks. When the epidemic ended, these migrant women wanted to continue their studies and work hard.

On the other hand, with the COVID-19 pandemic process, the immigrants' responds from our focus group have been among the people most affected by the COVID-19 pandemic. When the pandemic broke out in Turkey and a nationwide curfew was declared, these people's jobs were immediately affected like other Turkish citizens. During that period, migrants with regular jobs started to receive salary cuts due to lockdown restrictions. This situation also made it difficult for those needing a fixed income to support their families. Some of these people stated that they received a one-time cash grant from the state during this period and helped their families find a temporary solution.

Besides these, one of the challenges is that Turkey's already strained education system is struggling to integrate nearly one million Syrian school-age children. Simply enrolling Syrian students is a tremendous challenge; about 370,000 children still do not attend school. However, the authorities have also had to manage the concerns of the Turkish people by addressing their concerns about overcrowded classes and the impact on the quality of education.

Adults with migrant backgrounds interested in training to develop a STEM-related career through STEM skills and competences

The interviews carried out explored the perspectives of STEM (science, technology, engineering, and mathematics) during a focus group among participants with migrant backgrounds. Participants were interviewed using questions approved in the framework of the project and a structured interview guide. The recorded interviews were transcribed separately to reach an expanded text. Extended texts have been revised to create themes and meaningful expressions. This focus group interview revealed that these people are often interested in the STEM-related field. These people's employment and adaptation to the preferred course at the University was the primary reason for the participants' interest in STEM. Almost all participants stated they want to continue STEM-related courses and STEM education for their future business life and career.

These interviews show that personal aspirations emerged as the main reason for participants to pursue STEM-related professions. They believed this focus group would help them gain skills in STEM-related courses, including possible career paths, motivations, and abilities.

Participants also believed that innovative pedagogies are necessary for better STEM education. Moreover, they suggested that it would be helpful to guide them through the subjects they should take up according to their vocation with formal or informal methods or organizing career guidance seminars.

The Turkish government is trying to implement clear policy objectives for the sustainable integration of migrants and refugees. It prepares short-term and long-term plans to prevent inter-communal conflicts while educating these migrant and refugee children and helping adults transition from aid to productive employment.

Comments and personal opinion

Turkey has taken important steps to integrate 3.4 million Syrians, accommodating this massive influx of refugees with less backlash than might have been expected or feared. However, it still faces social challenges. Frictions between host and refugee communities are rising, particularly in inner-city districts with high refugee density. Policymakers should develop mechanisms and public messaging to defuse refugee-related tensions at the local level.

The biggest challenge is the sheer number of job-seeking migrants and given that Turkey's informal sector is estimated to employ around a third of Turkey's workforce, many migrants and refugees have no choice but to accept informal employment, often with no benefits or with low wages. Both migrants and Turkish citizens need new skills, such as STEM to find better-paying jobs in the formal sector. In fact, the Turkish labour market suffers from “skills and education mismatches” manifested in an estimated 1.2 million unfilled market gaps. More targeted STEM-supported vocational training and on-the-job apprenticeship programs based on sector-specific development strategies can help address this issue. NGO representatives are of the opinion that training programs are generally effective in matching skills with local market demand.

On-the-job apprenticeship programs designed by the STEM-supported Ministry of Labor in consultation with employers will be another way to connect both immigrants and local youth to the formal economy. In fact, some programs that have been successfully implemented in Turkey's border regions can also be implemented in urban areas.

For example, in cooperation with the local İŞKUR office, some Turkish NGOs implemented a project in the provinces bordering Syria, bringing Syrians and migrants together with employers and covering their expenses for six months. An İŞKUR official said such efforts must be led by "large businesses committed to investing in these places and recruiting refugees" to succeed in economically disadvantaged areas.

Thus, Turkish small business owners include an increasing number of undocumented migrants, including street vendors and shops selling electronics or accessories, grocery stores, restaurants, hair salons and bakeries. According to Turkish shopkeepers, these unregistered businesses operate without being audited by tax officials, municipal controllers or health inspectors, giving them an unfair advantage. These educated and STEM-equipped immigrants will be included in the formal economy, expanding this formal economy and making a great contribution to the Turkish economy. Authorities should reduce the bureaucracy required to obtain licenses, reduce registration costs, and make procedural information more accessible to bring undocumented migrant businesses into the formal economy.

CONCLUDING REMARKS

As a result, without a doubt, STEM education is vital in building the productivity of migrants. The prevailing view in the Focus Group has been that the workforce and economy require additional STEM skills and knowledge to support the country's productivity and well-being so that it can remain a competitive one internationally. Also, Turkey needs a serious workforce, and it has been crucial to channel these workforces into the STEM field to meet the human capital demand for this workforce, especially the Turkish people and newcomers.

In this regard, we intended to supply enough time to provide adequate knowledge about STEM skills to prepare the migrants for future employment. STEM programs are seen as a way to help people with migrant backgrounds find better job opportunities, even if they cannot enroll immediately. STEM training also aim to teach immigrant youth to be entrepreneurs offering basic business management skills that encourage immigrant youth to generate business ideas and earn profits according to their interests. For migrants who choose to pursue a career in STEM without adequate knowledge of STEM-based careers, it will be crucial to encourage their willingness to participate in activities that can open awareness and knowledge about STEM careers.

And STEM Education must continually evolve and help young immigrants become more competitive locally and globally. Thus, these people can become more competitive, especially in Science and Technology, but also in Engineering and Mathematics using advanced concepts and topics.

This ASSETS survey hopes to shed light on the motivation, interests and career paths of people with migrant background seeking for a basic knowledge in STEM field. In addition, this research revealed the lack of studies on the career path of immigrants who want to take STEM education and emphasized the interest in making a career in the STEM field, aware of the importance of producing more STEM-oriented immigrant workforce in the country.

ITALY

INTRODUCTION

In 2019, Italy had a population of 60.359.546, of which 5.255.503 people had a foreign origin, with the majority coming from non-EU Countries. According to the tenth annual report about the job market for foreigners in Italy (2), non-EU migrants accounted for roughly 3,7 million. The same report showed how in 2019, the employed population was around 23 million, out of which about 820 thousand were migrants coming from the EU, and almost 1,7 million were coming from extra-EU Countries.

Scientific and highly intellectual specialized professions accounted for 7.5% of jobs within the youngster population aged 15-29. Europeans and non-Europeans, respectively, 1% and 2% of migrants were doing those professions, unlike Italians who had a percentage of 8,3%. Considering other “Technical professions”, the percentage of EU and non-EU migrants accounted for 7,9% and 4,1%, against 18,4% of Italians. It can be said that in percentage, STEM jobs, here considered to lie within the categories of “technical professions” and “Scientific and intellectual highly specialized professions”, are more likely to be undertaken by Italians than by European migrants, and lastly by extra-EU migrants (2).

According to a study concerning the professional and educational needs of migrant workers (3), the request for foreign manpower in the firms among the leading industries calls for a higher demand for workers with low levels of specialization, such as professional qualifications and high school diplomas. This is especially true for the tourism sector. Nonetheless, between 2017 and 2019, it has been registered a constant increase in the newly employed migrants in big professional groups toward higher qualified professions. For example, migrant "directors, technicians and highly skilled employees" increased from 43 to 67 thousand, with an increase of 55%. Similarly, Italians employed in the same years also increased, but lower (from 19,1% to 21,3%). Although degrees are not the qualifications required the most for migrants to get a job, the report also shows how most graduated migrants may be employed in "technical professions" and in "Intellectual, scientific and with a high specialization professions" (3).

The project "ASSETS" aims at developing relevant and high-quality skills and competencies related to STEM (Science, Technology, Engineering, and Mathematics) for the indirect target group of second generations migrants (aged 21+) who are facing difficulties in terms of access to jobs.
To do so, project partners undertook a "needs analysis" for migrants concerning STEM skills. The process started with a focus group, which will be further developed in this report. All target groups of the project, which are both adult educators and young migrants, participated in two different focus groups. The results are to be used to develop a training curriculum. 7 young adult participants, between 21 and 26 years old, from Greece, Nigeria and Gambia participated in the Migrant Focus Group. 5 participants between 40 and 60 years old living in Italy permanently for several years (of which one participant with Burkina Faso origins and one coming from Ukraine) took part in the Adult Educators Focus Group.

FIELD RESEARCH: QUESTIONNAIRES

General Information about Respondents

7 young adults between 21 and 26 years old took part in the Migrant Focus Group. They came from Greece, Nigeria and Gambia, but they all currently reside in Italy. One is in Italy as a volunteer through the "European Solidarity Corps" program, most of them work and some are currently unemployed. The jobs mentioned are assistant cook, employee in a car rental agency, and operator in the field of adult migrant services.

Some of them, besides working, are studying to obtain a high school diploma or a University degree. The study paths favour technical and professional institutes for surveyors; University faculties of engineering, or social and health services.

The Adult Educators Focus Group involved 5 participants between 40 and 60 years old. All of them have lived permanently in Italy for many years but one participant has Burkina Faso origins and one comes from Ukraine. The study background mainly concerns humanities subjects with a focus on the fields of Sociology, Sociology of Communication, African Studies and Educational Sciences. They carry out activities as sociologists and educators. One participant studied Engineering in his home country and was employed as a researcher. In Italy, he works as a cultural mediator at an Employment Center and is president of an association that supports migrants.

Information about adult migrant's situation in the labour market and the existing education opportunities in the STEM field

The educators who participated in the focus group agreed that the context in which they work is the so-called "low threshold", in which the target is made up of adult immigrants or young adults with objective difficulties. Those difficulties include, for instance, coming from a context with a low schooling threshold in their country of origin (such as those arriving from Africa or Middle Eastern countries). In these cases, it is necessary to keep in mind that in addition to an individual maturation time, there is also a pre-literacy need because of a lack of fundamental skills to "read" a new culture, a different communication and behaviour code to understand procedures, new technologies and their applications in everyday life. Some have an advanced level of education and when they arrive in Italy, they manage to complete secondary studies. These people are supported in a career orientation path, and some have access to university education. Those people, however, represent a small part.

According to educators, for most migrants, it is tough to promote their skills through a Curriculum Vitae without help. In Italy, Employment Centers are coordinated by regions and help people enter or re-enter the labour market, giving advice on how to write a CV that will be inserted in databases and kept online for 60 days.

Furthermore, these centres offer short seminars that explore key topics to accompany people into the job market, for example, by explaining keywords and qualities to highlight based on the position they are applying for or by teaching how to perform job interviews working on self-awareness and body language. These seminars address issues that would be very difficult to explore without help for an immigrant.

Furthermore, it must be noticed that previous work experiences or academic paths in their Countries of origin are not often considered. Migrants with a high-level qualification, such as a degree, encounter many difficulties in obtaining recognition of their qualifications in Italy. Educators think it is necessary to emphasize the talents of these people, enhance their skills and promote their qualities. If these talents are not nurtured, there is a psychological and cultural breakdown risk.

According to educators, it would be necessary to build an integrated system, a path for progressive steps for those who arrive in Italy as migrants. The first step of this path should involve “reading” the new culture by explaining cultural and communication codes, teaching the language and providing the first “computerized hot spot" as soon as migrants arrive in Italy. Educators emphasize the importance of pre-literacy to start several procedures to obtain documents (Identity Card, Health Card, all the documents accompanying the residence permits, contracts, utilities etc.). Although many administrations are trying to streamline bureaucratic procedures and many steps are done through IT platforms, migrants need to be able to understand the procedures and access the platforms.

An integrated system should then involve the public school, and migrants should have access to a range of training offers that produce recognized qualifications and titles that can therefore be spent, educators say. The task of the public school should be to promote and implement training courses also in STEM areas by offering incentives for participation. The incentives should function as “good bait”, for example, a more extended residence permit. The system of incentives should be studied carefully through an institutional effort that is lacking today.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

According to migrants who participated in the focus group, there is a difference between rules and reality in Italy. Some immigrants do not speak any other language than their mother tongue and sometimes it is hard to communicate with them. Racism is intense in Italy and it is hard to find a job for immigrants. The lack of jobs and support results in psychological problems for them.

When migrants think about ´´relevant job positions´´, they think first about what allows them to have a certain economic independence and, simultaneously, a position that makes them feel comfortable and have new experiences. Others think of a job combining two main elements, namely what they like to do and what they are good at, but they feel that in the labour market, there are few opportunities to combine these elements.

Furthermore, one identified problem is that the educational system produces potential workers who are equipped with a skill set, while in the labour market, employers require different sets of skills, which represents one of the biggest obstacles. This is true for the migrant from Greece with a Greek degree. In the respondent's opinion, the Greek educational system is not producing labour that is equipped with the appropriate skills required in the labour market. Universities do not prepare people for entering the labour market; they only provide theoretical knowledge. Once people finish their studies, they are unemployed due to a lack of practical skills. Furthermore, traditional training courses do not prepare us to face some challenges, such as how we adapt to work for environments and companies, how to maintain good relationships and working environments within the company, how to work in a team and how to be a good employee.

Coming back to the educators' focus group, one of the significant obstacles that they report that is often underestimated is to consider that migrants often come from cultures with a different educational methods. As a matter of fact, they do not learn subjects such as mathematics with the same Italian or "western" system. It is important to consider the difficulty of an adult to get oriented between cultural differences and a different logical method conveyed in a different language with a different communicative code.

Underestimating the importance of these fundamental aspects when implementing educational strategies risks producing systemic racism. Another example that educators make is that migrants often know how to use the telephone but are in deep difficulty in front of the keyboard of a PC. This happens because the Italian keyboard is organized differently from what they are used to, which becomes an obstacle.

A further obstacle to implementing these strategies is understanding a process and following a procedure. In this period of the pandemic with distance learning, educators have discovered that only three out of ten students can use new technologies independently, as students need assistance in creating an account and logging in. When migrants do not fully understand a procedure, they sometimes do not express it because of a mechanism of intercultural embarrassment, which is triggered when something is difficult. Peer-to-peer education may be necessary in these cases, as most skilled migrants help their friends or compatriots, although sometimes it is instrumental help as they get paid to do it.

Many public bodies are trying to streamline procedures and new technologies can be used to streamline even more. Still, it is necessary to take informatics literacy courses because there is no approach to technology and awareness.

Adults with migrant backgrounds interested in training to develop a STEM-related career through STEM skills and competences

The migrants who intervened offered their personal points of view and agreed that the Covid-19 pandemic has made these skills more necessary than ever. Migrants recognize STEM skills as crucial to their carrier paths regardless of the individual jobs. Some sentences have been extracted from the focus group and have been written below:

- "I would like to develop a framework of these skills and how I can comfortably use these tools that create the output and make things faster and easier. All of these are crucial skills and tools that can help you find a job more efficiently. Or upgrade, change positions or whatever. "
- "Personally, learning technical skills would help me more in the future and develop my career path".
- “I am looking to develop my IT skills and am currently writing a new project on this and am looking to learn more about programming. This is my goal for now and I am sure it will pay off soon”.

General comments by educators

What emerged from the educators' focus group is that rethinking the whole system, from the reception to the insertion in the labour market, would be helpful since today's rules of marketing result in many single courses but not an integrated and recognized system of education for migrants.

More than "integration", it would be helpful to promote "interaction" firstly between public entities. It would be important to share the information between public administration bodies to allow the office workers to help people access the labour market and recognise their workers' rights. If databases are networked between PA bodies, that will be enough to streamline bureaucracy.

Educators believe Italy is far behind in terms of information technology and innovation compared to other EU countries. Reasons for this underdevelopment are political, as funds allocated for computerization and services for migrants have been lost, and Italy is investing less in education.

CONCLUDING REMARKS

In conclusion, we can observe how both groups of migrants and the group of educators pay attention to the problematic condition of adult migrants who arrive in Italy due to their poor basic skills. For example, they only speak their language, have lower levels of education, and have difficulties with keyboards or laptops due to the different way they are built in their Countries of origin.

Furthermore, migrants often come from cultures with different educational methods and do not learn subjects such as mathematics through the same Italian or “western” system. When it comes to procedures, they are sometimes unwilling to show their difficulties due to intercultural embarrassment. It is, therefore, necessary to provide them with pre-literacy courses and support to get to know the host country's culture, as well as informatics literacy courses to approach technologies.

From the first steps, the fundamental aspects of the STEM competencies that should be promoted concern computer skills and knowledge of new technologies. These are useful for the migrant to communicate with the Public Administration and to produce the necessary documents from the first moment of his arrival.

Furthermore, IT skills are recognized as transversal skills useful for reaching relevant positions in all career paths. An integrated system of services to support immigrants should also complement the training courses on STEAM Competence with a support path to job placement to reduce obstacles to entering the labour market.

SWEDEN

INTRODUCTION

Sweden hosts nowadays roughly 10 million inhabitants. According to OECD, "in 2013, close to 16% of the Swedish population were born abroad". This number means that 1.78 million inhabitants of Sweden were born abroad, and roughly 536,000 are second-generation immigrants whose parents were born abroad and were present in the country.

This amount made Sweden one of the countries with the largest foreign-born population among the OECD countries.

The country has always hosted immigration flow.

In 2015, Sweden received 163,000 refugees; within these groups, the majority of people came from Syria, Iraq and Afghanistan. Within this flow, there were approximately 70,000 minors under the age of 18 years.

This multiculturalism had and still has an impact on everyday life in Sweden, from the labour and housing markets to its culture and educational system. Integration is not always easy and the country has faced several challenges, including segregated housing, school segregation, and a widening social gap between ethnic Swedes and migrant minorities.

The challenge was also confirmed by a review of the Swedish system for labour market integration of migrants conducted in 2004 by the OECD. The outcomes were unfavourable in an international context and some measures were recommended as a way to improve it. In particular, it stressed the importance of working on enhancing language and vocational training and giving a clearer labour market focus to integration policy.

Many changes have happened since then at the policy level. Already in 2010, a new law took place intending to support integration in the labour market through the realization of introduction activities addressing the newcomers. New programmes started to be in place, ad much has been done, but many spaces of improvement are still available.

The methodology

An important part of the need analysis was realized by each partner through the organization of focus groups. In Sweden, focus groups have been organized online through the zoom platform. The first focus group involved 5 migrants resident in the country. The group was composed of people between 21 and 40 years old. The second focus group involved 5 educators and social workers. In this case, the age range was between 30 and 45 years old.

The two focus groups started with a general introduction and with a brief presentation of the facilitators and the participants. Then, the discussion started and continued around the primary guiding questions identified by the partners. For the two focus groups, we prepared a jamboard containing the guiding questions to support the process of communication and discussion. The use of jamboards opened the possibility for the participants to add any comments at any time during the discussion. Focus groups lasted for two hours and a video recording was made for internal purposes

Example of the jamboard

FIELD RESEARCH: QUESTIONNAIRES

General Information about Respondents

As indicated in the previous box, participants in the focus groups ranged in general between 21 and 45 years old. In general, there was a good gender balance between the two groups. Participants had different backgrounds and all of them lived permanently in Sweden. Most participants were connected with associations dealing with inclusion topics and environmental protection.

Information about adult migrant's situation in the labour market and the existing educational opportunities in the STEM field

The discussion about the labour market was focused on two main points:

- The request in the Swedish job market field for professionals figures in the field of science and technology;
- Difficulties in accessing the job market for migrants relate to the language and the need to follow formal education paths.

Despite many successful stories, many migrants encounter linguistic barriers and difficulties with the local bureaucracy, which tends to discourage them.

The general concern is that "in Sweden, there are not so many opportunities as we think - the market is small (10 million people) and people are fighting for jobs.

A good part is represented by the Educational system, which is free of charge for residents and European Union citizens.

The term STEM was not well known by all the participants. Some of them had never heard about it. A small group of participants was instead familiar with the STEM concept. After framing STEM the discussion was focused on the availability of programmes for STEM competencies in Sweden. The main point that emerged was that the availability of courses is linked to schools of universities. This means that it is not easy to access to courses for STEM competencies.

One of the exceptions to this was made by some courses for coding for women - also for minorities (called Pink programming). The course included many women, among which migrants. The course had already proven its effectiveness, indicated by the fact that many participants who started with no tech background are currently working in the field. Access to the course is also easy since it requires an application, and applicants are directly contacted by the association promoting the course. The main characteristics that make this course a good practice are: accessibility, language, and no link to a formal school system but provided by an association.

During the focus group, a participant shared a direct experience with the course knowing "some women who have taken part of this course, and it's been useful".

The main need that emerged from the discussion was to increase the offer of courses (not linked to universities and schools) to acquire competences in the STEM field which match with the needs of the job market. A second need emerged is related to sharing information concerning the existence of courses which can improve the chance of finding a job. Courses availability is not publicised correctly, reducing the possibility of joining courses.

"I Have friends who have taken part in these programs, and a key challenge is that most of the people have low self-esteem but the main problem it's the lack of information".

Another interesting good practice shared by the participant concerns a programme for social workers. The programme consists of a combined path in which first the learner can study the language and then acquire competencies related to the job field. The programme has been conceived to support newcomers.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

Discussion of challenges and obstacles determined the raising of main points, listed below:

-policy and bureaucratic system in Sweden. Each individual who wants to join a course needs to look for the information by him/herself and be independent ("they're not used to it");
-The new environment, language, system (adapted to the Swedish society, not to the migrants), society;
-obstacles to convalidation and recognising migrants' certificates in Sweden. They need it to continue their educational path;

- economy is a problem, working in the field you've studied or you always wanted to work with is not possible;

An additional challenge identified was low motivation linked to low level of self-esteem. According to the participants, to address this challenge it could be useful to identify testimonials from people who have attended one of the programmes mentioned above and see the market opportunities. Networking is also important, in this sense creating meetings to share stories, explain courses informally and share coffee together helps people to come closer to the opportunities.

Participants also underlined the existence of organisations and centers dedicated to help migrants. These same organization in partneeship with institutions organize courses for migrants such as “Welcome to Sweden” / “How to become Swedish?” – in which basic information are provided.

Sharing some personal stories help to understand how challenges are a combination of external and internal factors. Here are some examples:

“When I arrived to Sweden was difficult for me because I didn’t know the language I was on high school but when of my sisters get sick after giving birth to twins and I had to struggle between caring for my family or going to school, so I had missed many classes, so my teachers told me I can’t continue like this because I had to choose between family or school so I asked them to let me fail but quitting was worse because I wouldn’t have any knowledge and would be harder for me to retake it. In the end they allowed me and I succeeded, it took me one year and a half for basic understanding. Learning the language depends if you already know any other language.”

“My biggest challenge is still going, I live alone because my mother went back to Africa, and it was a big challenge because I was used to having her home to do everything that needed to be done ready. I was used to have a home full of people always because of her, and when she left I remained completely alone, so the first months I felt really lonely, I felt alone, at the beginning I was going to my friends' homes to sleep, then I need to start learning how to cook, how to manage finance because I had to start paying the bills and so on. After this situation you have learnt that you have the resources, you just need to have the time to do it.”

For me I came alone with 18 years old, so with nobody, not knowing the language anything, I didn't even know how to cook, so I needed to learn everything, but the biggest challenge was coming without relatives, completely alone facing a lot of problems and was hard to don't go back home, then I met a Swedish family and they help me and then I have to learn the language and after facing reality I success, now it's 12 years that I'm living and working here helping other to face the same challenges."

"Migrating to another country it's always hard, for me it is hard because I had some mental problems. I felt scared, and depressed. I started the Swedish initiation program that helps adults to study to learn the language so you can have your diploma, it was hard because I hate everything, my classmates, so the only thing I did was read and pray and finally, I found the solution and things started to be easy. I just changed my focus on how I can get over this situation. Usually, home sickness it's hard because you don't have your role models, but then I took the initiative to create an association to have mentors and help others to face the same situations I had. I solved my problem by helping each other, which helped me grow.

Adults with migrant backgrounds interested in training to develop a STEM-related career through STEM skills and competences

All the participants agreed on the importance of acquiring STEM competencies. The general concept was that "they're tools to get a better job" and this is very important in a context in which the level of competition is high. STEM competencies are also related to the acquisition of soft skills which are not only linked to the specific working field but can be useful for everyday life and working in a different field (they are transversal). So, for many participants, basic STEM should be available for everybody.

Indeed, participants underlined some crucial aspects to improve and develop their careers and they are related to creativity and problem-solving, be able to analyze situations, critical thinking, team creation and team management.
They are all very open to learning and conclude with some final thoughts connected to what STEM can support:

"If you are open to learning, you can learn from everything everywhere".

General comments

The possibility of getting a good job position in the Swedish job field is linked to a mix between personal skills and external factors.

Many people agree that there is no right moment to try but “it's always a good time” examples provided for that are “Right now only if you are selling masks you can success, now it’s hard to start up something but you need to know your market, the needs, and nowadays they are very detailed and thorough.” I wouldn’t do it.

Another general comment that emerged is related to the concept of integration which is broadly linked to getting a job but should also be linked with the possibility to take part to activities such as for food lessons, football, and cultural nights.

Together with having a job also, side activities are essential to make people feel integrated into society.

At the same time, other kinds of activities are important such as workshops, conferences, meetings, etc. This enhances the possibility of networking.

CONCLUDING REMARKS

In general, people are interested in getting competencies connected with STEM education, even if many of them do not identify it as such.

Swedish context is advanced in terms of services for education. Students can enrol for free and the possibility of having a scholarship is very common. The job field instead is highly competitive and the majority of requests concern professionals involved in the technological and scientific field. For professional figures, a specific diplomas are required. Concerning migrants' situation, even if there are many successful stories, a large portion of people are experiencing problems and difficulties integrating. Factors that determine this situation are due to a combination of a systemic and personal issue.

The first difficulty is linked to the Swedish language and the second, still relevant challenge, is linked to the bureaucratic system with which most people are unfamiliar. These two aspects reduce the opportunities for migrants to find a job or to join a course to acquire competencies. The lack of information concerning opportunities further increases these challenges.

These factors often combine with individual situations such as the difficulties to live in a foreign country without relatives. The combination of all these factors reduces self-esteem and motivation.

Addressing this situation is crucial to support an integration process which favors individuals and society in general.

To achieve these goals, starting from existing good practices could be crucial and favouring the creation of partnerships which could spread information and create a supporting system. In general, the acquisition of STEM competencies is welcoming and linked to the job field and everyday needs. For this reason, accessible education offers should be increased and maintained.

REFERENCES OF THE SWEDEN REPORT

Finding the Way: A Discussion of the Swedish Migrant Integration System, OECD 2014- https://www.oecd.org/migration/swedish-migrant-intergation-system.pdf

Migration and Education in Sweden: Integration of Migrants in the Swedish School Education and Higher Education Systems- https://nesetweb.eu/wp-content/uploads/2019/06/Migration-and-Education-in-Sweden.pdf

International migration outlook 2019- https://www.oecd-ilibrary.org/sites/8c1a5832-en/index.html?itemId=/content/component/8c1a5832-en

GERMANY

INTRODUCTION

On the labour market ,adults with own migrant experience are structurally discriminated. Factors that contribute to lower income on average for both migrants with their own migration experience and migrants of 2nd and 3rd generation are situated both on the side of the employers, that prefer German applicants and filter by name and appearance, and public institutions of schools and unemployment office, that perceive migrants as less able based on cultural differences and language usage.

As a result ,both school grades and support for job seekers sets migrants on a path into non-academic fields and even a secondary, low pay, precarious migrant labour market.

Adult education programmes that receive funding by the state or rather the federal states in the German welfare system are directed at preparing low-qualified migrants for precarious job training, e.g. as nursing assistants rather than nurses, truck drivers, machine operators or mechanics rather than engineers.

We conducted a Migrant Focus Group and an Adult Educators Focus Group. Both were held online due to COVID-19 restrictions.

To reflect on the issues faced by different groups of migrants, we included migrants with own migration experience as well as 2nd generation migrants. To allow for equal number of men and women in the group we increased the number of participants to 6. The migrants were aged 18 – 45 Adult Educators Focus Group had a group size of 5 and included 1 school teacher working with migrants and 4 adult educators aged 25 – 39.

FIELD RESEARCH: QUESTIONNAIRES

General Information about Respondents

Migrant Focus Group
Group size: 6
3 migrants with own migration experience
3 2nd generation migrants
Ages 18 – 45
Gender: 3 male 3 female

Adult Educators Focus Group
Group size 5
1 school teacher
4 adult educators
Ages 25 – 39

Information about adult migrant's situation in the labour market and the existing educational opportunities in the STEM field

In the labour market, adults with their own migrant experience are structurally discriminated. Factors that contribute to lower income on average for both migrants with own migration experience and migrants of 2nd and 3rd generation are situated both on the side of the employers, that prefer German applicants and filter by name and appearance, and public institutions of schools and unemployment office, that perceive migrants as less able based on cultural differences and language usage.

As a result both school grades and support for job seekers sets migrants on a path into non-academic fields and even a secondary, low-pay, precarious migrant labour market.

Adult education programmes that receive funding by the state or rather the federal states in the German welfare system are directed at preparing low-qualified migrants for precarious job training, e.g. as nursing assistants rather than nurses, truck drivers, machine operators or mechanics rather than engineers.

Examples for directed support in vocational rather than academic and scientific fields are:

1. Young Refugees into Labour

   Organisation: National Labour Office support programme

   Target Group: Refugees under the age of 25

- Preparing Refugees for work in a vocational traineeship
- Finances for companies that hire young refugees as trainees by the national employment office by reducing the social security contributions for these employees and offering support for additional training needs.

2. IQ Netzwerk / Mission Future – Environment Craftmanship

   (de: Mission Zukunft Umwelt Handwerk)

   Organisation: Chamber of Crafts / IHK Hamburg

   Target Group: Migrants (1st and 2nd generation) that work below skill and qualification level

   Bridging Measures for underqualified working migrants into professions:

- Building technician
- System mechanic
- Electronics technician
- Refrigeration and air conditioning technician
- Contents of Trainings:
- Technical Language
- Practical
- Excursions to Companies
- Supported Application Procedure

3. One Day German – in the care sector (de: Ein Tag Deutsch – In der Pflege)

   Organisation: Passage gGmbH

   Digital Format for acquiring technical language for the care sector

   App that worked with professionals to collect realistic every day language required from care workers in Germany.

   Dialogues are made accessible through

- Visual form (Cartoons)
- Written form
- Spoken form

And trained with vocabulary and contextual exercises and tests

To fight structural discrimination a new Programme for Intercultural Training for Companies and Public Institutions started in 2020 and financed by the Federal agency for migration and refugees.

Challenges/obstacles that Adult migrants face to establish a career in the STEM-related professions

Migrants in our focus group describe structural and individual obstacles to establishing a career in STEM. Also there is a difference between adults with own migration experience and inhabitants with migration background, i.e. 2nd generation background.

For adults with own migrant experience:

1. Degrees and qualifications from sending country are not accepted or are connected to a different job profile in the receiving country Germany
2. Lack of programme and opportunities to acquire the needed qualifications for adults that have acquired school education in a foreign country, i.e. only job experience in the receiving country Germany qualifies as entry requirement for a related university degree, e.g. engineering for former engineers or mechanics.

For 1st & 2nd generation migrants

3. Discrimination by employers in not anonymised application procedures
4. Discrimination and racial profiling of public employment agencies & job training measures towards the secondary migrant labour market

Only 2nd generation migrants

5. Unfair grading of STEM subjects based on language skills, rather than technical ability and scientific understanding

Adults with migrant backgrounds interested in training to develop a STEM-related career through STEM skills and competences

Migrants with job experience in the STEM field in the sending country…

6. Crave the opportunity for on-the-job learning to experience the differences in their field first hand
7. Find it sensible to build upon their qualifications rather than beginning training in a new field

2nd generation migrants…

8. See formal qualification in STEM as a way to prevent ending up in the secondary labour market for migrants.
9. Are interested in technical subjects but prefer vocational training to university training.

Comments and personal opinion

Participants welcome new, digitally accessible forms of qualification in the stem field.

CONCLUDING REMARKS

Barriers and needs of migrants in STEM fields may vary according to the generation. All generations are facing or have to face discrimination and difficulties in integrating classic educational paths to build a career in STEM, either of the lack of opportunities offered and or the language barrier. It has been highlighted the need of adults to use professional paths such as Work Based Learning methodology to develop their skills and potentially build a career in one of STEM fields.

RESEARCH REPORT: COLLECTION OF GOOD PRACTICES

LATVIA

Name	**Migrant talent Garden (Migrantu talantu dārzs)**
When	01.10.2018. - 30.09.2022
Where	Project partners are from Croatia, Bulgaria, Lithuania, Greece, Norway and Iceland.

Who	Lead Partner: Active Youth Association, Lithuania Partners: • Hemus Technologies, Bulgaria • Zagreb Entrepreneurship Incubator, Croatia • European Institute for Local Development, Greece • Baltic Arab Chamber of Commerce (Shelter "Safe House", Latvia • Reykjavik Red Cross, Iceland • Caritas Norway
Objectives	The aim of the project is to involve migrants aged 15 to 29 in creating businesses, including providing support to this target group and knowledge of national laws and conditions for setting up their own businesses. It is planned that the project will create an e-platform for business support, which will provide online opportunities for participation in the training program, as well as information on the regulatory base for starting a business in each project member state, as well as the establishment of business incubators for migrants in each of project countries.
Stakeholders of the project	• Young entrepreneurs of migrant background • Asylum-seekers
Beneficiaries	Target groups of the project are young entrepreneurs of migrant background and asylum-seekers. As the project is still in implementation, total reach of the project activities is not known.
Financing	The project is funded by Iceland, Liechtenstein and Norway through the EEA and Norway Grants Fund for Youth Employment. Amount of financing is not public.

Description	The project partners will study what is being done on entrepreneurship support in Europe today and create a business support network and training programme. In addition, they will set up an online platform and local centres to support and train young entrepreneurs with migrant background. This will help migrants develop their own business ideas and create new jobs.
Results achieved	These are planned results for each individual that would want to get support: • All participants will be given consultations with professional mentors • 12 theoretical and practical trainings with top lecturers to perfect your business skills. • Business needs networks; thus, you will be granted access to specialised networking events • Fully-equipped working space for all businesses in the programme
Innovation	Development of online training materials for business development
Empowerment	The main empowerment of the project is that it creates tools and possibilities for migrants to try to start their own business which in other words is to
Website	https://startbusiness.today https://eeagrants.org/resources/fund-youth-employment-project-factsheet-migrant-talent-garden
Contacts	https://startbusiness.today/contacts_latvia/

Name	**PRIME - Promoting Integration for Young Migrants**
When	The project has been implemented from the 1st September 2017 until the 30 August 2019
Where	Municipalities of Riga and Balvi in Latvia and Municipality of Linkoping Sweden
Who	NGO “Radošas Idejas”
Objectives	The project addresses the challenge posed by the social and economic exclusion of young migrants through the joint development & delivery of a holistic approach which will use a range of tools & interventions to promote integration which can be tailored to individual needs.
Beneficiaries	Target groups: migrants looking for job opportunities
Financing	Project is financed by the Central Baltic INTERREG programme (74%) and the Latvian state budget (5%). The Ministry of Culture of Republic of Latvia supports and co-finances the implementation of the project with a co-financing of 3748,00 euro.
Description	The project is implemented by the Research and Development Centre of Municipality of Linkoping (FoU Centrum, Linkopings kommun), Sweden, and Creative Ideas. The project includes mapping of the needs/barriers faced by young migrants in 2 regions and lessons learned from existing integration programmes, and establishment of regional partnerships/support networks including representatives of municipalities, training providers, employers and communities with high concentrations of young migrants.

	A joint training programme will be developed with a range of options, including informal education (including creative / sports activities) to support engagement, cultural/language training, vocationally specific training, job brokerage & workplace mentoring. The training programme will be piloted by recruiting & training 50 young migrants, 30 in Sweden and 20 in Latvia. The piloting will be evaluated, including a survey of young migrants participating & of stakeholders in the regional partnerships.
Results achieved	75 migrants in Latvia and 30 in Sweden has been integrated in the local job market. PRIME learning in Latvia has reached 719 hours – 214 h Latvian Language, 56 h Latvian culture, 55h Entrepreneurship, 112 trainings for development of self identity and 11 young migrants received mentoring of 160h in their potential working places (hotels of Riga).
Innovation	At the moment of project implementation one of the innovations where that training was done in small groups thus increasing the efficiency of it
Empowerment	Impact of the project is being achieved through integration of migrants in the local environments as well as through training their work capacities in the tourism sector and entrepreneurship.
Website	http://www.creativeideas.lv/en/projects/prime-promoting-integration-for-young-migrants-2018-2019/
Contacts	Alise Vitola, +306971710794

Name	**Training material and programme for social and business entrepreneurial competence development by virtual learning methods for multinational and multicultural groups, and recognition and validation of the acquired competence**
When	Start: 02-10-2017 – End: 01-10-2019
Where	Latvia, Lithuania and Italy
Who	Coordinator – Baltijas Datoru Akadēmija – a STEM field oriented organisations (teaches ICT to adults), Latvia Partners: • Social – educational initiatives centre Plus, Lithuania • UAB "Baltijas kompiuteriu akademija", Lithuania • Associazione caritative diocesana "Giustizia e Pace" onlus, Italia • Training 2000 psc, Italia • NGO "Shelter "Droša Māja"", Latvia
Objectives	The main aim of the developed training guideline is to define approaches and methodologies in order to support migrants and refugees in arranging their own training on social and business entrepreneurship and project management. This guideline can also be used by teachers and coaches to arrange training for migrants and refugees.
Financing	Erasmus+ 2017-1-LV01-KA204-035469 EU Grant: 170696 EUR

Description

The developed project training platform includes country-specific, easy-to-adapt study materials in English, Latvian, Lithuanian and Italian language, and information regarding the project itself and project partners. As this training platform will mostly be used by the NGO partner organizations (responsible for the sustainability of the project results) after the project is closed, also, their contact information is available in case some of the visitors of the training platform have questions regarding the available training solutions. On this platform, all the interested parties will also be able to find not only the training materials but also all the other aforementioned intellectual outputs of the project.

The main aim of the developed training guideline is to define methodologies in order to support migrants and refugees in arranging their own training on social and business entrepreneurship and project management. Teachers and coaches can also use this guideline to arrange training for migrants and refugees.

The testing methodology describes the methodology that must be applied to carry out the testing phase, from the beginning to the evaluation report. It provides instructions, timing and objectives useful for the project partners, the trainers and coaches, and the migrants and refugees involved in the testing phase to perform the tasks assigned.

Also, guidelines for mentoring were developed during the project, describing not only the stages of mentoring but providing information, for instance, on such topics – who can be a mentor and what skills and experience is required. The developed training pr–gram consists of 8 modules created for individual, remote learning online. The program can also be easily adopted for classroom training.

	Some of the offered modules of the training program – "business forms", "Taxes" and "Support opportunities" – are localized for Latvian, Lithuanian and Italian audiences, thus providing an opportunity for a deeper understanding of the country's business environment.
Results achieved	1. Development of virtual learning environment platform; 2.Methodology and guidelines for working in a multicultural environment 3.Training materials, training program, competency assessment tests The project had to prepare educators that will lead this training course to migrants. During the piloting phase 36 migrants were trained. All project results are described here: https://ec.europa.eu/programmes/54rasmus-plus/project-result content/aaac7bfc-313b-4e2e-8175-9bbf9553f50d/Project_overview.pdf
Innovation	Project completely focus on how to develop ICT related learning materials in the digital forms
Empowerment	Strengthening ICT skills, especially for migrants, as part of success to find a favourable job positions.
Website	https://ec.europa.eu/programmes/54rasmus-plus/projects/eplus-project details/#project/2017-1-LV01-KA204-0

GERMANY

Name	**One Day German – in the care sector (Ein Tag Deutsch – In der Pflege)**
Where	Hamburg, Germany
Who	Passage gGmbH
Objectives	Training Technical Language for the Care sector Motivating citizens with German as a second language to work in the care sector
Stakeholders of the project	Companies, National Labour Office, Federal state of Hamburg, Germany
Beneficiaries	Migrants (1st and 2nd generation) that work below skill and qualification level
Financing	National Labour Office support programme
Description	App-based digital Format for acquiring technical language for the care sector Developers worked with professionals to collect realistic every day language required from care workers in Germany Dialogues are made accessible through a combination of Visual form (Cartoons) , Written form and Spoken form

	The game presents numerous authentic conversations of everyday work in health care. In additional exercises on communication, grammar, vocabulary and pronunciation the participants internalize the main linguistic aspects of the setting. Vocabulary is then trained with word-based and contextual exercises and dialogue-based tests.
Innovation	Filling technical language gaps through a gamified digital learning programme that is multimedial and based on realistic every day language required from care workers in Germany.
Empowerment	Participants gain the language skills for applying to, training for and working in the care sector.
Website	https://www.ein-tag-deutsch.de/
Contacts	Telefon: 040 766172-0 E-Mail: info(at)passage-hamburg.de Internet: www.passage-hamburg.de

Name	**Mission Future – Environment Craftmanship (Mission Zukunft Umwelt Handwerk)**
When	Since 2018, ongoing
Where	Hamburg, Germany
Who	Chamber of Crafts / IHK Hamburg

Objectives	Inclusion of migrants into stem employment
Stakeholders of the project	Companies, National Labour Office, Federal state of Hamburg, Germany
Beneficiaries	Migrants (1st and 2nd generation) that work below skill and qualification level
Financing	National Labour Office support programme
Description	Bridging Measures for underqualified working migrants into professions: ·building technician ·system mechanic ·electronics technician ·refrigeration and air conditioning technician Contents of Trainings: ·Technical Language ·Practical ·Excursions to Companies ·Supported Application Procedure
Innovation	Filling skill and qualification gaps of migrants through training programmes with the involvement of future employers that are members of the governing association. For ASSETS: the training elements can be instructive, although the format cannot be reproduced. Also, we can consider including contacts to the chamber of commerce or company associations in the mint field.
Empowerment	Participants gain the capacity for applying to, training for and working in the stem field.

Website	https://hwk-hamburg.de/missionzukunft
Contacts	Projektleiterin & Modul „Externenprüfung“ Bettina Ehrhardt 040/35905-690 bettina.ehrhardt@elbcampus.de Modul „Anpassungsqualifizierung im Hamburger Handwerk“ Johanna Reutter johanna.reutter@hwk-hamburg.de 040 35905-408 Modul „Brückenmaßnahme Umwelthandwerk“ Haiko Hörnicke haiko.hoernicke@elbcampus.de 040 35905-776

Name	**Cyber Mentor**
When	since 2005
Where	Nationwide, Germany Coordinated in Regensburg, Bavaria
Who	Universität Regensburg
Objectives	Motivating female pupils with migrant background to start a career in stem. Empower participants to discover and apply their scientific talents. Integrating participants in a network of current and future stem professionals.
Stakeholders of the project	Universities, Companies, National Labour Office, Schools

Beneficiaries	·Female pupils with migrant background. ·7973 Participants in 2021
Financing	National Labour Office, Federal state of Bavaria
Description	Online-Mentoring-Programme in three phases ·“MINT in everyday life”: serves to build up the relationship between the student and mentor and strengthens the group cohesion in the communities. Together with the community, they can get to the bottom of exciting everyday STEM issues. ·“MINT aktiv” encourages communities to do projects like “Why does highlighter erase ink?” Or “How do I charge my smartphone with a pickle?”. “MINT each other” enables a view beyond one's own “MINT horizon”: Here different communities can join together in order to carry out interdisciplinary projects together. ·“MINTblick” phase, the participants reflect on their programme.
Results achieved	75% of participants go on to study or work in Mint Field.
Innovation	Community Based motivation and learning programme for female pupils with migrant background. For ASSET: the community elements of the programme can be instructive, although the format cannot be reproduced.
Empowerment	Participants are motivated to start a career in stem.
Website	https://www.cybermentor.de

Contacts	Prof. Dr. Heidrun Stöger Universität Regensburg Lehrstuhl für Schulpädagogik Universitätsstr. 31 93053 Regensburg Telefon: 0941/943-1700

GREECE

Name	**EU MENTOR STEM** (Creation of a EUropean e-platform of MENTORing and coaching for promoting migrant women in Science, Technology, Engineering and Mathematics)
When	Start: 01-11-2017 - End: 31-10-2019
Where	Bologna (Italy), Budapest (Hungary), Athens (Greece), Bastad (Sweden), Shefield (UK)
Who	Alma Mater Studiorum – Università di Bologna
Objectives	Address: 1. the increasing influx of migrants 2. the gender gap in STEM sectors 3. the disadvantage faced by highly-skilled migrant women in the labor market stemming from the intersection of gender, age and ethnicity
Stakeholders of the project	EU Erasmus plus Key Action: Cooperation for innovation and the exchange of good practices Action Type: Strategic Partnerships for adult education

Beneficiaries	IO1: 57 migrant women (including refugees and asylum seekers) 25 professionals about 270 stakeholder organizations 97 more professionals participated in the online survey delivered by UNIBO IO2+3 :11 partners 60 migrant women 56 professionals IO4: 5587 users acceeded the Hub, 83 enrolled
Financing	Erasmus plus Budget: 284.447 euro
Description	The project aimed to support the labour market participation (as paid employees or as entrepreneurs) of migrant women with a STEM background by: a) enhancing migrant women's soft skills to increase their chances to succeed in the labour market; b) implementing the competencies in mentoring and coaching (M&C) of the professionals (job counsellors, career advisers, educators, social workers, HR staff, etc.) who can intercept this particular category of beneficiaries.
Results achieved	Dissemination activities allowed EUMentorSTEM reaching an impact at the local, regional, national and international level on about 8000 persons Products: Trainer's kit Learner's kit Reports Virtual Hub ·Very specific target group ·Interactive booklet version of the 2 kits

Empowerment	Both for trainers and learners. Aim: support the labour market participation (as paid employees or as entrepreneurs) of migrant women with a STEM background.
Website	https://www.eumentorstem.eu/

Name	**Steps for educational innovation: digital development of our school and implementation of STEM education**
When	Start: 01-07-2018 - End: 30-06-2019
Where	Trikala, Greece
Who	8o GENIKO LYKEIO TRIKALON (8th High school - Lyceum- of Trikala)
Objectives	• Improve ICT innovative teaching skills of our staff through their participation in European training courses • Equip our young learners with the necessary skills so that they will be able to deal with problems using STEM education and take advantage of the professional opportunities provided • Training of the teachers
Stakeholders of the project	Programme: Erasmus+ Key Action: Learning Mobility of Individuals Action Type: School education staff mobility

Beneficiaries	School staff, school students (Exact numbers not available) The dissemination through the overall presentation of the acquired skills in teachers, parents and the local community as well as the colleagues throughout Europe are also considered of major importance and enhance the european dimension of the school.
Financing	Erasmus plus EU Grant: 6915 EUR
Description	The 8th High school (Lyceum) of Trikala is a school unit of general secondary education operating since 2006 in the prefecture of Trikala. 265 students (15-18) are currently enrolled and 25 teachers are employed in the school. Some of our students come from vulnerable backgrounds, such as unemployed economic migrants and low-income or single-parent families. Based on the school's strategic planning, teachers seek effective ways, such as continuing education and implementation of European programs to prepare students for their future European identity and prevent early school leaving by minimizing social discrimination and promoting learning of foreign languages.
Results achieved	1. Training course for the digital upgrading of the school through the use of digital devices in the teaching process. The one-week (7 days) learning mobility abroad aimed at the enhancement of the teacher's digital skills and their incorporation in the teaching process according to the school's European Development Plan. The training activity focused on the utilization of specific models of portable devices in the creation of rich-media materials in the school environment.

	The objectives of the course were enriching digital skills, inclusive learning, safety policy on the Internet, contact with other mentalities and participating in innovative collaborative networks. 2. Participation of the teacher of biology in a 5-day training course for the application of STEM education at school. The training activity focused on the adoption of innovative practices and new technology tools both for teachers and students of primary and secondary education on the field of learning and teaching through STEM (Science, Technology, Engineering, Mathematics) as well as the linking of school knowledge with the real world.
Empowerment	The training course (A1) gave incentives to the rest of the staff to adopt and implement teaching through ICTs and some of them are willing to implement multilateral European partnerships in the future. Regarding the impact on the students, it gave them a chance to familiarize with mobile learning especially in the context of the subject “Creative Projects” and promote language proficiency in foreign languages and sociability skills that will contribute to the future development of their European identity in the context of European and international labour markets. For the A2, the knowledge acquired involved BeeBots/ BlueBots, LegoWeDo2, LegoMindstormsEV3 as well as practical application of robotic equipment and helped our students familiarize with STEM education and digital tools. The creation of the school robotics team and the student participation in robotics competitions as well as in the subject of “Creative subject” can be considered as added value in our school.

Website	EPALE: https://ec.europa.eu/programmes/erasmus-plus/projects/eplus-project-details/#project/2018-1-EL01-KA101-046744

Name	**10 GEL Kilkis is adjusting to a new intercultural and multicultural environment by welcoming refuges and immigrant students from Balcan area and the arabic world.**
When	Start: 01-10-2019 - End: 30-09-2022
Where	Kilkis, Greece
Who	1st GEL Kilkis (high school)
Objectives	To improve cooperation and learning in the multicultural class of heterogeneous student population School staff need to renew and develop their teaching practices in relation to key competences (intercultural education, foreign languages, ICT, development of cross-border partnerships and innovative actions) Preparation of the students for Europe
Stakeholders of the project	Erasmus plus
Beneficiaries	School students and teachers
Financing	Erasmus plus EU Grant: 15478 EUR

Description

10 GEL Kilkis is adjusting to a new intercultural and multicultural environment by welcoming refuges and immigrant students from Balcan area and the arabic world.

1. The first program concerns science, technology, engineering and mathematics, which are essential elements of today's society. In European curricula and educational systems, there is a tendency to integrate these subjects into one approach: STEM. The school is going to embrace this new approach. Tackling early school dropouts can start with offering teaching and learning methods that are more interactive and assigning responsibility to students for their learning process. The STEAM approach hugely enhances student's motivation and overcomes the obstacles of language at the multicultural class.
2. The second program concerns multiculturalism in education and aims at the acquisition of techniques for implementing multicultural management methods and new teaching approaches in a multinational school environment offering realistic solutions to 1st GEL Kilkis which hosts students with different religious, cultural and national backgrounds.
3. The third program explores methods of managing complex long-term projects to foster social cohesion, peaceful coexistence and diversity. It also addresses the concepts of multiculturalism and negotiates ways of avoiding racism and the social marginalisation of vulnerable groups of the student population.
4. The fourth program explores intercultural learning practices aimed at effective classroom communication. It proposes solutions for teachers to design activities aimed at addressing the needs of migrant refugees without disturbing the teaching process.

Innovation	Wholistic approach
Empowerment	The seminar experience will enhance the motivation for intercultural learning and intercultural cooperation and thus school participation in European programs will be more effective. Training will further inspire the teaching staff for European projects, aiming to expand the intercultural, language and social skills of students. The pupils will be able to escape the narrow boundaries of the school. 1st GEL will be closer to meeting the demands of the education of the future by providing continuing training and development opportunities to its teachers and the wider local educational community, and by providing its students with learning opportunities adapted to the needs of the 21st century using modern and innovative teaching approaches geared to a European and global educational environment.
Website	https://argonautes-1o-geniko-lykeio-kilkis.webnode.gr/erasmus/

ITALY

Name	**Pedagogical Resources IN Teaching Science, Technology, Engineering, Mathematics**
When	Start: 01-09-2014 - End: 31-08-2016
Where	Via Alfieri 4 , 43036 Fidenza , Emilia-Romagna, IT
Who	Istituto di Istruzione Secondaria Superiore "A.Berenini"

Objectives	The objectives of the initiative were to develop, carry out and validate training programs and related tools for the transferrable use of 3D printers in secondary schools, to foster pedagogical innovation according to 2 pursued logics: a) the logic of the project work (with a focus on design and applied technology), through which you look at the process of engineering and production of an object: the conception, design, modelling, creation; b) logic of pedagogical experimentation, through which it is possible to print three-dimensional objects that support reflective observation and abstract conceptualization of calculations, measurements and geometric figures (mathematics), magnitudes, motions and forces (physical) particles and structures of organic matter and inorganic (biology, chemistry).
Stakeholders of the project	Istituto Istruzione Superiore "C. E. Gadda" (IT), Kirkby Stephen Grammar School (UK), SABANCI MESLEKI VE TEKNIK ANADOLU LISESI (TR), 1epalchanion (EL), DANMAR COMPUTERS MALGORZATA MIKLOSZ (PL), Evropska rozvojova agentura, s.r.o. (CZ), ASOCIACION DE INVESTIGACION DE LA INDUSTRIA DEL JUGUETE, CONEXAS Y AFINES (ES), Forma Futuro Soc Cons. a r.l. (IT), Cisita Parma srl (IT)
Beneficiaries	PRINT STEM Partnership involves 10 organizations of different and complementary nature: 5 Secondary Schools (2 Italy, 1 Greece, 1 Turkey, 1 UK), 1 VET centre (Italy), 1 training service company of entrepreneurial association (Italy), 2 IT companies (1 Spain, 1 Poland), 1 European Development Agency (Czech Republic).
Financing	259,283 EUR

Description

The project included logical and sequential activities, related to the 5 Intellectual Outputs:

1) Identification, by a panel of experts at the transnational level, of the hypothesis of profitable use of 3D printing technology in relation to specific critical points in the learning curriculum of mathematics and science literacy skills. Delphi method were used;

2) Establishment of a Teachers Team (one for each partner education-oriented) and familiarization of teachers in the subject areas involved in experimenting with 3D printing technology, also with the support of partner technology / business-oriented;

3) Implementation of pupil-led experimentation in project work methods, which aims to cover the entire production process of an object (conception, design, modelling, creation). At least 1 experimentation carried out by each school partner;

4) Implementation of teacher-led experimentation mathematical literacy skills, according to a disciplinary logic of experimental teaching refers to the key ideas and / or mathematical processes and / or contexts/situations scientific. At least 1 experimentation carried out by each school partner;

5) Implementation of teacher-led experimentation of scientific literacy skills, according to a logic didactic experimentation that refers to knowledge, and scientific concepts for the understanding of the phenomena; scientific processes of description, explanation and prediction; contexts / situations in the areas of life-health, land and environment, science and technology. At least 1 experimentation carried out by each school partner. All experimentations have been modelled and released as OER Open Educational Resource.

Results achieved	http://www.printstemproject.eu/
Innovation	The innovation of the project is mainly based on the use of 3D printers for didactical aims in STEM education.
Empowerment	Impacts on schools: innovation of own pedagogical context, improvement of effective didactic teaching of STEM subjects validated introduction of 3D printer use in curricula activities, ten new school-business partnerships with local companies for the carry out of work-based learning experiences with the use of 3D printers, increase in reputation on the territory and increase in several students enrolled in the schools. Impacts on technology/business-oriented organizations: 6 new cooperation with local schools, development of know-how in the development of experimentations using 3D printers for didactical aims.
Website	www.istitutoberenini.gov.it
Contacts	Rita Montesissa , dirigenteberenini@gmail.com

Name	**Do Well Science**
When	Start: 01-11-2017 - End: 31-10-2019
Where	Via Santo Spirito 39, 50125 Firenze , Toscana , IT
Who	ISIS MACHIAVELLI

Objectives	The general objective of the DoWellScience project has been to increase secondary students learning in STEM (maths, physics and natural sciences). The specific objectives were to: - Provide valuable support to STEM teachers in promoting an interdisciplinary and inquiry-based learning approach to increase students' capacity in problem-solving, critical thinking, active research and curiosity towards scientific subjects; - Develop innovative pedagogies for science teaching and learning based on the use of youngsters' most diffused communication and information tools as apps for smartphones and tablets and the web; - Make full use of ICT communication potential to promote among students a cooperative-based and peer-to-peer learning practice to stimulate their commitment to learning scientific subjects.
Stakeholders of the project	UNIVERSITA DEGLI STUDI DI GENOVA (IT), SODERTORNS HOGSKOLA (SE) , Ufficio Scolastico regionale per la Liguria (IT), PIXEL ASSOCIAZIONE CULTURALE (IT), Zinev Art Technologies (BG), Arsakeio Lyceum of Patra (EL) , SPGE "John Atanasov" (BG), UNIVERSITY OF PELOPONNESE (EL)
Beneficiaries	TARGET GROUPS 1/Secondary School STEM teachers - 24 of them directly involved in the creation of the 2 Intellectual Outputs; - 12 among them were involved in the Short-term joint staff training events; - 130 STEM teachers involved in the testing of Intellectual Output contents;

	- More than 100 teachers and policymakers participating in Multipliers events. 2/ Secondary School students The project had an impact on the preceding underachieving results in STEM of a number of around 2 600 secondary school students (considering an average of 20 students per teacher) of the 30 schools involved in the project.
Description	The idea of the project was to act on secondary School STEM teachers by: - Increasing their skills and competencies to plan and adopt innovative methods for motivating students to study scientific subjects through enquiry-based approaches; - Improving their capacities to make full use of ICT teaching materials to raise students' achievements in maths and sciences; - Providing them with didactic content developed through a strong cooperation pattern with academic and technical experts to ensure that the available materials are scientifically and didactically reliable and usable in their real everyday life teaching activities. The project acts as well on secondary school students underachieving in STEM by: - Enhancing their pro-active attitude towards their learning process in STEM using their means of communication, i.e. Web and Mobiles/Tablets; - Reinforcing their problem-solving capacities as a strategic approach to learning STEM issues and motivating them to overcome their difficulties on the matter;

	- Stimulate their willingness to learn through enquiry-based approaches within which they are not only asked to be able to solve the problem but to share, discuss and explain the solution
Results achieved	To guarantee the long-term impact on the aforementioned categories, the DWS project developed two Intellectual Outputs that students, teachers and end-users, in general, can access and use for free from the project portal. The two Intellectual Outputs are: IO1 – STEM Teaching Package The teaching package is a consistent, scientifically and pedagogically validated, innovative and highly transferable set of operative teaching materials. The teaching materials, available according to an OER principle both on the Web App and on 2 dedicated APPs (iOS and Android), use gamification methods. WebApp: https://www.dowellscience.eu/ui/en/index.html iOS: https://apps.apple.com/us/app/dowellscience/id1326841702 Android: https://play.google.com/store/apps/details?id=eu.dowellscience.dowellscienceapp&hl=en IO2 - Manual Manual (https://www.dowellscience.eu/project/-manual.php) has been specifically designed for STEM teachers, academic researchers and policymakers. It deals with analysing and understanding the obstacles that demotivate students in learning scientific subjects. It also proposes how to plan and implement effective strategies to remove those obstacles using the most innovative pedagogic approaches.

Innovation	The project uses gamification in order to stimulate students' motivation on STEM fields and increase their pro-active attitude towards the learning process.
Empowerment	Science education is a key factor for the European economy and society's future competitiveness. This is why, indeed, basic literacy in STEM is a Horizontal priority of the Erasmus+ Programme and one of the benchmarks of the ET 2020 and Europe 2020 well known European Union's strategies. Over the past 20 years, science education has been at the top of the educational policies in most European countries. Such policies usually have a dual purpose: - To promote science literacy among all young people - Attract young people to science in secondary education
Website	https://www.dowellscience.eu/project/index.php
Contacts	www.liceomachiavelli-firenze.gov.it

Name	**NZEB for Enhancing STEM skills and motivating Students**
When	01-09-2015 - 31-10-2017
Where	Piazza Dante Alighieri 13 , 01100 Viterbo , Lazio , IT
Who	Liceo Scientifico Statale "Paolo Ruffini"
Objectives	The general objectives were the following: • Implement processes of education and training using new technologies;

- Reinforce the centrality of the student as part of a flexible educational process to enhance the motivation to learn, the ability to build its training program, a sense of responsibility concerning the future path;
- Decline the teaching of STEM disciplines on concrete and up-to-date issues;
- Deepening CLIL.

The specific objectives of the project were the following:

- Stimulate students' interest towards a knowledge proposed by experimenting with forms of learning on the job in real situations, more stimulating than those simulated;
- Instil skills of self-orientation and train students to have confidence in themselves, and demonstrate initiative, flexibility, and openness to change;
- Acquire skills in the use of a Content Management System and software for the control and calculation of energy loss, data processing, spreadsheets and presentations;
- Teaching students and staff of the school to behave differently and reach a more rational use of energy;
- Solicit institutions to invest in energy saving to free up resources that could be used in projects that enrich the knowledge of the pupils and the teachers
- Develop collaborative learning, utilizing the expertise and knowledge of others (peers, teachers and professionals)

Stakeholders of the project	OSG de Ring van Putten (NL), LPo Le Corbusier (FR), Liceul Teoretic "Tudor Arghezi" (RO), High Private Language School "Leonardo da Vinci" (BG), Joutsan lukio (FI), OZEL TEKDEN FEN LISESI (TR), kerteminde 10. klasse center (DK)
Beneficiaries	The project directly involved ten students from each partner school, of which 30% with fewer opportunities, aged between 16 and 18 years, related to the courses of Applied Sciences in the activities of non-formal learning and based on field research and on the 'application of STEM disciplines to the innovative theme of NZEB. Specifically, 15 events (seminars, lectures and workshops, as well as experiences on the field and on the job) were organized and taught by teachers at the school in collaboration with experts that are part of networks of stakeholders that NESS aims to involve. 40% of seminars were in CLIL. 4 blended mobility were also foreseen, which consisted of 30 days of virtual mobility through TwinSpace and GoogleClass and 5 days of physical mobility in Denmark, Italy, the Netherlands and Finland. The project also includes the integration of the disciplines involved in the programs (Physics, Mathematics, Science and Technical Drawing) of some topics to be covered during the normal teaching to reach students not directly involved in the activities and ensure a greater impact and sustainability.
Financing	306,702 EUR

Description

The project "Enhancing NZEB for STEM skills and motivating Students" is presented by the Liceo Ruffini in partnership with six other schools from Denmark, Finland, Turkey, Bulgaria, Romania, France and the Netherlands. The strategic partnership proposed was focused on three main topics:

1. The teaching of STEM (Sciences, Technology, Engineering, Maths) by analysing concrete problems and current challenges, such as energy efficiency in public buildings;
2. The development of self-entrepreneurial skills, even in general secondary schools, where many students are interested in starting the profession at the end of university studies;
3. Methodological innovation through the use of ICT and learning methods on the field, on the job, cooperative learning and blended mobility.

The methodologies used were:

1. Inquiry-based learning;
2. Learning by doing;
3. Learning on the job and on the field.

The training on the job requires stakeholders inviting classes to make study visits and practical workshops to enable pupils to understand the various concrete applications of the topics they worked on, giving them an outlook for the future choice of university and work.

At the end of the activities, the students acquired skills in STEM, basic and transversal, such as self-employment, skills and the digital English language.

Results achieved	http://www.nzeberasmusplus.eu/
Innovation	To involve students in the analysis of energy consumption while improving their entrepreneurial and STEM skills.
Empowerment	The project aims to produce lasting results cultural approach that both students and teachers could adopt in their relationship with the environment around them, the world of work and teaching techniques.
Website	www.liceoruffiniviterbo.gov.it

Name	**Creation of a EUropean e-platform of MENTORing and coaching for promoting migrant women in Science, Technology, Engineering and Mathematics**
When	Start: 01-11-2017 - End: 31-10-2019
Where	VIA ZAMBONI 33 , 40126 BOLOGNA , IT
Who	ALMA MATER STUDIORUM - UNIVERSITA DI BOLOGNA
Objectives	EUMentorSTEM was designed to address three critical phenomena in Europe: the increasing influx of migrants; the gender gap in STEM (Science, Technology, Engineering and Mathematics) sectors; and the disadvantage faced by highly-skilled migrant women in the labour market stemming from the intersection of gender, age and ethnicity. The project aimed to support the labour market participation (as paid employees or as entrepreneurs) of migrant women with a STEM background by:

Stakeholders of the project	OBUDAI EGYETEM (HU), Greek Women's Engineering Association (EL), WITEC SWEDEN (SE), INOVA CONSULTANCY LTD (UK)
Beneficiaries	In the collaborative assessment phase (IO1), the Consortium reconstructed the training needs of the project beneficiaries through exploratory research that reached – in the five partner countries – 57 migrant women (including refugees and asylum seekers), 25 professionals and about 270 stakeholder organizations; 97 more professionals participated in the online survey delivered by UNIBO. The comparative report (available on EPALE, on the E+ project results in platforms and on the project website), including the 5 national reports compiled by partners and the Final Report on Quantitative Needs assessment, allowed identifying common beneficiaries' needs across the Consortium. Those documents informed the subsequent production phase (IO2 and IO3), which consisted of elaborating a Trainer's and a Learner's kit based on the project beneficiaries' needs and moving from the existing Mentoring Circles methodology developed in 2001 by Inova. In M8, 11 partners were coached by Inova in the training methodology during the Training of Trainers (ToT, C1). The kits were tested through pilot training (EUMentoring) targeting the project beneficiaries. The pilot's implementation (2 rounds of the pilot with two different groups of migrant women; 1 pilot with professionals in each partner country) was carried out between M12 and M17. Overall, 60 migrant women and 56 professionals participated in mentoring. The implementation of pilots allowed the Consortium to revise and finalise the Trainer's and the Learner's kit (available in 5 languages)

Financing	283,529 EUR
Description	Outputs produced within the project: 1) collaborative assessment phase, aimed at increasing the understanding of the training needs of the project beneficiaries (IO1 Collaborative Diagnostic Assessment, led by UNIBO); 2) production phase, concerning the development and testing of training kits for migrant women and professionals (IO2 EUmentorSTEM Trainer's kit and IO3 EUMentorSTEM Learner's kit, led by Inova); 3) virtual engagement phase, regarding creating an online open hub to make available the training materials across Europe (IO4 EUMentorSTEM Virtual Hub for Learning and Community, led by EDEM).
Results achieved	https://www.eumentorstem.eu/
Innovation	The innovation of the project was based on the e-learning solution to answer the increasing influx of migrants; the gender gap in STEM (Science, Technology, Engineering and Mathematics) sectors; and the disadvantage faced by highly-skilled migrant women in the labour market stemming from the intersection of gender, age and ethnicity
Empowerment	Two comparative reports on process, contents and lessons learnt from IO2 and IO3 EUmentoring pilots' implementation are available on EPALE, on the E+ project results platforms and the project website together with the 2 Kits.

	The Virtual Hub (IO4) aimed at disseminating the tested 2 toolkits to a broader, international community. A Moodle E-learning platform was set up, and all partners – drawing on the results of EUMentoring pilots' implementation – adapted the vis-à-vis training and the toolkits (Trainer's and Learner's kits) to their online shape. The two courses (available in 5 languages) for migrant women and professionals include an interactive booklet version of the kits, with additional free resources that offer a complete learning experience and a printable version of the training contents and tools. Users can also interact with them using the forums. The Hub, which is accessible from the project website, was finalized at the beginning of M21 and promoted by the Consortium through different channels (project and stakeholder organizations' websites, press releases, social media, personal emails); by the end of the project, 5587 users acceded the Hub, 83 enrolled. The hub was made available after the end of the project, allowing the project sustainability in the future and a longer-term impact of its outputs. To disseminate the project activities and results, the Consortium organized 5 national Multiplier Events between M7 and M20 (178 participants) and an International Final Conference in Bologna in M23 (67 participants). These and further dissemination activities allowed EUMentorSTEM to reach an impact at the local, regional, national and international levels on about 8000 persons.
Website	https://www.unibo.it/it
Contacts	eumentorstem@unibo.it

TURKEY

Name	**Stem Enhanced Education for Young Adults (S.E.E.Y.A.)**
When	Year 2017 finished
Where	Antalya, Turkey
Who	Youth Opportunities Association (Y.O.A.)
Objectives	The project '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) '' primarily aimed to: -providing an opportunity to jointly work with staff and young adults in developing new methods for developing key lifelong skills and developing intercultural understanding and STEM learning Therefore its primary objectives were: 1. to facilitate participation in interactive learning sessions to develop skills and competencies using ICT; 2. to develop a collection containing the materials developed throughout the life of the project; 3. to develop language and cultural understanding 4. to reflect and identify best practices to share with participating stakeholders and the wider local community during and after the project life; 5. to develop a common platform where adult learners from each associated organisation can communicate and build a strong relationship based on sharing; this will improve adult learners' confidence and also their communication skills which in turn will improve several skills and competencies both personally and professionally.
Stakeholders of the project	·Local NGOs ·LIDOSK ·Local Vocational adult education providers

Beneficiaries	The main target groups were young adults, migrants, unemployed vulnerable people
Financing	Local sources
Description	The project (SEEYA) has considered the four main strategic objectives for the ET 2020 framework and in particular, its strategic objectives of improving the quality and efficiency of STEM education and training and that all local young citizens and migrants need to be able to acquire key competencies and all levels of STEM education and training. Adult education providers have a duty to advance the level of STEM education for their adult learners. Facilitating STEM Enhanced education was key to improving staff and adult learners' skills, increasing their competitiveness in a competitive economic climate. The World Wide Web underwent a significant transition (C.2010) in which the emphasis shifted from an audience of predominantly passive receivers to a far more participatory experience that emphasised content creation, collaboration, expressive communication and greater levels of interaction. The '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) ''project brought about changes to how adult education providers planned for STEM-enhanced education, in the long term transformed STEM education as well as the in the adult education settings of those who benefitted from the materials which remained available to the public beyond the term of the project.

	The '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) ''project aspired to bring about similar transformational changes in adult education by exploiting the full potential of STEM computing , reflecting the same maturing understanding of this key technology. It too, set out to enable and empower its audiences, teachers, and young adults to engage in a greater degree of content creation, collaboration, expressive communication and greater levels of interaction, all within learning and teaching contexts. It is known as TEC 2.0.
Results achieved	The expected results of the '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) '' project were to: - Develop and strengthen professional links with other stakeholders and young adults; - Professional development through project work; - Develop new and innovative teaching methods and implement these directly into practice; - Capacity to respond to new educational needs at organisation and local and national levels; - Implement new practices generated by the mutual exchange of knowledge, expertise, and innovative (this will continue after the project); - The development of a strong focus on the organisation of STEM teaching and learning; - The EU dimension embedded in the culture of the organisation and increased involvement in cooperation activities

	- Use of innovative ways to promote learning that engages learners and develops new skills.; - Provide tools and support for integrating digital tools within sound pedagogic practice; - Strengthen professional profiles and increase competencies; - Develop skills and competencies in young adults and migrants.
Innovation	The benefits the '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) '' project were invaluable and long-lasting. Therefore they supported the innovation and modernisation of our curriculum and provided the adult learners and staff with the skills and competencies needed to be active citizens. The project brought about innovative changes to how adult education providers will plan for STEM-enhanced education; in the long term, it transformed STEM education as well as the adult education settings of those who benefitted from the materials that remained available to the public beyond the term of the project.
Empowerment	The '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) ''project had impact at various levels from staff to young adults and it improved the skills of those engaged in teaching and learning in STEM education, which in turn will provide scope for changes directly into the wider community. The '' Stem Enhanced Education for Young Adults (S.E.E.Y.A.) ''project :

- Provided a better understanding of learning and teaching contexts enhanced by the use of STEM Education;

- Directed access to relevant STEM training tools framed within a European context;

- Improved STEM teaching and learning, which supports engagement and attainment levels;

- Increased knowledge & understanding of sustainability issues, the global dimension and ability to conceive and implement new STEM teaching methods;

-Direct access to non-formal learning from formal learning within a European focus

-Improved literacy, language and ICT skills leading to be active in society;

-Increased knowledge and understanding of sustainability issues, the global dimension and ability to use information and communication technologies
greater awareness of local support structures

The benefits of the project were invaluable and long-lasting. Therefore they supported the modernisation of out curriculum and provided the migrant learners and staff with the skills and competencies needed to be active citizens.

SWEDEN

Name	**CHOICE**
When	Start Date: 01/01/2020, End date: 31/12/2022, ongoing
Where	Italy, Spain, Greece, Cyprus and Belgium
Objectives	CHOICE aims to promote and improve STEM education at schools by designing innovative Open Educational Resources (OERs) collected in a MOOC (Massive Open Online Course) that will increase the professional competences of teachers by equipping them with a STE(A)M approach of teaching.
Stakeholders of the project	The joint effort of partners and key stakeholders towards the design of the CHOICE outputs are a proof of the diverse expertise available at EU level bundled within the project, which shall be used to benefit all of the involved parties in the partner countries and beyond: • Students will be able to provide first-hand-knowledge about interests, attitudes and challenges related to STEM education in the school, becoming "makers" of their own educational resources and better informed about the opportunities offered by STEM subjects. • Teachers and school institutions will be able to provide insight into teaching routines, existing problems and good practices in the school context, playing an active role in the production of educational resources and will become closer to their students and better aware of their needs.

Stakeholders of the project	• Higher Education Institution representatives and business experts will provide insights on the skills future students of STEM fields need to possess. They will have the chance to provide first-hand information on their fields of study, on current challenges the labour market is facing, and on skill demands in the labour market. Through their involvement as role models, they will thus motivate students to make critical choices for their academic study path. In the long term, they will benefit from a renovated interest in STEM subjects at the university and employment level. Policy-makers will be able to build on the project activities and approach to enhance the impact and effectiveness of existing policy initiatives related to STEM education and will be empowered by providing their insights for the design of policy recommendations able to be multiplied to other systems
Beneficiaries	Students, Teachers and school institutions, Policy-makers, private sector
Financing	CHOICE is funded by the Erasmus+ Programme, under the action "KA3: Support for policy reform"
Description	By proposing a practice-oriented, ICT-based educational approach and an innovative STE(A)M-based training path, CHOICE shall: 1. Boost young people's interest towards STEM subjects and careers, thus contributing to produce a workforce capable of tackling complex societal challenges 2. Involve teachers and students in a cross-disciplinary bottom-up learning process promoting the use of innovative pedagogies focused on a constructive interaction between STEM and non-STEM subjects.

	3. Promote coordination and collaboration among educational institutions, businesses, local authorities as key stakeholders able to support the reform of STEM curricula at school, turning them into multipliers supporting critical career choice of students 4. Support transnational cooperation and mutual learning among and within education institutions promoting innovative STE(A)M approaches to STEM education, entailing a systemic impact on education systems.
Beneficiaries	Students, Teachers and school institutions, Policy-makers, private sector
Financing	CHOICE is funded by the Erasmus+ Programme, under the action "KA3: Support for policy reform"
Description	By proposing a practice-oriented, ICT-based educational approach and an innovative STE(A)M-based training path, CHOICE shall: 1. Boost young people's interest towards STEM subjects and careers, thus contributing to producing a workforce capable of tackling complex societal challenges 2. Involve teachers and students in a cross-disciplinary bottom-up learning process promoting the use of innovative pedagogies focused on constructive interaction between STEM and non-STEM subjects. 3. Promote coordination and collaboration among educational institutions, businesses, and local authorities as key stakeholders able to support the reform of STEM curricula at school, turning them into multipliers supporting critical career choice of students 4. Support transnational cooperation and mutual learning among and within education institutions promoting innovative STE(A)M approach to STEM education, entailing a systemic impact on education systems.

Results achieved	National Reports National reports gathering findings on local and regional initiatives connected to the reform of STEM education, best practices, students' attitudes and teachers' approaches at local and EU level. State-of-the-Art Study The State-of-the-Art study is a comparative cross-country analysis of the findings across the involved countries, thus providing a comprehensive overview and conclusions. Reflective Practice Case Study Compendium This is a collection of case studies discussed during the reflective groups with experts from companies, Higher Education Institutions and local authorities conducted in 4 countries. The groups identified a set of issues at the university, labour market and policy level, demonstrating the need to adopt a STE(A)M approach. Framework for Reforming Curricula The framework indicates the areas needing improvement within the current state of STEM curricula and educational approaches. Working Guidelines The operational guidelines will guide partners in delivering the design & development workshops at local level involving students and teachers. https://www.euchoice.eu/resources
Innovation	NA
Empowerment	NA
Website	https://www.euchoice.eu/the-project
Contacts	admin@euchoice.eu

Name	**STEM4YOUTH**
When	CLOSED IN 2018
Where	Italy, Spain, Slovenia, Czechia, Poland, Greece
Who	Polytechnic University of Warsaw
Objectives	More young students become interested in STEM subjects and pursue STEM related careers, they make an informed decision and run a lower risk of having to change the subject or their study. More ICT specialists and PhD students, currently lacking in many EU countries. New highly qualified experts in research and innovation take up industry-based jobs. More women study STEM disciplines.
Stakeholders of the project	Our group of partners includes experts in STEM higher education. We are a team of scientists, teachers, researchers, educators, and marketing analysts. We have all previously worked with local schools in formal and informal education activities. Together with them, we will hold the 6 courses in each country of our group. Politechnika Warszawska (Poland) TechnickÁ Univerzita Ostrawa (Czechia) InŠtitut za razvojne in strateŠke analize zavod institut joŽef stefan (Slovenia) Idryma evgenidou research paths (Greece) Fondazione umberto veronesi (Italy) Universidad de barcelona (Spain) Universidad de cantabria open evidence (Spain)

Beneficiaries	Students, teachers, families, and people from different sides of the world will work side by side in crafting new things from scratch in the streets, museums and all the more locations, using scientific concepts acquired with our citizen science module.
Financing	N/A
Description	WHAT WE DO - School courses in 7 STEM subjects across our partner countries. Each of these will explain how the core principles of that discipline happen in our everyday life. We will mix basic notions with hands-on experiments or activities, games and critical thinking sessions and show how to use the skills gained in future professions. - A teacher's toolkit to make science & technology fun through museums, science festivals, university lectures, self-study material, experiments, games, and citizen science activities at schools and in the streets. - Urban happenings and pop-up installations open to everyone. Students, teachers and families will work side by side in crafting new objects and generating knowledge through scientific principles. All in public spaces. - Events where we will examine how to use STEM education for future jobs. Our workshops and conferences will target scientists, companies in need of STEM profiles, educational authorities, citizens and students. - An open-source educational platform where teachers and students can download and upload all the material from our courses and interact with one another through games and self-testing tools. Social networks where our students and teachers can share memories and ideas. - A final proposal to public authorities to adopt the best STEM educational methods in European school systems.

	We will present 7 to 9 core topics for each discipline by explaining their practical applications and their impact on our everyday life and work. This will happen by mixing basic notions with hands-on experiments, games and self-reasoning sessions. Also, for each discipline, we will show which specific skill and competencies you can learn with that subject and use in your future profession. We will create - a multidisciplinary guide for teachers on how to best exploit STEM education, including a more formal section on extra-curricular activities at school and an informal one on how to work with science festivals, university-organized lectures and web-open accessible self-study materials - Formal and informal educational content and methodologies to teach and learn science in an attractive way (learning by experiment, gaming, citizen science activities at schools) - Recommendations for the uptake of the best STEM learning practices by local, national and Europe-wide education systems
Website	https://www.stem4youth.eu/the-project/ brochure: https://www.stem4youth.eu/wp-content/uploads/2017/03/SFY_Brochure_WEB_3.pdf
Contacts	info@stemforyouth.eu Miroslaw Brzozowy +48-602205881 Polytechnic University of Warsaw Faculty of Physics 00-662 Warsaw ul. Koszykowa 75 4076 Warsaw Poland

Name	**STEM Continuous Professional Development at European Universities**
When	Start: 01-09-2020 - End: 31-08-2023, ongoing
Where	Poland, Italy, Slovenia, Finland, Belgium, The Netherlands
Who	UNIWERSYTET JAGIELLONSKI
Objectives	The aim of this project is to promote the importance of CPD at the EU universities so that lecturers can keep on track with the quality of teaching and learning considering the developments in STEM disciplines and society and cope with challenging problems that arise. The main goal is to develop sustainable cooperation between people who organize or wish to organize technological pedagogical content knowledge-oriented CPD activities at their universities. This will be based on an inter-university collaboration framework within the EU context, the so-called CPD-Ambassadors and through the activities of said CPD-Ambassadors to improve the teaching competences of university lecturers at their home universities and in consequence, improve university courses. This will increase notably motivation and enhance the learning outcomes of the students.
Stakeholders of the project	The list of partner institutions for STEM-CPD@EUni: Uniwersytet Jagielloński – Jagiellonian University (Krakow, Poland) European Chemistry Thematic Network Association – ECTN (Brussels, Belgium) Universiteit van Amsterdam – University of Amsterdam (Amsterdam, The Netherlands) Univerza v Ljubljani – University of Ljubljana (Ljubljana, Slovenia)

	L'Università degli Studi di Napoli Federico II – University of Naples Federico II (Naples, Italy) Oulun Yliopisto – University of Oulu (Oulu, Finland)
Beneficiaries	Teachers, universities, students, private sector. The project will bring together a broad spectrum of learning opportunities for teaching staff of participant institutions to improve the quality of education in university STEM by enhancing the quality of teaching and learning – one of the priorities in the current Bologna Agenda and the Paris communiqué. Partners in the STEM-CPD@EUni project will create synergies between professional development in teaching and research, supporting collaboration and communication of the academic staff with educational developers, professional bodies and the private sector.
Financing	EU Grant: 434.356 EUR Programme: Erasmus+ Key Action: Cooperation for innovation and the exchange of good practices Action Type: Strategic Partnerships for higher educationun
Description	For a long time, there has been an erroneous belief that being a renowned researcher is enough to be a decent university teacher. It is generally recognized that pedagogical knowledge and teaching skills need to be developed for good teaching abilities. To this effect, most universities now organize some training for their academic staff. According to the survey of the European Chemistry Thematic Network Association (ECTNA) Working Group, the training for lecturers at different universities greatly varies and are for the most part, voluntary.

Besides, the teaching staff training is usually focused only in pedagogy and general teaching skills. They are organized in groups of lecturers in different disciplines. In this way, training cannot address the specifics of teaching and learning in one determined discipline and the potential that specific digital tools can have for one discipline. This means that university lecturers in the present situation at most HE institutions cannot develop nor keep up to date with their Technological Pedagogical Content Knowledge (TPACK) (Mishra and Koehler 2006). This is extremely important in STEM (Science, Technology, Engineering & Mathematics) disciplines where there is a fast development of science and technology knowledge which is strongly connected to complex social quests that have a multicultural dimension.

To cope with these changes and to ensure sustainable quality of teaching and learning in university STEM disciplines, a STEM-oriented Continuous Professional Development (STEM-CPD) of lecturers at their universities is indispensable. It is known that professional development works on its best if it is closely connected to working practice, in our case STEM teaching practice.

It is a very complex and demanding task for one university by itself to organize continuous professional development activities for the lecturers in each and all particular disciplines in which they operate. Even more, we believe that no university in Europe, no matter how big or wealthy, can correctly handle this alone because collaboration is essential to reach the necessary international discourse focusing especially towards quality considerations.

The aim of this project is to promote the importance of CPD at the EU universities so that lecturers can keep on track with the quality of teaching and learning considering the developments in STEM disciplines and in society and cope with challenging problems that arise. The main goal is to develop sustainable cooperation between people who organize or who wish to organize technological pedagogical content knowledge-oriented CPD activities at their universities. This will be based on an inter-university collaboration framework within the EU context, the so-called CPD-Ambassadors and through the activities of said CPD-Ambassadors to improve the teaching competences of university lecturers at their home universities and in consequence, improve university courses. This will increase notably motivation and enhance the learning outcomes of the students.

CPD needs to be considered as a regular part of professional life for all academic staff. The project will bring together a broad spectrum of learning opportunities for teaching staff of participant institutions to improve the quality of education in university STEM by enhancing the quality of teaching and learning – one of the priorities in the current Bologna Agenda and the Paris communiqué. Partners in the STEM-CPD@EUni project will create synergies between professional development in teaching and research, supporting collaboration and communication of the academic staff with educational developers, professional bodies and the private sector.

To give the impulse to this process and empower the local CPD activities at the STEM faculties during the project, a summer school will be organized twice to train future CPD-Ambassadors. The philosophy of the summer schools is to train the trainer in co-creation.

	At the summer school, the CPD-Ambassadors will gain knowledge, receive relevant material and produce their own resources to organize CPD activities at their home universities, the so-called user cases. In this project, six partners will collaborate on six intellectual outputs. In O1 a Roadmap to set up STEM continuous professional development at EU Universities will be designed based on the expectations of the different stakeholders. In O2 the Framework for STEM-CPD according to the CPD-Ambassador principle will be developed. In O3, STEM-CPD scenarios and user cases will be collected and shared on the open platform. In O4 open online modules, the microMOOCs will be developed to be used in CPD activities in different user cases. IO5 will design the summer school, its activities, materials and certification of CPD-Ambassadors. In O6 the evaluation and effect measurements will be conducted to evaluate use cases and CPD scenarios in the European context.
Empowerment	Through the activities of said CPD-Ambassadors with the aim of improving the teaching competences of university lecturers at their home universities and in consequence improve university courses. This will increase notably motivation and enhance learning outcomes of the students.
Website	https://ectn.eu/work-groups/stem-cpd/ guidelines:https://ectn.eu/wp-content/uploads/2021/06/Roadmap-Recommendtions-and-Guidelines-O1-April2021.pdf
Contacts	https://ectn.eu/contact-us/

Name	**Empower Girls to Embrace their Digital and Entrepreneurial Potential (GEM)**
When	2020 – 2021, ongoing
Where	We will be offering two rounds of GEM project summer schools in 11 different European countries: Cyprus, Czech Republic, Germany, Greece, Lithuania, Malta, Netherlands, Norway, Sweden, and Slovakia. Another round of summer schools will take place in the year 2022. The updated information will be available in May 2022.
Who	International Centre for STEM Education (ICSE), http://icse.eu/
Objectives	The main aim is to to increase girls' interest in STEM and ICT subjects and careers. GEM's mission is to close the gender gap in Europe's labour market in the natural sciences and advance digitalisation. Aimed at girls, a number of summer camps around Europe will introduce girls to the complex but exciting facets of STEM and ICT in order to inspire them to study these subjects and eventually choose a career in the natural sciences. From Vilnius University: To ignite interest in girls and inspire them to engage in STEM/ICT, our Summer School will be organized to achieve 5 crucial objectives: • girls with STEM (especially ICT) knowledge, • girls with knowledge about the STEM/digital world of work, • girls with entrepreneurial mind-sets, • girls with transversal skills and girls with knowledge of inspiring role models and their meaning.

Stakeholders of the project	Our consortium consists of 11 higher education institutions. Together with collaboration partners from business, policy and education providers in each country, the consortium is drawing from an unbeatable mixture of STEM education expertise, STEM/ICT subject knowledge and transnational project experience. • University of Education Freiburg, Germany • University of Nicosia, Cyprus • Charles University, Czech Republic • University of Jaen, Spain • National and Kapodistrian University of Athens, Greece • Vilnius University, Lithuania • University of Malta, Malta • Utrecht University, Netherlands • Norwegian University of Science and Technology, Norway • Jönköping University, Sweden • Constantine the Philosopher University, Slovakia Since research has found that the largest influence on female decisions is due to controllable factors, such as encouragement (e.g. through family influence) and exposure to sector-related topics (e.g. to raise awareness of ICT careers) (Wang et al., 2015) we will address and convince 4 main stakeholder groups to engage in the supportive process. That are: (1)Families/friends/close human environment (2)Business/industry representatives (3)Policy makers and media and (4)Educational stakeholders include teachers, HEI, and informal learning providers.
Beneficiaries	Schools, students, stakeholders
Financing	Co-Funding: 346 450 €uro, European Commission Type of Action/Programme: Pilot Project & Preparation Action Grant

Description	GEM's mission is to close the gender gap in Europe's labour market in the natural sciences and advance digitalisation. Aimed at girls, several European summer camps will introduce girls to the complex but exciting facets of STEM and ICT to inspire them to study these subjects and eventually choose a career in the natural sciences. Higher education institutions from 11 European countries will organize summer camps for girls, piloting various learning activities which specifically support the development of a diverse range of STEM-related and personal skills. Skills that enable girls to contribute to Europe's digital innovation processes. We induce encouragement by raising the girls' interest and confidence. Therefore, we put a particular focus on challenging stereotypes, highlighting inspirational role models and offering participating girls the possibility to enjoy themselves in the context of STEM and enjoy STEM. Another side of the coin is to enable society to encourage and support girls in pursuing STEM and ICT careers. Therefore, a long-term European network will be established connecting actors from various STEM education, digital and entrepreneurial spheres. Members of the network will run diverse awareness-raising activities in society to address impending issues, demonstrate the need and ways to support girls and inform girls about their options.
Website	https://icse.eu/international-projects/gem/
Contacts	icse@ph-freiburg.de

Name	**GIRLS GO CIRCULAR**
When	2020-2021 Not ongoing
Where	On an online learning platform (the "Circular Learning Space") in Bulgaria, Greece, Italy, Portugal, Romania, and Serbia until 2020 and in addition Hungary and Poland in 2021
Who	EIT RawMaterials
Objectives	The project contributes to gender diversity policy objectives and, more specifically, to Action 13 of the Digital Education Action Plan 2021-2027 – Encourage women's participation in STEM. The Girls Go Circular project aims to: • Substantially contribute to EU gender diversity policy objectives by equipping girls with digital and entrepreneurial competencies. The project aligns with competence areas 1-3 of the EU Digital Competence Framework 2.0. • Improve students' digital skills in alignment with proficiency levels 1-5 of the EU Digital Competence for Citizens Framework 2.1. • Teach the competencies needed to tackle sustainability challenges and support girls aged 14- 18 in understanding the role of STEM disciplines in fostering sustainability. • Advance digital education in the EU by complementing school curricula and supporting teachers/facilitators with tools to facilitate learning in the classroom.
Stakeholders of the project	Schools: The Circular Learning Space (CLS) supports European schools in transitioning to digital education. The CLS will enrich the school curriculum by introducing new methodologies designed to deliver knowledge on the circular economy, and digital and entrepreneurial skills.

	Teachers/facilitators: they play a fundamental role in guiding students through the learning programme, supporting them in navigating the online learning platform and advancing their learning, and helping students take a leading role in tackling socio-economic challenges and gaining essential skills for their future. Educators will also acquire digital competencies by mentoring their students in an online learning environment and supporting them in using digital tools. Students: The CLS is an online learning platform designed to improve secondary school students' digital skills while exploring the critical topic of the circular economy. Project partners: - brainshuttle™, - ellen macarthur foundation, - DLEARN (the European Digital Learning Network) - JA Europe - sostenibilidad etica - young initiative association
Beneficiaries	Schools participating: 700+ Students supported: 15.000+ partners involved: 10
Financing	Funded by the EU
Description	The project's methodology is based on a learning-by-doing approach which engages students in different activities such as online research, entrepreneurial role-plays or challenge-based exercises.

The digital skills developed align with competence areas 1-3 of the EU Digital Competence Framework 2.0. The students can either autonomously or assisted by their teachers/facilitators to access the Circular Learning Space. The CLS is an open-source online learning management system. It allows learners to work individually and in groups during online and in-person sessions. Furthermore, the CLS encompasses interactive learning modules on the circular economy, including entrepreneurial roleplays and challenge-based exercises to develop digital and entrepreneurial skills. To that end, the CLS offers a mix of videos, podcasts, learning materials and group challenges. In addition, the CLS supports teachers/facilitators in conducting interactive and motivating classes, allowing them to easily follow students' progress on developing entrepreneurial and digital competencies.

The CLS encompasses two groups of learning modules:

1. Introductory modules give students basic information to commence their learning. We strongly recommend starting with these modules before moving on to the thematic modules:
   - Introduction to Online Safety and Etiquette
   - Introduction to the Circular Economy

2. Elective modules focus on specific aspects of the circular economy and guide students through the activities and challenges to train their digital skills:
   - Metals and the Circular Economy
   - Fashion and the Circular Economy
   - Rethinking Plastics
   - A Circular Economy for Smartphones and Electronic Devices
   - Robotics and the Circular Economy
   - E-Waste and the Circular Economy

	• Circular Economy of Food in Cities •Tackling Climate Change Through Circular Consumption Detailed descriptions of the learning modules and guidance on facilitating work in the classroom can be found in the second part of the guidebook - Teacher Guidebook: Introduction to the Learning Modules .
Results achieved	Certificates for Students, Teachers and Schools: successfully completing the learning programme will grant students certificates that recognise their acquired skills and competencies. The CLS will automatically generate these certificates and send it to the email addresses students used to create their accounts. Teachers that participate in the project will also be granted a certificate recognising their contribution to reaching gender equality in STEM. Finally, schools will be given visibility on the project's website as the pioneers in Europe supporting the European Commission's Digital Education Action Plan. A digital certificate can also be issued in the school's name if desired. Schools participating: 700+ Students supported: 15.000+ partners involved: 10
Empowerment	Girls Go Circular supports schoolgirls, and more broadly, any student, to develop their digital and leadership skills while learning about the circular economy and finding solutions for a sustainable future. Entrepreneurial Skills: Through challenge-based exercises, students learn how to identify business opportunities, take the initiative and work in teams. Group activities boost their creativity and confidence, and train analytical and problem-solving skills.

	These new abilities will support students in becoming the change-makers of tomorrow. Digital Skills: To thrive in the digital era, young people must be able to evaluate and manage information on the internet competently, interact through different online tools and develop digital content. Girls Go Circular equips learners with these competencies and raises awareness of online threats and etiquette. Circular Economy: The Circular Economy complements digital learning and provides a unique lens to raise the students' environmental awareness. Thanks to the cross-cutting nature of the topics addressed, students are empowered to reflect on the societal challenges of our time and prepare to be the leaders who will build a more sustainable future for Europe.
Website	Programme: https://eit-girlsgocircular.eu/wp-content/uploads/2021/10/Girls-Go-Circular-Teacher-Guidebook_EN.pdf Project: https://eit-girlsgocircular.eu/
Contacts	girlsgocircular@eitrawmaterials.eu

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MAPPING OF STEM-RELATED PROFESSIONS

Profession	Description
Information Systems Manager	Information systems managers, or IT managers, are responsible for the secure and effective operation of all computer systems, related applications, hardware and software that is used within a company. Information systems managers can work in any industry and service sector organisation and are in charge of a staff of technicians, programmers and database administrators. Responsibilities of the job vary according to the employment sector. However, typical tasks include: • Managing a team of staff, including business analysts, developers, support specialists and other computer-related workers; • Researching and installing new systems and networks; • Managing crisis situations, which may involve complex technical hardware or software problems; • Mentoring and training new IT support staff, as well keeping up to date with latest technologies and so on. Information systems managers can be self-employed or do freelance work whereas the IT sector employs contractors. Travel within a working day is occasionally required. There are opportunities to work overseas, particularly within international companies located in several countries. Once the person is in the role of Information Systems Manager, they will have a variety of career options available to them, ranging from increasing management and technical responsibilities to going into technical consultancy, leasing, or project management.

Cyber Security Specialist

Cyber security is fast becoming one of the most important roles in the tech sector as cybercriminals and hackers become increasingly sophisticated. Specialists in cyber security are among the most sought-after professionals in the tech sector, as they ensure that the company's technology infrastructure is well-protected. The Cyber Security Specialist oversees the day-to-day operations and data structures by overseeing the operational performance. They configure anti-virus systems and consoles, identify and manage incidents, and mitigate risks. Typical duties include:

- Seeking to build in security during the development stages of software systems, networks and data centres;
- Looking for vulnerabilities and risks in hardware and software;
- Finding the best way to secure an organisation's IT infrastructure and constantly monitoring for attacks and intrusions.

There is increased potential for career progression, especially in larger organizations and financial service providers. There is also scope for experienced security professionals to go into business for themselves as consultants. Careers in cyber security can be found in nearly every industry, thanks to organizations' widespread use of data. Although 28 per cent of information security analysts work in the computer systems industry, others work in finance and insurance, company management or administrative and support services.

Software Developer

Software Developers are the creative minds behind software programs, and they have the technical skills to build those programs or to oversee their creation by a team. They create software that enables users to perform specific tasks on computer devices. Those tasks might involve playing a game, watching a movie, writing a business letter, or building a spreadsheet.

Specialized software is created or customized for virtually every profession, industry, and government department. Much more than just playing around with codes, Software Developers play an important part in making a business more efficient and helping to provide better IT service. Developers can work in systems software or in applications such as those for mobile devices, but their duties are similar in many cases:

- Develop and test software to meet consumers' and clients' needs;
- Create models and diagrams to show programmers the code needed for applications;
- Monitor quality and performance of applications through testing and maintenance;
- Document all work for future reference.

Many factors are driving the demand for Software Developers, including a competition to create new applications for mobile devices, the needs of the health and insurance industries for innovative software to manage patient care, and concerns over threats to computer security that require investment in security software and so on.

Sociologist

As human social relationships are core to every sphere of life, sociology is widely applicable and sociologists are one of the most demanding professions. Sociologists study society and social behavior by examining the groups, cultures, organizations, social institutions, and processes that develop when people interact and work together. Sociologists typically do the following:

- Design research projects to test theories about social issues;
- Collect data through surveys, observations, interviews, and other sources;
- Prepare reports, articles, or presentations detailing their research findings;

- Collaborate with and advise other social scientists, policymakers, or other groups on research findings.

Sociologists often use both quantitative and qualitative methods when conducting research, and they frequently use statistical analysis programs during the research process. Their research may help administrators, educators, lawmakers, and social workers to solve social problems and formulate public policy. Sociology is a vast field. Sociologists generally specialize in one or more areas within the field:

- education and health;
- crime and poverty;
- families and population;
- and gender, racial, and ethnic relations.

Many people with a sociology background become postsecondary teachers and high school teachers. Some sociologists work for government agencies or private social service agencies. Many sociologists work for private industry, research organizations, or management consulting firms. They may do full or part-time consulting work or find work in related jobs outside the sociologist profession, such as policy analysts, demographers, survey researchers, and statisticians. To be successful as a sociologist, the person should be genuinely interested in the world around them and committed to searching for ways to improve it. A remarkable sociologist will use their platform to serve the needs of marginalized groups.

Survey Researchers

Research is an evolving field. Companies regularly adopt new research methods and new data sources that are expected to increase productivity. Organizations in all industries rely on data and information acquired through research, and survey researchers play an important role in the research process, as they design surveys and analyze data.

Surveys are used to collect factual data, such as employment and salary information, or to ask questions to understand people's opinions, preferences, beliefs, or desires. Survey researchers typically do the following:

- Conduct background research on survey topics;
- Plan and design surveys, and determine appropriate survey methods;
- Test surveys to make sure that people will understand the questions being asked;
- Analyze data using statistical software and techniques - tables, graphs, and fact sheets.

Survey researchers are also expected to be needed to design surveys for businesses. In an increasingly competitive economy, firms will continue to use market and consumer research surveys to help make business decisions, improve their products or services, and compete in the market. Many of these researcher jobs will be in consulting, research, polling organizations, nonprofits, and corporations. Some may work outside the office, traveling to meet with clients or conducting in-person interviews and focus group sessions. When designing surveys and analyzing data, they usually work alone in an office, although some work in teams with other researchers.

Mechanical engineer

Satellites, robots, cars, and aeronautics would certainly not see the light of day without mechanical engineers.

Mechanical engineers enable the realisation of all technical industrial products. They design the overall plan of a product, a machine or a tool and choose the most suitable materials for its manufacture. Using computer simulation, they check the resistance of parts subjected to different stresses and adapt their project according to their calculations and results.

	In the methods department, the mechanical engineer specifies the machines and tools required for production. They may also be responsible for organising a new production line by offering technical assistance and advice.
Web programmer	The main task of the web programmer is to make the website come to life. Web programmers are directly connected to the global Internet. They use web languages to build, improve, and modify web pages and websites. They design and integrate computer codes into websites (Internet and intranet) while making their content optimal and their use safe. They apply specific languages to obtain characters, font textures, special effects, animations, colours, etc. They also support users and are responsible for documents related to the operation and use of their computer programs. Based on the wishes of the customer, the web programmer creates a graphic concept of the future website, it is the task of the web programmer to implement these ideas technically to make the website come to life
Biologist	The biologist is a high-level scientist. The profession of biologists involves the study of living organisms and the environment: from the cellular level to large-scale processes occurring in the biosphere. He/she is generally specialised in a particular field (embryology, zoology, botany, etc.) and is interested in a specific theme to produce new knowledge. This scientist contributes every day to the progress of science

Nurse	The nurse coordinates and provides technical, relational, educational and preventive care. Nurses provide care to maintain or restore patients' health and monitor their clinical condition. This profession combines theoretical and practical skills. The nurse takes vital signs (blood pressure, temperature), blood samples, injections and dressings and ensures that the patient understands the doctor's explanations and can answer any questions.
Microbiologist	A microbiologist is a qualified researcher who studies various microorganisms: bacteria, viruses and fungi. The main task of the microbiologist is to study the causes of emergence, development and change of microorganisms, as well as the peculiarities of their behaviour in different environments. Currently, mycological research is in demand in various fields of science and life: from food production to the military industry. In addition, for a more thorough and complete study of individual microorganisms, such specialists are often profiled and divided into bacteriologists, mycologists and virologists. Their observations and research work are then used to preserve the environment, combat disease, etc.

STEM SKILLS AND KNOWLEDGE

BASIC STEM CONTENT

TECHNOLOGY IN STEM

Technology transforms how we live, work, study, learn, and do business. The digital revolution has given us the power to handle information logically, transmit it with high precision, and change it at will.[1] Technology is a broad concept that may be described simply as applying scientific knowledge to solve a problem or perform a specific function. The term "technology" is originated from the Greek word “technologia“. The Greek word “technología” itself is a combination of two other Greek words, “techne” which means art, skill or craft and “logía” which means the study of. Generally, technology makes human life better. Technology affects humans' ability and performance to control and adapt to their natural environments.[2]

The history of technology began 3,500 years BC, when the wheel, one of the most important inventions, was created. Different things were gradually developed, but the core era of technology and innovation began in the 18th century when the development of trade and the emergence of business sparked the Industrial Revolution. Numerous machines were built during this time, and various types of development and manufacture occurred, leading to the rise of technology. As The Industrial Revolution began in Great Britain, many of the technological innovations were of British origin.[3]

Nevertheless, the fact remains that the evolution of technology has resulted in its adaptation by all sectors of businesses.

[1] Definitions of Information Technology Terms, available at: https://www.defit.org/technology/

[2] Leon, A., Vikas, L. (2009), "Fundamentals of Information Technology (Second Edition)", available at: http://mathews.lnl.net/2009/10/05/fit2e.html

[3] Khan, N.N. (2018), "History and Evolution of Technology", available at: https://nation.com.pk/23-Jul-2018/history-and-evolution-of-technology

Thanks to technology, today's information age have witnessed drastic progress and changes in almost every field. This advancement in technology has made its way to various types of technology. Some technology categories are communication, construction, product technology, medical technology, architecture, business, educational, information, Space, Artificial Intelligence, robotics, entertainment, etc. [4]

Technology affects almost every aspect of 21st-century life, from transport efficiency and safety to access to food and healthcare, socialization and productivity. The power of the internet has enabled global communities to form and ideas and resources to be shared more easily. [5] New technologies have transformed education, everything from smartphones to smart boards.

These tools have enhanced communication, research and literacy. Technology has helped to make it more convenient for almost anyone to attend college and obtain degrees from the comfort of their own home. The convenience of being able to take classes online without having to step foot in a traditional classroom can be very appealing. It has made it possible for many people to continue their education, people who otherwise would not be able to fit college into their busy lifestyles between work and other family obligations.[6] Another significant benefit of technology in people's lives is the modernization of the healthcare industry. Patients who are battling severe health conditions have a higher chance of surviving today, thanks to the vast contributions of technology to the field of medicine. Various medical research and development efforts have also been made to find treatments for serious diseases that seemed incurable before technological advancements.[7]

[4] Whatchawearing, "16 Different Types of Technology", available at: https://whatchawearing.com/types-of-technology/

[5] Tech.co, "The 7 Main Ways Technology Impacts Your Daily Life", available at: https://tech.co/vpn/main-ways-technology-impacts-daily-life

[6]Term Paper Warehouse, "How Technology Improves Our Life", available at: https://www.termpaperwarehouse.com/essay-on/How-Technology-Improves-Our-Life/413098

[7] HealthTECH, "5 Ways Technology Has Improved Our Quality Of Life", available at: https://www.healthtechzone.com/topics/healthcare/articles/2021/02/19/448068-5-ways-technology-has-improved-our-quality-life.htm

SCIENCE IN STEM

Science is any system of knowledge concerned with the physical world, entailing observations and experimentation. Its different categories include physical sciences (inorganic world, i.e., astronomy, physics, chemistry and Earth sciences), biological sciences (organic world, i.e., biology, medicine) and social sciences (human behaviour, i.e. anthropology and economics)[8].

Science has a long history, with experiments and attempts at understanding the world going back to thousands of years. It has been tightly connected with people in power: princely courts, the military, and even whole empires[9]. The birth of modern science, though, is more recent: in the 17th century, people started using instruments such as telescopes, microscopes, clocks and barometers, coming up with scientific laws (i.e., gravity), while the 18th century was the period of great scientists such as Dalton and Darwin. The evolution of science has been incredible since then – with ground-breaking theories such as relativity and quantum mechanics being discovered in the last century[10].

Some science categories are the following: agriculture, astronomy, biochemistry, chemistry, psychology, environmental science, food and nutrition science, genetics, home economics, earth science (geology, hydrology), neuroscience, microbiology, nuclear science etc. [11].

Science increases our fundamental knowledge, creates new technology and applications, helps exchange ideas, and gives us a better worldview. While our modern lives are intertwined with science in each and every one of their aspects, it is easy to forget and not consider the immense impact science has on the world[12].

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[8] Britannica Online Encyclopedia, available at https://www.britannica.com/science/science

[9] Secord J. (2021), "What is the history of science?". The British Academy, available at https://www.thebritishacademy.ac.uk/blog/what-is-the-history-of-science/ .

[10] "Discover More- A Brief History of Science", Rough Science series, available at https://www.pbs.org/weta/roughscience/discover/briefhistory.html .

[11] Boulden Publishing, "S.T.E.M. careers", available at https://bouldenpublishing.com/pages/s-t-e-m-careers?fbclid=IwAR2ixbciOMK6vdoW2ogFB1t96xX8odykK6FhjIS5m2UBbfaT9anNSbSP_K0

[12] Dr Erica (2017), "WHY IS SCIENCE IMPORTANT?". Rosie Research, available at https://rosieresearch.com/why-is-science-important/

Knowledge contributes to the functioning of democracies and innovation. In our increasingly fragmented and digital society, the role of science will be redefined. While it can never offer a universal truth or an objective representation of the world, it can offer methodologically verifiable interpretations and question certainties and trigger reflections. Science has an important social role and, at the same time, bears great responsibility precisely when the situation is not clear[13].

ENGINEERING IN STEM

Engineering is the application of science and math to solve problems. Engineers figure out how things work and find practical uses for scientific discoveries. Scientists and inventors often get the credit for innovations that advance the human condition, but engineers are instrumental in making those innovations available to the world. The history of engineering is part and parcel of the history of human civilization. The Pyramids of Giza, Stonehenge, the Parthenon and the Eiffel Tower are today monuments to our engineering heritage. Today's engineers not only build huge structures, such as the International Space Station but also build maps of the human genome and better, more minor computer chips.

Engineers design, evaluate, develop, test, modify, install, inspect and maintain various products and systems. They also recommend and specify materials and processes, supervise manufacturing and construction, conduct failure analysis, provide consulting services and teach engineering courses in colleges and universities.

Engineering is an occupation with an extensive reach. The term 'engineering' covers many fields and, by extension, many skills. Engineers are scientists, inventors, designers, builders and great thinkers. They improve the state of the world, amplify human capability and make people's lives safer and more accessible. Engineering skills include the scientific method, social, cultural and economic awareness, mathematics, biology, chemistry, physics and other areas of science, creativity and teamwork. Engineering disciplines cover mechanics and the construction of tools and machines of all sizes, from the nanoscale to entire manufacturing facilities.

[13] Alexander von Humboldt Institute for Internet and Society (HIIG), “Why is science important for society?”, available at https://www.hiig.de/en/science-and-society/

The creation of cars, trains, ships, boats, aircraft and all other vehicles. The design and production of chemical compounds. Operations of businesses and cities. Entertainment, industry, construction, transport, healthcare, defence and more!

Engineering encompasses a whole range of industries that could include on-site, practical construction work and evaluating safety systems from an office. They use the knowledge they have within a specific industry to make things work and solve problems, whether this be with transport, medicine, entertainment, space or the environment. In fact, engineering is behind everything. Mobile phones? They're down to engineers. Make-up? Also, down to engineers. Cars, computers, shoes and even cutlery? It's all down to engineers. Healthcare has also improved dramatically thanks to advancements in medical technology thanks to engineers. The improvement of medical technology has meant that the discovery of illnesses and treatments has helped save and improve many people's lives.

Credible engineers that have changed society include Alan Turing, who invented the Enigma machine that helped to bring an end to World War II, the engineers behind high-speed flight that helped to send a man to space and the engineers behind advancements in communication- who'd of thought we could see and talk to someone on a screen from anywhere in the world.

New developments are taking place every single day. Have you heard of the Crossrail in London? It will increase the transport capacity in London and the South East by 10%, contributing to shorter journey times and more accessible, quicker connections.

No one knows precisely how engineers could make a difference in society in the future, but it is guaranteed that they will. New engineering jobs are constantly appearing alongside new and innovative technologies. Though it's easy to overlook the sheer amount of work that engineers do, it is inevitable to understand that there is more to engineering than is first thought.

It's estimated that the UK engineering industry will need an extra 1.8 million fully trained workers by 2025, and little progress has been made in recent years to address this glaring need. More pressingly, a study from the Royal Academy of Engineering back in 2017 found there would be a need for new science, engineering and technology professionals by 2020, and it appears the target will be comfortably missed this time next year.

The issue most engineering companies are finding at the moment is a severe lack of skilled young workers applying for vacant roles. Whilst young people may be applying for these roles, the applicants simply don't have the relevant skills or experience to succeed without significant and sustained levels of training. It's fair to say that steps have been taken in recent years to try and address this obvious need, but more must be done if the industry is to come close to the estimated 1.8 million extra workers needed by 2025. Experts suggest that one of the underlying reasons for this shortage is that young people are simply not encouraged to pursue a career in STEM (science, technology, engineering and mathematics) subjects early enough. Most young people won't have any exposure to engineering and technology-related subjects until they come close to finishing secondary school. By the time they reach the age of 16, the desire to take up a career in this field has already passed.

Encouraging young people to participate in vital training needed within the engineering sector, such as health and safety courses during school or college, could help the next generation of engineers gain a solid footing in the industry. This approach would also be highly beneficial to future employers as they could rest assured that the young people they will be employing have some formal training under their belt before starting an apprenticeship or full-time role.

There is also an argument that teachers, parents and employers must do more to showcase how a modern engineering workplace functions. The stigma surrounding engineering workplaces of the past is still prominent today and doesn't accurately represent how the vast majority of engineering companies work today. The sector operates vastly differently than it did 10 years ago, with Industry 4.0 and automation becoming more prominent within engineering every year.

Whilst it's obviously important for children to gain a rounded education, introducing apprenticeships from an earlier age could be a potential fix for the shortage of suitable engineering candidates. Something as simple as an apprenticeship starting at the age of 14, where young people spend two full days a week in an engineering setting for an extended period of time could help young people develop the skills needed to succeed within the industry. By the time they are 16, there is a good chance they would possess the skillset to take up a junior position within many engineering companies comfortably.

Recent research shows that young women are often overlooked when addressing the engineering skills gap. In 2017, only 4% of the students enrolled on engineering apprenticeships were female, a statistic that highlights the need for a new approach when trying to encourage young women to sign up for apprenticeships within the sector. One of the main selling points engineering companies use to entice young people into a career within the sector is future salary expectations. This approach isn't an effective tactic to engage young women, as research shows that only 30% of females are encouraged to get into engineering due to salary, whereas 88% saw the prospect of an exciting job as the key reason for getting into the sector.

Engineering Disciplines

Aerospace Engineering

Aerospace Engineers design, construct and operate aircraft, aerospace vehicles and propulsion systems. This includes planes, jets, helicopters, gliders, missiles and spacecraft. They are involved in researching, developing and testing new materials, engines, body shapes and structures that may increase the speed and strength of aircraft. There are three main areas of work in the aerospace industry; design and manufacture, research and development and airworthiness operations. A new graduate engineer may be involved with one aspect of a project, such as calculating the type and weight of material to go into a component. Senior engineers may coordinate a whole project, give other engineers, technicians and draftspersons different tasks to complete, and ensure that the project meets budget. Aerospace Engineers may work for commercial airline companies, aerospace manufacturers, government defence departments and defence forces, and government research laboratories.

Agricultural Engineering

These engineers are involved with conserving and developing the world's natural resources, including soil, water, land, rivers and forests. They research and develop solutions to combat problems such as soil erosion and salinity. They are responsible for designing better methods of farming and forestry, improving farming machinery and buildings and also in lessening the impact of humans on the environment. Government departments employ many Agricultural Engineers in such areas as water supply, agriculture, forestry, soil conservation and in environmental protection agencies.

Private employers may include consulting firms, manufacturers and distributors of agricultural and irrigation equipment, corporate farms, intensive animal industries and food processing plants. Work may also be available on overseas agricultural aid programs.

Biomedical Engineering

Biomedical Engineers work with doctors and medical scientists, researching and designing ways to improve health care and medical services. Biomedical Engineers use microcomputers, lasers, and other materials to develop and improve medical research equipment that is used to diagnose health problems. They may be involved in developing medical products and different equipment used to monitor and treat patients and designing and improving equipment for disabled people. A Biomedical Engineer working in a hospital, for example, may be responsible for the safe and effective operation of equipment such as monitoring, diagnostic, and therapeutic medical equipment ranging from catheters, CAT scanners, pacemakers and kidney machines.

Building Services

Building Services Engineers are involved with designing heating, air-conditioning, electric lighting and power, water and gas supply, plumbing and drainage systems. Fire safety and security systems, phones, faxes, intercoms, computers, lifts and escalators are all needed for a functional and safe work environment.

Chemical Engineering

Chemical Engineering is concerned with changing raw materials into useful and commercial end products. Research of raw materials and their properties, design and development of equipment and evaluating of operating processes are all part of Chemical Engineering. Skills are combined to extract raw materials that can then be refined and manufactured to produce food, petrol, plastics, paints, paper, ceramics, minerals and metals. Often these processes are carried out at large-scale plants, and the safe operation of these plants is also part of chemical engineering. Extracting these raw materials without harming the environment is also a major work area for Chemical Engineers. Chemical Engineers may work in companies involved in producing such things as food, plastics, ceramics, pharmaceuticals, metals and glass.

Many Chemical Engineers also find employment in environment protection and the reclamation or clean-up of contaminated sites or research laboratories, chemical plants and petroleum refineries. Other major employers of chemical engineers include manufacturers of basic iron and steel products, organic industrial chemicals and the mining industry.

Food Engineering

Food Engineers design equipment, machinery and production methods that increase the life of food whilst maintaining its quality and nutritional value. They also ensure that the food produced is free from bacteria and disease and does not lose its original texture and colour.

Petroleum & Petrochemical Engineering

Based on the geological study, engineers in this field find, produce, use and improve oil and natural gas. Methods of safely and economically removing oil and gas from the earth are constantly being researched and tested. Raw materials extracted from the earth or oceans are turned into synthetic fibres, dyes, detergents and many forms of plastic materials and products.

Pharmaceutical

Equipment that produces life-saving drugs and medicine is designed and operated by engineers in the pharmaceutical field. These drugs must be made precisely in small and large quantities. Engineering teams work closely with medical research teams to achieve the most effective results.

Process Control

Process Control Engineers are concerned with creating and maintaining computer software and systems designed to control the quantity and quality of a particular product when it is being manufactured. Computers are used in a chemical plant to control such things as pressure, temperature and liquid levels in a tank. It is also important to ensure the minimum amount of waste material is produced during manufacturing.

Production

Production Engineers are responsible for the equipment and processes used in various chemical or manufacturing plants. Production Engineers ensure equipment is maintained and operating at peak production level and may also advise on the factory floor's layout to maximise production levels or on the purchase of new equipment.

Civil Engineering

Civil engineers provide much of our modern society's physical infrastructure. Civil Engineers are concerned with all types of structures, including dams, bridges, pipelines, roads, towers and buildings. Civil Engineers are responsible for the design and construction of all our transport systems, the design and management of our gas and water supply, sewerage systems, harbours, airports and railways. They plan, design and test the structures of private and public buildings and facilities. They are also involved in many environmental areas, such as assessing the impact large-scale projects have on the environment and the collection and treatment of sewage and industrial wastes, pollution control, environmental control and resource protection and management.

Geotechnical Engineering

These engineers provide information and knowledge on how the soil and rocks beneath a proposed structure will behave under pressure. An understanding of the structures being built is needed to assist in the design of their foundations. Geotechnical Engineers spend a lot of time outdoors, collecting samples, testing ground areas, and advising on work in progress.

Hydraulics (Water) Engineering

Hydraulics Engineering is concerned with planning and organising how water is provided and removed for large and local schemes. Hydraulics engineers also deal with the treatment of waste from industry, the control of rivers and flood waters, the protection of the coastline and careful planning of harbours.

Structural Engineering

Natural forces such as wind, waves and earthquakes and their effects must be considered when a structure is designed and built. Certain stresses caused by the modern environment, such as the traffic of cars and people, also need to be considered. A structural engineer ensures structures are built to withstand these forces. Structural engineers research, develop and test innovative solutions to these problems. Structural Engineers often work with architects, builders and those in mechanical, electrical and chemical engineering to organise and supervise the construction of particular structures.

Transport Engineering

Transporting Engineering is concerned with the transport means for both people and freight. Transport Engineers design, test, and improve systems and structures for moving people, cars, trains, aeroplanes and ships. For example, it is vital that traffic intersections are designed so that traffic flows freely and does not cause unnecessary congestion. The layout of train lines needs to be designed with similar objectives in mind. Transport Engineers also plan future travel needs of city and country areas as populations increase and need change.

Coastal and Ocean Engineering

Coastal and Ocean Engineers work at the interface between land and the sea and in the open ocean environment and are skilled in understanding this dynamic natural environment. This provides the specialised knowledge needed to ensure safe and ecologically sustainable development of our near-shore zone, vital ports and harbours and valuable offshore resources. Coastal and Ocean Engineers work in either the private sector as consulting engineers, project managers, construction contractors, specialised government organisations, and university teaching and research.

Electrical Engineering

Electrical Engineering encompasses electronic, computer systems, telecommunications, control and electrical power engineering. It concerns how electrical energy is produced and used in homes, the community and industry.

They are involved in the research and development of alternative energy sources, water reclamation, waste treatment and recycling. Environmental Engineers may work with government departments or in the private sector with resource processing companies as Consulting Engineers.

Industrial Engineering

Industrial Engineering is concerned with the design, improvement, and installation of integrated systems of human resources, materials, equipment and finance. Industrial Engineering draws upon specialised knowledge and skill in the mathematical, physical, physiological and social sciences together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from such systems and measure achievement. Industrial Engineering is a science devoted to getting the best results from available resources while ensuring that the project's quality and expectations are met.

Marine Engineering

Marine Engineers are involved in designing, testing, and improving machinery and equipment used at sea. This machinery may include propulsion machinery, electrical, refrigeration, air conditioning, cargo handling and domestic services equipment. It is their responsibility to check that everything is functioning effectively and properly maintained. A marine Engineer needs to have a good understanding of how all these systems operate. Marine Engineers must also become familiar with pressure vessel operation, including steam-generating equipment and the associated control instrumentation. Automatic control systems are becoming increasingly widely used, so understanding computer-controlled processes are also essential. Computers now mean that Marine Engineers do not have to be on constant watch in the engine room. Marine Engineers may work with organic pumping or mooring systems, pipelines, dockyards, port and harbour operations, and equipment for offshore oil rigs and platforms. This is a relatively small field of engineering and there tends to be a low turnover of staff. Demand is basically determined by activity in the water transport industry.

Materials Engineering

Materials Engineers test how certain materials behave when put under pressure or are heated or joined with other materials. Materials Engineers are involved with developing new materials and improving certain qualities of existing materials. They may also be involved with developing new and improved ways of recycling plastics and paper.

Electrical Engineering

Electrical Engineering encompasses electronic, computer systems, telecommunications, control and electrical power engineering. It concerns how electrical energy is produced and used in homes, the community and industry. Electrical Engineers design and build the systems and machines that generate, transmit, measure, control and use electrical energy essential to modern life.

Electronics & Telecommunications Engineering

Electronics Engineering deals with devices and systems that use small amounts of electrical energy to analyse, transmit and store information. Transmission of these electronic signals forms the basis of communications and the information technology industry, including the field of microelectronics and silicon chip technology. Various communication systems between people nearby and on the other side of the world have been developed and are constantly being improved and refined. This communication occurs using satellite, telephone, optical fibres and computer systems. These systems are vital in everyday communication, defence, transport, civil aviation & medical equipment such as the bionic ear, pacemakers and life support systems. People who specialise as Electronics Engineers may work in such industries as communications, broadcasting, aviation, defence, robotics, computers, medical engineering or meteorology. Many Electronics Engineers are now finding more opportunities in the entertainment, transport and telecommunications industries. Data communications, mobile radio and the broader entertainment industry all require the input of electronics engineers.

Environmental Engineering

Environmental Engineers are concerned with protecting the environment by assessing a project's impact on the air, water, soil and noise levels in its vicinity. This is done by studying the project's design, construction and operation and minimising any adverse effects that it may have on the environment. Environmental Engineers are also involved in removing problems caused by past activity, such as cleaning contaminated industrial land so it can be used for housing. Environmental Engineers predict what problems may be caused by accidents, such as oil spills for example, and assess what may cause problems for the environment in the long term. They also plan and design equipment and processes for treating and safely disposing waste material and direct the conservation and wise use of natural resources.

Materials Engineering deals with the manufacturing, structure, properties and use of metals and non-metallic substances such as polymers, ceramics and composites. Materials Engineers may work in diverse areas, particularly those where chemical, electrical, manufacturing and mining Engineers find employment. These areas include large foundries, steel works, aluminium plants and companies involved with alloy research.

Mechanical and Manufacturing Engineering

Mechanical and Manufacturing Engineering turns energy into power and motion. Mechanical Engineers design, create and improve systems and machinery that are used for domestic, public and industrial purposes. This area covers the design and manufacture of various products such as domestic appliances, industrial machinery, ships, aircraft, engines, pumps, compressors and turbines or complex systems such as the air-conditioning and ventilation systems of buildings. The mechanical area interlinks closely with other areas of engineering and applies knowledge of materials, energy and structures. Mechanical Engineers often work for industry designing systems and machinery that generate power, make products, move things and help in building. They may also work in chemical processing, power generation, automotive, manufacturing, building services, aeronautical, defence technology, food processing, and public utilities. Demand for mechanical Engineers depends on activity in the manufacturing and construction industries. Many graduates cross over into the field of Industrial Engineering and building services.

Minerals and Metallurgical Engineering

This form of engineering is concerned with turning raw materials of low value into valuable products, for example, bauxite, into aluminium. Minerals Engineers use a wide range of treatments to process materials most efficiently. This might involve physical or chemical separations and hydro or pyro-metallurgical processes. Metallurgical Engineering takes this one step further by combining metals and non-metals to make new composite materials. These new composites are designed to be light, robust, durable and heat-resistant materials for use in the design and performance of cars, boats, jets, spacecraft and other vehicles.

Mining Engineering

Mining Engineers work together with geologists to investigate and carry out the extraction of ore bodies and mineral deposits, as well as the extraction of non-metallic ores and fuels such as coal and uranium. They are responsible for planning the safest and most cost-effective way of removing minerals from the ground, rivers or the sea bed. They may be involved with designing, installing and supervising the use of mining machinery and equipment and inspecting the progress of mining operations. Computerised techniques are often used in the development and operation of mines. Mining Engineers are responsible for protecting conditions for people and the environment near mines. Mining Engineers work on mining sites and in the head offices of mining companies. Many mines are located in remote areas and young graduates should be prepared to travel and live in non-urban areas. Salaries for those working in the mining area are usually well above that of most other professionals and the opportunities for travel are excellent. Experienced Mining Engineers have various career options, including mine planning and design, operations management, technical specialists, contracting, consulting, the mines inspectorate, investment analysts and advisers, research, tertiary education and general management.

Resource Engineering

Resource Engineering is concerned with developing and efficiently using natural resources and managing the environment in rural areas. This includes the development, conservation and control of water resources, soil conservation and the recovery of degraded land, catchment and land management, and assessing and controlling water pollution from agricultural and mining industries. Particular roles in Resource Engineering may include estimating water yields from catchments, flood analysis, or designing and constructing drainage and irrigation systems sympathetic to the environment. Resource Engineers are employed by government management agencies, local government bodies, Consulting Engineers, the mining and forest industries, and Civil Engineering and construction companies.

Risk Engineering

The general public has a growing awareness of the need for risk assessments to be carried out before a project begins. This involves analysis based on a knowledge of any given project's chemistry, physics and operational aspects.

It is important to identify any potential hazards, their consequences, and the frequency and magnitude with which they are likely to occur. These hazards need to be managed and emergency response procedures identified. Risk consultants often carry out detailed risk assessment studies for private companies or they review studies completed by other parties.

Software Engineering

Software Engineering is about creating high-quality software systematically, controlled, and efficiently. It is an approach to designing software to maximise quality and reliability by treating it as a formal engineering process. In a software engineering approach to building software, there is an important emphasis on the analysis and design, specification and evaluation of the software. Engineers specialising in software can work for industries as varied as entertainment, transport, resources, defence, medicine and telecommunications. Emerging opportunities for software engineering include cyber security, which is increasingly important for industry and government, including utilities and other critical infrastructure, smart infrastructure and homes and in security monitoring. The ability to use energy resources more efficiently and create sustainable solutions increasingly depends on software engineers. Automation, control and instrumentation in all forms of infrastructure, manufacturing, buildings, utilities and transport will increase demand for software engineers. A scan of job databases will reveal the potential careers on offer.

MATHEMATICS IN STEM

Introduction

While until a few decades ago, the possibility of a world governed by technology was the result of conjectures based on the incessant progress recorded in various sectors since the Second World War, nowadays, there is no longer any doubt that technology has entered our lives in an almost all-purpose way, on a transversal level. Every day we make increasing use of it, without discrimination of business or sector. In certain circumstances, it is now essential to satisfy specific primary and secondary needs: from the production, exchange and reuse of goods and services, trade, personal care and health, construction, communication, medicine, information exchange, and entertainment, up to study and work.

One of the significant implications of this technological revolution is knowing how to use the technologies at our disposal and preparing future generations to know how to manage them and make the most of their potential. It must be said that, although the focus on disciplines that ensure the mastery of technologies is characteristic of the digital age, the need for methodologies, practices and tools that make life easier for human beings has always been present since the dawn of the most ancient human civilizations. In this sense, the term "technology" should be understood in its broadest meaning, that is, as the application of scientific knowledge for practical purposes.

It's not rocket science that the prosperity of a country, and therefore its social well-being, is primarily determined by its levels of production, education and technological progress, these systems being closely interconnected. Despite implementing new and more efficient automated technologies, man remains at the centre of the productive nucleus and his/her education, preparation, knowledge and experience are the focal point. To this end, to keep pace with the most advanced countries and meet the market demand, in recent years, there has been an exponential increase in STEM education, an acronym that stands for Science, Technology, Engineering and Math and designates a teaching approach that combines these with other disciplines. More recent is STEAM, which also incorporates the Arts and have the "ability to expand the limits of STEM education and application," according to the Stem Education Guide.

As a matter of fact, STEM can be found all around us by simply considering that all the daily tasks we run have elements of science, technology, engineering, and math. Among these, STEM has the potential to play a prominent role in developing the next generation of students and, thereby in preparing future workers. But to fully exploit its potential, STEM elements must enter our daily life in a simple, effective and pleasant way. To this end, educators, schoolteachers, university professors, and the education system, in general, must be enabled to bring to school - and consequently in everyday life - STEM subjects and integrate them into their lessons to make them an integral part of an all-encompassing system in which STEM subjects are not treated as separate disciplines, but as an accompaniment to other disciplines, including the more traditional ones.

"M" in STEM

"M" in STEM stands for mathematics. Mathematics is defined as the "abstract science of number, quantity, and space, either as abstract concepts (pure mathematics), or as applied to other disciplines such as physics and engineering (applied mathematics)".
Starting from this definition, scholars have identified mathematics as essential in everyday life and it is equally important in every STEM discipline.

An Ancient history…

Mathematics has always been fundamental for other disciplines like science, engineering, and philosophy. Throughout history, Mathematics, as conceived, has changed a lot, passing from simple counting, measurement and calculation to a broader and more complex discipline.
The study of mathematics as a "demonstrative discipline" began in the 6th century BC with the Pythagoreans, who coined the term "mathematics" from the ancient Greek μάθημα (mathema), meaning "the subject of instruction".

As underlined on https://www.storyofmathematics.com, the importance and the practical use of Math are evident. Examples are the notched bones of early man to the mathematical advances brought about by settled agriculture in Mesopotamia and Egypt, and the revolutionary developments of ancient Greece and its Hellenistic empire. Other examples are China, India and the medieval Islamic empire, where mathematics further developed until its use in Europe in the late Middle Ages and Renaissance. Also, during the revolutionary developments that occurred in 17th Century and 18th Century Europe, maths was at the centre of innovation, bringing progress not always used in favour of humanity's development.

Mathematics Nowadays

Nowadays, Mathematics is inevitable in any educational path and is indispensable for developing people's skills. Therefore, to make sure future generations have a good foundation in mathematics, STEM is a critical factor for the prosperity of individuals, and their personal growth, development, and wellness. In the current global scenario, it is now a fact that many of the future professions will focus on science subjects.

Besides, it is also crucial to the development of countries and humanity in general, starting with analysing and solving the problems that afflict the Earth, such as climate change. But the role of mathematics goes far beyond just environmental issues and is not an effective tool if studied independently from other disciplines. Math plays a part in every other STEM discipline, so it's important to understand foundational math to grasp other STEM disciplines properly. Integrating math into the teachings of Science, Technology, and Engineering has several benefits to students' overall understanding of STEM, such as improving problem-solving skills, challenging critical thinking abilities, providing valuable math skills that can be applied outside the classroom, etc.

The importance of mathematics relies in many fields. It teaches essential life skills, such as using numbers for basic and advanced calculations, carrying out arithmetic, understanding shapes, sizes, angles, distances and spaces, continuous change and limits, and so much more. It is no secret that mathematical concepts are wide and universal, crossing over to different languages outright. The field of mathematics can also be used to teach students the importance of truth, the value of identifying patterns and trends, the purpose of structure, and the need to use logic and reasoning. These kinds of skills and abilities are transferable to other areas too, and so can be crucial for cognitive development on a more general level. As mentioned, some of the importance of mathematics is connected to its value within the workforce, making it useful for professional development. For example, mathematics is a vital part of fields like accounting and finance, medicine, IT, and any field where statistics and numerical data play a key role. In addition, mathematics provides an effective way of building mental discipline and encourages logical reasoning and mental rigour. Finally, mathematical knowledge plays a crucial role in understanding the contents of other school subjects such as science, social studies, and even music and art.

Mathematics can be a daunting subject for many students, and it has historically been taught traditionally, which does not suit all learning styles. This can make it difficult for some students to engage fully, leading to a lack of understanding about some of the essential mathematical concepts that later lessons build upon. One of the ideas recommended to improve learning outcomes is to try to teach mathematics by framing some of the traditional math problems in a more integrated way, allowing students to connect the concepts to real-life situations.

This is relatively simple with areas like physics and engineering, where mathematics plays a key role already. Still, it can also be done with the remaining STEAM education fields as well. For instance, mathematics has increasingly become integrated with technology through things like computer databases and spreadsheets. In fact, computers have actually played a key role in proving that some long-standing mathematical concepts hold. Moreover, mathematics can also be integrated with the liberal arts, with psychology, in particular, being a good example of this, as it is a subject area that utilizes statistics and data samples.

Final remarks looking at the job market…

Mathematics is fundamental for many professions, especially science, technology, and engineering. Yet, mathematics is often perceived as complex and many students leave disciplines in science, technology, engineering, and mathematics (STEM) as a result, closing doors to scientific, engineering, and technological careers. Insofar mathematics is commonly perceived to be difficult (e.g., Fritz et al. 2019), and many believe "it is ok — not everyone can be good at math" (Rattan et al. 2012). With such perceptions, many students stop studying mathematics soon after it is no longer required of them. Giving up learning mathematics may seem acceptable to those who see mathematics as "optional," but it is deeply problematic for society as a whole. Mathematics is a gateway to many scientific and technological fields. Leaving it limits students' opportunities to learn a range of important subjects, thus limiting their future job opportunities and depriving society of a potential pool of quantitatively literate citizens. This situation must be changed, especially as we prepare students for the continuously increasing demand for quantitative and computational literacy over the twenty-first century (e.g., Committee on STEM Education 2018).

A final remark is important to notice the connection between mathematics studies and the job field. In particular, we want to share the work done by AGCAS editors, which recognizes the Top jobs for mathematics graduates. These include programmer and software development professionals (11%), finance and investment analysts and advisers (9%), secondary education teaching professionals (9%), business and related associate professionals (7%) and chartered or certified accountant (6%). [14]

[14] Written by AGCAS editors

February 2021

Another interesting perspective is offered by the Jobs Rated Almanac , a 1990 publication of World Almanac Books of New York, NY. In which, it is individuated that careers that require a very strong background in mathematics are among the "best" jobs:

- software engineer
- actuary
- computer systems analyst
- computer programmer
- mathematician

TRAINING PROGRAMS

LETTONIA

Program Title	**Introduction to Cyber Security**
Responsible organisation	RIGACODINGSCHOOL
Program's Topic	Technology
Target Group	Migrants
Language used within the program	English
Specific requirements for participation	There are no specific requirements as the program is open to both corporations and people with no prior experience in the IT area.

Timeframe	Not mentioned (Closest course starts on 27.12.2021)
Objectives of the program	·The program's goal is to provide students with the necessary cybersecurity knowledge and practical skills to pursue a career as a cybersecurity professional. ·Students will not only get the opportunity to study the foundations of cybersecurity, - the Riga Coding School's Carrier Centre will also assist all motivated students that will finish their studies in finding an internship in one of their IT partner companies.
Overview of the program	Beginning with computer network security, cyber-attacks, application security, and general security mechanisms, the program will progress through crucial WEB App technologies, mobile application security, safe application development, code analysis, and penetration testing. • Intensity: 72 hours • Duration: 6 lessons in 6 weeks • Time: 3 times a week, three working days evenings • Full price: 1350 €
Results achieved	1) The Adult Non-Formal Education Institution "Riga Coding School" will offer students a certificate upon completion of the study. 2) Following completion, the school assists students in obtaining a job or internship, along with preparing a CV and an interview with an employer. 3) School also will provide students to have free meetings with IT HR professionals. 4) After graduation, only graduates of the school have the opportunity to collaborate in the ALUMNI community (Students will get the opportunity to learn about new job opportunities and other useful information, as well as meet like-minded people).

	5) The school's programs and high-quality learning process have been recognized by not only alumni of the programs, but also several employers. The majority of students underline that after completing their courses, they were able to find work in a variety of IT firms (Source: https://rigacoding.lv/atsauksmes/ (in Latvian)
Contact	RIGA CODING SCHOOL info@rigacoding.lv +371 232 208 85
Links	Website: https://rigacoding.lv/ Social media: @rigacodingschool (Instagram) ; @rigacoding (Facebook)
Notes	Also offers various of other STEM related studies but in Latvian or Russian language.

Program Title	**Management of Information Systems (Master of Engineering Science in Management of Information Systems)**
Responsible organisation	Transport and Telecommunication Institute
Program's Topic	Technology
Target Group	Migrants
Language used within the program	English

Specific requirements for participation	Higher education, Bachelor of Engineering Science or Bachelor of Natural Sciences in Computer Science or Mathematics, or Bachelor of Social Sciences in Management Science or Economics, or Higher professional education of the second level in Computer Science, Information Systems, Electronics, Logistics, Management Science and Economics.
Timeframe	Accreditation: until 30.06.2023
Objectives of the program	The program is tailored to students who are intrigued about and interested in IT projects, information systems, business intelligence, and IT infrastructure, as well as those who are willing to learn new technologies and are able to manage large amounts of data.
Overview of the program	The master's degree program in Management Information Systems (MIS) combines business and technological skills to prepare world-class specialists with extensive knowledge of modern information and communication technologies and how to apply it in a variety of settings. Students will be able to apply their newly acquired knowledge and abilities to serve as a vital link between technology creators and users. The program focuses on information system management, features of change management, and technology use. Students will receive lectures, practical exercises, and case studies from the greatest local and international teachers and specialists during class. • Duration: 2.5 years (Online classes) • Fee: 1700 €/per year
Results achieved	1) A Master of Engineering Science in Management of Information Systems degree will be awarded following the compilation.

	2) Students will be able to work as IT project managers, consultants, department heads, information systems integrators and promoters, and business analysts in the public and private sectors. 3) The Alumni have provided positive reviews on the study program.
Contact	Transport and Telecommunication Institute info@tsi.lv +371 67 100 661
Links	Website: https://tsi.lv/study_programmes/management-of-information-systems/ Social media: @tsi_student_counci (Instagram) ; Transport-and-Telecommunication-Institute (Facebook)
Notes	Also offers various of other STEM related studies in English, but full-time (not distance learning).

Program Title	**Java/Software engineering**
Responsible organisation	Accenture
Program's Topic	Technology
Target Group	Migrants
Language used within the program	English
Specific requirements for participation	There are no specific requirements as the program is open to those **with no prior experience,** as well it does not matter what educational or professional background the student has unless they have an interest in IT. **Knowledge of basic coding would be advantageous, but it is not essential.**

Objectives of the program	The program is designed for students who are intrigued by and interested in pursuing a career in the field of information technology. Its primary goal is to educate students the foundations of Java programming and software engineering.
Overview of the program	Accenture, one of the largest IT corporations in the Baltics and the globe, offers the most comprehensive free IT training in Latvia and Lithuania. Students will study both the theory and practice of Java, the world's most popular programming language. Students will learn Java programming, architecture, and design, as well as testing and methodology essentials, throughout Bootcamp. Students will study Java programming, Git (version control), and the fundamentals of Linux installation before diving into building Java command line programs, Java desktop, Java Android, and server applications. • Duration: 1-4 weeks of online studying (Followed by a 3-6 month fully paid internship at Accenture Latvia/Lithuania) • Fee: Free
Results achieved	After completing the Bootcamp, students will be eligible for a 3-6 month fully compensated internship at Accenture Latvia/Lithuania, as well as full-time employment offers after the internship. Reviews of Accenture and the offered Bootcamps: https://bootcamp.lv/?page_id=355
Contact	riga.bootcamp@accenture.com +371 29398098 +371 25616699
Links	Website: https://bootcamp.lv/?post_type=course (List of all the available bootcamps)

Notes	There are lot of various bootcamps for students and non-students specializing in IT, STEM, management, and other fields.

GERMANY

Program Title	**Understanding 0 and 1- Preparation Course for IT Degrees**
Responsible organisation	Universität Würzburg (University of Würzburg) in the framework of “Virtuelle Hochschule Bayern) (VHB), which offers online courses by 32 universities and universities of applied sciences in Bavaria, Germany
Program’s Topic	IT, Mathematics
Target Group	Everyone Interested in Studying IT at University
Language used within the program	German
Specific requirements for participation	None
Timeframe	Information N/A , Course is available Online at any time
Objectives of the program	In this course, the school knowledge in the field of computer science and mathematical topics relevant to computer science is not only refreshed, but also expanded and consolidated.

Overview of the program	Chapter 1 Introduction to mathematics / computer science Binary representation algorithm Chapter 2 variables Primitive data types Faculties, powers, binomial formulas Chapter 3 Introduction to Java Boolean operators Complex data types (lists, maps, arrays, strings) Chapter 4 Objects Methods Class diagrams Chapter 5 Logarithms Recursion Sequences and ranks Chapter 6 Derivatives and matrices Chapter 7 Evidence and Contradiction Evidence Bernoulli experiment Binomial distribution Chapter 8 Formal languages and automata Chapter 9 Computer architecture Limits of predictability
Results achieved	Certificate of Attendance: If at least 75 percent of the test questions from the quiz lessons are answered correctly, you can download a certificate of attendance.

	As the course is conducted by a university within a network of 32 universities it is likely to be accepted for credit points in foundational IT degrees by the participating universities and possibly other German Universities. The certificate will aid applications for traineeships in IT technologies, that are not academic based, by demonstrating math and logic skills not demonstrated by school certificates.
Costs	Course and Certificate free of charge
Contact	Prof. Dr. Marc Erich Latoschik Julius-Maximilians-Universität Würzburg Human-Computer Interaction Universität Würzburg Am Hubland D-97074 Würzburg ✆ +49 (0) 931 31 85871 ✉ marc.latoschik@uni-wuerzburg.de Prof. Dr. Arndt Balzer Hochschule für angewandte Wissenschaften Würzburg-Schweinfurt Prof. Dr. Arndt Balzer Hochschule für angewandte Wissenschaften Würzburg-Schweinfurt Fakultät Informatik und Wirtschaftsinformatik Sanderheinrichsleitenweg 20 97074 Würzburg ✆ +49 931 3511-8362 ✉arndt.balzer[at]fhws.de

Links	https://open.vhb.org/blocks/ildmetaselect/detailpage.php?id=192
Notes	Course offered by a University

Program Title	**Online math bridge course OMB +**
Responsible organisation	OMB
Program's Topic	Mathematics, preparing for studies in engineering, economics, natural sciences or computer science studies
Target Group	Everyone Interested in Studying Mathematics at University
Language used within the program	German
Specific requirements for participation	None
Timeframe	Information N/A , Course is available Online at any time
Objectives of the program	Preparation course for engineering, economics, natural sciences or computer science studies. The course helps you to work through the school subject math to such an extent that you can then easily follow the university courses.
Overview of the program	Chapter 1a Elementary arithmetic: quantities and numbers Chapter 1b Elementary arithmetic: powers and proportionality

	Chapter 2 One-variable equations Chapter 3 Inequalities in one variable Chapter 4 Systems of linear equations Chapter 5 geometry Chapter 6 Elementary functions Chapter 7 Differential calculus Chapter 8 Integral calculus Chapter 9 2D coordinate system Chapter 10 Vector geometry Additional modules Chapter 11 Complex numbers Chapter 12 Logic and quantities Chapter 13 Stochastics
Results achieved	Certificate of Attendance: You will receive a certificate for successfully completing the course if you have achieved at least 80% of the maximum number of points in each of the 11 chapters of the main part. (The certificate is recognized as a study achievement at some universities - please contact the examination office responsible for you for binding information). The course is conducted by lecturers and professors from 11 universities.

	The Certificate is likely to be accepted for credit points in foundational IT degrees by the participating universities and possibly other German Universities. The certificate will aid applications for traineeships in IT technologies, that are not academic based, by demonstrating math and logic skills not demonstrated by school certificates.
Costs	N/A
Contact	The concept and the content of the OMB + are jointly developed by a consortium of German universities with the participation of the company integral-learning GmbH. Authors: Université de Toulon: Daniel Gandolfo TU Braunschweig: Volker Bach, Franz Konieczny BU Wuppertal: Margareta Heilman Univ. Hamburg: Ingenuin Gasser, Alexander Loose HCU Hamburg: Helena Barbas, Tom Schramm FH Aachen: Ivonne Albrecht, Georg Hoever, Andreas Maurischat RWTH Aachen: Kathrin Maurischat TH Köln: Katharina Hammersen, Heiko Knospe, Andreas Schwenk Univ. Bremen: Annette Ladstätter-Weißenmayer HS Ruhr-West: Andrea Ostendorf, Evelyn Schirmer integral-learning GmbH: Volker Enß, Andreas Maurischat, Ruedi Seiler
Links	https://www.ombplus.de/ombplus/public/index.html
Notes	Course offered by a network of Universities, Tutors are available for direct support during the course.

Program Title	**Computer Science Fit**
Responsible organisation	Technische Universität Graz
Program's Topic	Computer Science
Target Group	Everyone Interested in Computer Science / IT
Language used within the program	German
Specific requirements for participation	None
Timeframe	Annual since 2019, Course is available Online at any time, Tutoring available during semester time
Objectives of the program	The aim of the course is to give the participants a comprehensive picture of computer science and to convey a basic understanding of processes and procedures in computer science and programming. It should be shown that computer science is fun, is strongly linked to creativity and holds exciting questions in store.
Overview of the program	Chapter 1 Computer science in general: definition (what is computer science?), History (milestones; women in computer science), fields of study and professional fields, definition of terms (data versus information) Chapter 2 Basic functionality of an information processing system: hardware software, input-output, number systems, logic Chapter 3 Programming in general: algorithm, programming language, data structures

	Chapter 4 Computational Thinking Skills: Basic Concepts of Programming Chapter 5 Programming in practice: development environments, programming languages Chapter 6 Social aspects of information technology
Results achieved	Certificate of Attendance: For active participation in the course, an automated confirmation of participation is issued upon completion, which contains your user name, the course name, the course duration and the effort. It should be noted that this is only a confirmation that the user has answered at least 75% of the self-assessment questions asked correctly. The course is conducted by lecturers from a university. However, the course is very basic, and the certificate is not likely to be accepted for credit points in foundational IT degrees. The certificate will aid applications for traineeships in IT technologies, that are not academic based, by demonstrating knowledge and skills in IT.
Contact	Lecturer: Mag. Maria Grandl 7060 Institute of Interactive Systems and Data Science 8010 Graz, Inffeldgasse 16c/I +43 316 873 – 8566 maria.grandl(at)tugraz.at
Links	https://www.ombplus.de/ombplus/public/index.html

Notes	Course offered in German language by a University in Austria

GREECE

Program Title	**Front-end Web Development**
Responsible organisation	Odyssea (NGO)
Program's Topic	Technology (programming)
Target Group	Migrants
Language used within the program	Greek/English
Specific requirements for participation	1.To be a migrant/unemployed for a long time/sensitive group in general. 2.Soft Skills (good to have but not required): ·Conceptualize original website design ideas ·Creativity ·Keep up with the latest web trends ·Project management ·Work well under pressure ·Goal oriented 3.Hard Skills (good to have but not required): ·Knowledge of HTML, CSS, Javascript, or other coding languages ·UX Design experience ·Web Server Management ·Content Management System (CMS)

Timeframe	Every 3-4 months
Objectives of the program	The most common web technologies and coding languages will be presented during the course (HTML/CSS, JavaScript) and students will have the opportunity to participate in the design and implementation of a complete web project.
Overview of the program	A Web Developer is responsible for the coding, design and layout of a website according to a company's specifications. As the role takes into consideration user experience and function, a certain level of both graphic design and computer programming is necessary. • Total Duration: 60 hours • Duration / Class: 3 hours • Classes per week (approx.): 2-3
Results achieved	85% satisfaction rate in "Programming" training Source: https://platform.odyssea.com/courses-dashboard?title=&field_course_training_them_area_value=Programming&field_course_type_value=All&field_course_start_date_value%5Bmin%5D=&field_course_start_date_value%5Bmax%5D=&nids=1678,832,510,508,298
Contact	(+30) 210 8839877 (+30) 2104815780 info@odyssea.com
Links	Website: https://odyssea.com/ , https://odyssea.com/course/free-programming-course/ Social media: https://www.facebook.com/OdysseaGreece https://www.instagram.com/odyssea_athens/ https://twitter.com/Odyssea_Athens https://www.linkedin.com/company/odyssea-ngo/?originalSubdomain=gr

Program Title	**React App Development**
Responsible organisation	Odyssea (NGO)
Program's Topic	Technology (programming)
Target Group	Migrants
Language used within the program	Greek/English
Specific requirements for participation	1.To be a migrant/unemployed for a long time/sensitive group in general 2.Soft Skills (good to have but not required): • Conceptualize original App design ideas • Creativity • Keep up with the latest web trends • Project management • Work well under pressure • Goal-oriented 3. Hard Skills (good to have but not required): • Knowledge of HTML, CSS, Javascript, or other coding languages • UX Design experience • Content Management System (CMS)
Timeframe	Every 3-4 months
Objectives of the program	Learn how to Design simple views and a comfortable User Interface for your application, using React. React is one of the most popular and wanted front end frameworks. Introduced and supported by Facebook, based on proven and widely used technologies like Javascript, HTML, and CSS, React is a valuable tool in a developer's toolset, as it is used by well-established companies like Facebook itself and AirBnB.

	Frontend and Fullstack developers should have a working knowledge of React written in their CV, especially for aspiring entrepreneurs or ambitious startups. React course is addressing people that have a basic knowledge of front end development (HTML, CSS and Javascript) plus a basic programming background (variables, loops, arrays, objects).
Overview of the program	• Language: GR / EN • Total Duration: 36 hours • Duration / Class: 3 hours • Classes per week (approx.): 2-3 • Potential Job Placements • App developer • UX designer • UX researcher • Web content manage
Results achieved	2 participants are now full-time employees in a job highly related to the training. Source:https://platform.odyssea.com/livelihood-dashboard?field_livelihood_isco_code_lvl_2_target_id=&field_livelihood_cur_employ_stat_value=All&field_livelihood_type_of_contr_value=All&field_livelihood_relation_train_value=All&field_livelihood_train_compl_ody_target_id_verf=1678&field_livelihood_registr_date_value%5Bmin%5D=&field_livelihood_registr_date_value%5Bmax%5D=
Contact	(+30) 210 8839877 (+30) 2104815780 info@odyssea.com
Links	Website: https://odyssea.com/ https://odyssea.com/course/react-app-development/ Social media: https://www.facebook.com/OdysseaGreece https://www.instagram.com/odyssea_athens/ https://twitter.com/Odyssea_Athens https://www.linkedin.com/company/odyssea-ngo/?originalSubdomain=gr

Program Title	**Introduction to web development with HTML5, CSS3, Javascript (E)**
Responsible organisation	Mathesis
Program's Topic	Technology
Target Group	Anyone
Language used within the program	Greek
Specific requirements for participation	N/A
Timeframe	End: February 2022
Objectives of the program	In the course, the participants looked at the architecture and basic web protocols, the main elements of the HTML5 language, with which to describe the content and structure of a web page, the CSS3 language with which we define how the content will be presented to the user, and the JavaScript programming language that gives the website interactivity. Upon completion of the course participants are able to create their own websites, which contain videos, images, information entry forms, etc.
Overview of the program	This course aimed at introducing the basic technologies of the internet, this medium that today covers every aspect of the life of all of us. The course is particularly concerned with the technologies with which websites are constructed and does not require prior programming knowledge. • Course Code: HY3.1 • End of Course: 15 Feb 2021 • Effort: 60 hours • Duration: 5 weeks

	• Attendance: Free • Certificate Cost: 20 €
Results achieved	When the course was first offered, its students (707 answers) evaluated the course from the exit questionnaires as follows: Are you satisfied with what you learned in relation to what you expected? • Very satisfied: 53% • Satisfied: 41% • A little satisfied: 5% • Not at all satisfied: 1%
Contact	mathesis@cup.gr Forum of the e-learning platform
Links	Website: https://mathesis.cup.gr/courses/course-v1:ComputerScience+CS3.1+20E/about Social media: https://www.facebook.com/mathesisatcreteuniversitypress https://www.instagram.com/mathesis_cup/ https://twitter.com/mathesiscup https://www.linkedin.com/company/mathesis-crete-university-press/about/
Notes	More information available after the user signs up on the platform. Resources and suggested homework are also provided.

ITALY

Program Title	**University for Refugees - Education without boundaries**
Program's Topic	Education for migrants including STEM programmes
Target Group	Migrants / Refugees
Language	Italian, French, English, Arab, Greek
Additional requirements	Immigrants or refugees from Arab countries and the Sub-Saharan countries
Applicant Organization	Università Telematica Internazionale UniNettuno
Place	Italy, Rome Headquarter UNINETTUNO Programme was held remotely
Aims and objectives of the program	a) An open dialogue where everybody is equal, where everybody can access education and knowledge by not being denied due to his/her origin b) acknowledging the sharpening of the immigration emergency that involves the Arab countries and the Sub-Saharan countries, as well as the whole of Europe, as to the reception of the migrants c) recognition of educational qualifications, previously earned by refugees and migrants in their countries of origin, and the recognition of their professional competences
Overview of the program	Italy, thanks to its geographical position, but not only for that, has been historically and keeps on being a veritable bridge to the Mediterranean Sea; a bridge that people, civilizations and cultures pass through.

The dialogue made up by exchange, confrontation and interaction is a key element that could not be separable from whatever action aiming at bringing the two edges closer to each other; an open dialogue where everybody is equal, where everybody can access education and knowledge, by not being denied due to his/her origin.

Acknowledging the sharpening of the immigration emergency that involves the Arab countries and the Sub-Saharan countries, as well as the whole Europe as to the reception of the migrants, the International Telematic University UNINETTUNO contrived an Internet-based portal, “Education Without Boundaries”, www.istruzionesenzaconfini.it. UNINETTUNO is the only University in the world where teaching and learning are carried on in five languages (Italian, French, English, Arab, Greek), in which thousands of students, coming from over 163 countries, are currently enrolled. “The technological network – UNINETTUNO’s Rector, Prof. Maria Amata Garito, states – promoted the creation of a network of people, intelligence, able to connect and share their knowledge and that along with several lecturers coming from various universities of the Arab World (Syria, Egypt, Jordan, Lebanon, Tunisia, Morocco etc.) developed a virtual area for higher education and the spreading of knowledge in the Euro-Mediterranean Area". Thanks to this international experience, UNINETTUNO made out of internationalization an active instrument for cooperation, and that allowed to plainly create the “University for Refugees - Education without Boundaries” www.istruzionesenzaconfini.it, to let refugees and immigrants access the University from anywhere across the world.

This tool makes it possible the recognition of educational qualifications previously earned by refugees and migrants in their countries of origin, and the recognition of their professional competencies to facilitate their access to our University's degree, master's and vocational training courses.

	It is the first tool in the world realized in English, French, Italian and Arabic, allowing refugees and immigrants to access and continue their university education or enrol for vocational training and retraining courses; studying in the different languages of the hosting countries; spread language and Arab World culture courses among the citizens of the hosting countries; promote knowledge about the regulations and the laws that govern reciprocal rights and duties. The courses available include STEM courses such as the following ones: • Master in Applied and Industrial Mathematics Uninettuno ; • The Big Data for Civil Engineering and Architecture B.I.M. • MASTER & Professional training course ; • Master en économie circulaire 4.0: Energie, technologie et environnement ; • Computer Engineering ; • Cognitive Processes and Technologies ; • Civil Engineering ; • Etc.
Results achieved	The "University for Refugees - Education without boundaries" www.istruzionesenzaconfini.it has already yielded its first results. His name is Harout, he is the first Syrian refugee in Lebanon who enrolled to the degree in Information Engineering, delivered by the International Telematic University UNINETTUNO thanks to one of the 50 scholarships, that are delivered for free by the University and devoted to refugee students entitled with international protection. Even in a moment of international fear, the purpose is that of boosting and sustaining the academic path of the immigrants holding the status of refugee, and of contributing to their vocational integration in the hosting country.

The new technologies, in particular e- Learning, can help enhance the reception of the refugees; a reception that passes through qualified training aimed to develop vocational competencies by means of a new distance teaching approach, where knowledge is spread by a new model of University, the University of the 21st Century, where every citizen of the World can study and learn without limits of space, time and place thanks to the Net.

Harout is thirty years old, and was born in the town of Aleppo where he accomplished his bachelor's in chemistry. At this point, he has got the status of political refugee in Lebanon and hopes that peace will come back soon in his country, he can make his dream come true: achieving the study path he kicked off in Syria by attaining an academic title recognized in Europe.

Besides Harout, 60% out of the students enrolled to the portal the "University for Refugees - Education Without Boundaries" are Syrian refugees in Germany; they, too, googled the tools to resume their interrupted academic path, and to make their study dream come true, despite their refugee status.

The "University for Refugees - Education Without Boundaries" is developing a great laboratory towards true integration to value good immigration, dialogue, peaceful coexistence among peoples and international cooperation.

The International Telematic University UNINETTUNO has a long and consolidated experience in distance education, also delivered in collaboration with several universities of the Arab World, including Algeria, Egypt, Jordan, Lebanon, Morocco, Syria, Tunisia and Turkey.

UNINETTUNO allows the recognition of the study paths of thousands of foreign students and makes them earn study titles recognized in Europe and in the Arab World.

	So doing, UNINETTUNO offers foreign students the tools that enable them to acquire knowledge and expertise allowing them to play a constructive role in the social, cultural and economic life of the hosting Countries.
Contact Person / Project Coordinator	Prof. Maria Amata Garito
Contact to the organization	Secretariat: tel: +39 06 692076.70 tel: +39 06 692076.71 e-mail: info@uninettunouniversity.net
Links	Website: www.istruzionesenzaconfini.it

Program Title	**Girls who code**
Program's Topic	STEM education for migrants
Target Group	Women
Language	English
Applicant Organization	U.S. Mission to Italy, NGO Fondazione Mondo Digitale
Timeline	Start: 16-11-2018 End: 20-11-2018
Place	Italy: Naples, Catania, Salerno (online)
Aims and objectives of the program	Rreaching girls around the world and close the gender gap in new entry-level tech jobs by 2030.

Overview of the program	The fifth edition of Coding Girls—the national STEM education program sponsored by the U.S. Mission to Italy and Rome-based NGO Fondazione Mondo Digitale in collaboration with Microsoft Italy —held programs in Naples, Catania and, for the first time, Salerno. Starting this year, the Coding Girls association, which has a network of over 25 hubs throughout Italy, has started new collaborations, not only with high schools but also with several Italian Universities and private businesses that can now "adopt" a student and contribute directly to their success as they develop new coding skills. In Naples, over 100 young women in 23 teams from four high schools participated in the event led by U.S. coach Emily Thomforde. After workshopping their ideas in their high schools, the students came together for the hackathon at the Apple Developer Academy of the University of Naples, Federico II, using "Scratch", the online and free app provided by MIT. The theme of the competition was "Dream." 3 types of programs are freely available: • Clubs program: for students to explore coding in a fun and friendly environment; • College loops: college programs to help the alumni to succeed and build community with other women in tech; • Summer programs: virtual summer program for high school students to learn coding and make an impact in their community while preparing for a tech career.
Results achieved	• 500M PEOPLE REACHED through online resources, campaigns, books, and advocacy work - in the U.S. and around the world. • 450,000 GIRLS SERVED through in-person programming including our Summer Immersion Program, Clubs, and College Loops
Budget	Free programs financed by donations and fundraising.

Contact to the organization	info@girlswhocode.com
Links	Website: https://girlswhocode.com/ Social media: • Facebook: https://www.facebook.com/GirlsWhoCode • Instagram: https://www.instagram.com/girlswhocode/ • Twitter: https://twitter.com/girlswhocode • Linkedin https://www.linkedin.com/school/girlswhocode/

Program Title	**Polimi Open Knowledge**
Responsible organisation	Politecnico di Milano
Program's Topic	All fields of STEM are included in the MOOC together with other fields.
Target Group	All citizens or professionals
Language used within the program	Mostly English, Italian
Timeframe	3 / 4 weeks depending on the course
Objectives of the program	The main objective is to support students, not only from the Politecnico di Milano, in the crucial steps of their university and professional career: from high school to university, from Bachelor's degree to Master's degree, from university to the world of work. The courses are also open to amateurs.

Overview of the program	POK (Polimi Open Knowledge), inaugurated in June 2014 by the Politecnico di Milano, is the first Italian university MOOCs (Massive Online Open Courses) portal offering free online courses open to everyone. All those interested registers on the portal to access the videos, content, activities and self-assessment tests. At the end of the course, if the minimum score is reached, you will receive a certificate of participation (not linked to university credits or to the entrance test to the Polytechnic). The primary technological platform is the customisation of Open-edX, the open-source platform released by edX - an initiative born of a joint venture between MIT and Harvard. MOOCs available: ·MOOCs for Bachelor of science: to improve people's preparation for a Bachelor of Science or consolidate high school skills before starting a bachelor; ·MOOCs for Professionals: to Strengthen specific technical skills in innovative professional areas and enhance soft skills to smooth the step into and within the job scene; ·MOOCs for Master of science: to improve people's preparation for Master of Science or align skills to the ones required by existing Master; ·MOOCs for Teachers: to support teaching and learning innovation in both Higher Education institutions and schools; ·MOOCs for Researchers: to support researchers in developing transversal skills useful for their activities; ·MOOCs for Citizens: to explore global challenges and citizenship issues through the courses developed in the context of the third mission of Politecnico di Milano.
Results achieved	In 2020, there were 100.000 users from all over the world, more than 170.000 enrolments and more than 60 MOOCS produced.

Contact	pok@polimi.it
Links	Website: https://www.pok.polimi.it/ Social media: • Facebook: https://www.facebook.com/polimiopenknowledge/?ref=page_internal • Instagram: https://www.instagram.com/polimiopenknowledge/ • Youtube: https://www.youtube.com/channel/UCOKtBGblWKlkE-KIf-S0Fvg

SWEDEN

Program Title	**'Swedish for Immigrants' (SFI)**
Responsible organisation	Swedish Ministry of Integration, municipalities and corresponding refugee & social services, schools and employers
Program's Topic	Labour Market Training with SFI (Swedish for Immigrants) is a model of that combines professional and vocational training with Swedish language-learning.
Target Group	Unemployed Refugees living in Sweden
Language used within the program	
Timeframe	Started in: January, 2009, ongoing

Objectives of the program	The main objective is to support students, not only from the Politecnico di Milano, in the crucial steps of their university and professional career: from high school to university, from Bachelor's degree to Master's degree, from university to the world of work. The courses are also open to amateurs.
Overview of the program	'Swedish for Immigrants' (SFI) is the national language learning course offered for at least two years to all immigrants in Sweden. The programme is compulsory for resettled refugees and their financial benefits can depend on attendance. In 2009, SFI added a vocational training component to the language training. The programme is the first of its kind in Sweden and is currently carried out in ten municipalities across Gävleborg. The Labour Market Training courses amount to 25 hours per week and are taken in addition to the required 15 hours of Swedish. Labour Market Training courses last from 20 to 60 weeks, depending on the profession. Courses include welding, bus driving, personal assistance/care, gardening and cleaning. During vocational training, a language teacher is present to provide work-related language instruction and classroom communication skills. Unemployed refugees in Sweden for less than three years and registered at the employment office may apply for the Labour Market Training Programme. Generally, refugees participating in the vocational training component have an intermediate to advanced level of Swedish; however, two new training groups (cleaning and gardening) have been added for refugees with beginner's level Swedish and low literacy skills. Upon completing vocational training, refugees receive an official certificate of their professional, accredited training. The employment office liaises with employers in order to introduce both the programme and the refugees looking for vocational placements.

Results achieved	In 2011, approximately 200 places (10 different training groups) were made available. Companies and training centres alike have been very satisfied with refugee participants due to their strong motivation to work and learn.
Contact	Opening hours Monday, Tuesday, Thursday, Friday 09.00–11.00 Be sure to describe your case clearly if you contact us through e-mail. If your case is of personal nature, please enter your personal identification number so that we can handle your case more quickly. Telephone Telephone+46 8 508 35 450 Email Emailsfi@edu.stockholm.se Contact a Study and Career Counsellor Opening hours Monday, Tuesday, Thursday 09.00–11.00 Telephone Telephone08-508 88 900 Email Emailsfisyv@edu.stockholm.se
Links	https://www.resettlement.eu/good-practice/labour-market-training-programme-and-swedish-immigrants-swedish-ministry-labour https://www.resettlement.eu/resource/labour-market-training-sfi-swedish-immigrants-project-brochure

Program Title	**Introduction to Data Science and AI (AM course)**
Responsible organisation	University of Gothenburg
Program's Topic	Data science
Target Group	This course is open to employees in both private and public-sector organisations. No prior background in mathematics or engineering is needed.
Timeframe	Registration closes December 19, 2021 at 11:59 PM Starts 01/07/2022 at 8:30 AM
Objectives of the program	Data science is a cross-disciplinary field concerned with extracting useful knowledge from data, whereas AI builds intelligent systems based on this data. Expectations are high on what these fast-changing technologies can be used for. Many ask "How can I apply AI in daily routines, organizational work and business development"? This course you will give you an introduction to Data Science and AI, as well as an understanding of the opportunities and limitations of these technologies. During the course, we will help you start thinking about how Data Science and AI can be used in your own organisation. After the course, you will be able to describe basic concepts and methods in connection to the topic areas and how they have developed. You will also, in a general way, be able to evaluate which approaches to problem-solving are suitable in different situations.
Overview of the program	The course will consist of two half-day workshops together with online lectures and exercises between the workshops. Additionally, you will be asked some questions to think about before the first workshop to maximize the benefit of the course.

	The workshops will mix initial lectures and group exercises to discuss how these technologies can be used to solve business problems. The total workload is approximately 20 hours. The lectures and exercises will together convey knowledge in the following areas: • History and development of AI • Modelling and data science • Algorithms, optimization and classical rule-based AI • Machine-learning based AI • How to use data science and AI in different applications and settings Societal and ethical questions and other consideration
Contact	claes.strannegard@chalmers.se
Links	https://ui.ungpd.com/Events/6ef7bb88-07c0-4866-9ee8-c6cb89dbccb9/Speakers

Program Title	**Fostering Women to STEM MOOCs - FOSTWOM**
Responsible organisation	The consortium consists of the following partners: • UNIVERSITAT POLITÈCNICA DE VALÈNCIA (Spain) • INSTITUTO SUPERIOR TÉCNICO (IST) • Universidade de Lisboa (Portugal) • METID • POLITECNICO DI MILANO (Italy) • CONSERVATOIRE NATIONAL DES ARTS ET MÉTIERS (CNAM) (France) • KTH ROYAL INSTITUTE OF TECHNOLOGY (Sweden) • COLÉGIO AMOR DE DEUS (Portugal) • I.I.S. BENEDETTO CASTELLI (Italy)

Program's Topic	STEM
Target Group	Students, schools and institutions, teachers, private sector
Timeframe	2019-2022, ongoing
Objectives of the program	The FOSTWOM project aims to use the inclusive potential of Massive Open Online Courses (MOOCs) to offer Science, Technology, Engineering and Mathematics (STEM) content free of gender stereotypes. We want to help increase the numbers of female students and women who want to study in STEM-related fields, whether they are university students or MOOC participants. Sharing good practices in video and MOOC design to give girls and women a sense of belonging when entering the STEM field; Spur girls and women to pursue STEM careers, based on role models and examples from the real world; Nurture language choices and examples that can mitigate the effects of stereotypes regarding gender skills in STEM.
Overview of the program	Developing a gender balance Toolkit for MOOC design and development, to support females in pursuing STEM careers, based in our findings, is the very first step. Hence, we want to address instructional designers and teaching staff precisely when they prepare and design (Stumpf et al., 2020) the content for their MOOCs32 so that new MOOCs will have a greater chance in being better gender-balanced in the future. Another use for the toolkit is to support MOOC stakeholders (Teachers/tutors, MOOCs team development members, participants/students) in analysing existing STEM MOOCs so that they can raise awareness on biases against women in STEM.

More specifically, the toolkit should address the following topics in a MOOC:

- Awareness of gender stereotypes in STEM content and activities;
- Female visibility in the STEM subject;
- Female visibility in the MOOC (whenever possible): female teachers, tutors and/or research representatives (role models) in the subject;
- Welcoming gender balance discourse, helping girls recognise their career's relevant skills; 32 See also the SAGA Indicators https://en.unesco.org/saga that measure gender equality according to UNESCO, the Toolkit on Gender-sensitive Communication produced by EIGE https://eige.europa.eu
- Use of discourse that values study, exercise, growth and enhancement, not "talents" or great abilities, during the running of the course;
- Use of inclusive MOOC graphic design, where its images, colours, avatars and videos do not resonate exclusively with male participants;
- Real-life applications of the relevant content towards STEM careers, especially attractive for women;
- Assessment and other activities that are aligned with the content and promote formative feedback and group interactions to build confidence;

Clear statements in advance about the intended learning outcomes, performance standards, and expectations formulated in a gender-balanced way MOOC. The FOSTWOM's Toolkit shall later be disseminated through conferences and the project's webinars and website. Moreover, the production of the MOOC targeted at teaching staff and instructional and graphic designers shall include awareness to present gender-balanced STEM content and activities, which includes instructions on how to use the Toolkit.

	Furthermore, based on the recommendations from sections 3.2 and 4.2, we can infer that bridging MOOCs, produced by a university MOOC team, can provide female High school students with extracurricular learning possibilities and expand their STEM knowledge. At the same time, we also refer that it is essential to produce introductory online courses that can appeal to students with different levels of preparation or background before entering university. In section 5.2, there is a claim that virtual classrooms offered through MOOCs may provide a more comfortable learning space for many female students. Equally important are the MOOCs targeted at undergraduates that foster inclusive environments which support young women in science and engineering, apart from a suitable topic choice. Every such MOOC shall address/include the same topics that we bulleted above.
Results achieved	FOSTWOM Toolkit (see FOSTWOM Toolkit) is designed to be easy to apply in everyday usage. In order to fulfil that requirement, we recognize that the different roles in the MOOC production process may have a limited scope in what they may do. Thus, we have built two different checklists: one for content experts and another for visual designers. Instructional designers are expected to use both, together, and keep under control the consistency between the two. In applying FOSTWOM Toolkit checklists, follow the main principles. REFLECTION from a gender and diversity perspective is the guiding principle." It is a process (learning new skills and professional development) that requires time. A good starting point is to go through the checklist, preferably together with other people involved in MOOCs, to get started thinking and reflecting on how inequality affects teaching and learning in your specific teaching subject.

	Sensitive contexts may require an inclusive approach as the one proposed in the Universal Design for Learning (UDL) Guidelines, taking into account different perspectives. Local culture and language are important. Consider how this checklist applies to your culture and specific language issues, but also consider that MOOCs may be used by anyone in the world. Finally, do not look at single items, but at the overall result of having a better gender-balanced MOOC. All questions should be written affirmatively, so that all respondents understand the content easily. Consider also adopting the Toolkit and adapting it to your own institutional scenario: it will be released with an open license to allow anyone to do it.
Contact	mail@fostwom.com
Links	https://fostwom.eu/?lang=it

TURKEY

Program Title	**Software and Coding**
Responsible organisation	PATİKA
Program's Topic	Software and Coding Education
Target Group	Open to everyone
Language used within the program	Turkish

Specific requirements for participation	None
Objectives of the program	Project objectives: a) Basic Sofware development b) Website development c) Intermediate Sofware development
Links	Website: https://www.patika.dev/tr Social media: https://taplink.cc/patika.dev https://instagram.com/patika.dev

Program Title	**Information Technologies and Communication**
Responsible organisation	BTK
Program's Topic	Information Technologies and Communication
Target Group	Open to everyone
Language used within the program	Turkish
Timeframe	It is change for the programme
Overview of the program	Software / Programming. Cyber security. Digital Design. Self-improvement. Safe Internet. Telecommunications Systems. Regulation. Orientation.

Contact	0312 294 94 94 or 120
Links	Website: https://www.btk.gov.tr/ Social media: https://www.instagram.com/btk/ https://www.facebook.com/BTK https://twitter.com/btkbasin https://www.linkedin.com/company/979452/

WORK-BASED LEARNING ACTIVITIES

3D ART MODELLING INSTALLATIONS FOR MIGRANTS

PART I. GENERAL INFORMATION	
Name of the method	**3D art modelling installations for migrants**
Type of Method	Training
How many trainers/organisers are needed to perform the method?	Trainers: 2 Organisers: 1
How many participants is the exercise or training constructed for? (Scale)	One to ten

How long is the Preparation (a) needed to be able to conduct the method? How long does the application of the method take (b)	a) Preparation ☐ Less than an hour ☐ 1-3 hours, ☐ 4-8 hours, ☐ days ☐ 1 week ☐ 2 weeks – 1 month ☑ several month ☐ a year or more b)Implementation ☐ Less than an hour ☐ 1-3 hours, ☐ 4-8 hours, ☐ 2-4 days ☐ 1 week ☑ 2 weeks – 1 month ☐ several month ☐ a year or more
How does the preparation of the method look like? Do you use f. e. fixed curricula or non-formal planning?	To implement the PBL (problem-based learning) method, the preparation of the training requires the migrant students to: -Analyse 3D cultural heritage: statues and monuments, bridges, buildings, ... -Outlines and sketches, working in groups, their personal 3D sculpture installation -Create the 3D model of the sculpture digitally -Search for errors and iterate until the model is ready -Install the model -Analyse the installed model and, if any, fix errors -Create a presentation so that their artefacts can be shared
How does the documentation of the results look like?	The documentation will be in the form of a presentation of the model installation that the migrants have created.
How would you assess the overall difficulty of the method for the facilitator (a) and the participants (b)	a) Facilitator Level ☐ 1 ☐ 2 ☑ 3 ☐ 4 ☐ 5 b) Participant Level ☐ 1 ☐ 2 ☑ 3 ☐ 4 ☐ 5 Level 1 = no prior knowledge of the subject / similar methods Level 5 =deep experience and knowledge of the subject / similar methods necessary

What is the level of engagement during the activity?	☐ Listen / Learn ☐ Do / Apply ☑ Implement / Create
How do you motivate your participants to apply the method or the learned material beyond the duration of the activity?	The participant can be motivated through the various installments opportunities in museums, city exposures and art galleries. Also the STEM skills developed for the 3D digital art can serve them in a variety of marketing and social sectors.
How do you measure the impact of the method on the participants?	The impact can be measured through the an assessment or a questionnaire before and after the activity takes place.
If there is published material on previous implementation, please share the link.	https://ec.europa.eu/programmes/erasmus-plus/project-result-content/a4aec502-d6b4-4278-87cc-29aae0c79e02/IO2_COMPLETED.pdf

PART II. RELEVANCE FOR STEM TRAINING FOR MIGRANTS

What is the main challenge this method addresses regards to integration of migrants in the STEM field?	☐ unemployment ☐ language barrier ☐ lack of technical language ☐ lack of technical knowledge ☐ lack of cultural competences ☑ lack of competences for job search ☐ lack of competences for application procedures ☐ lack of digital skills for the job market ☐ lack of digital skills for work in STEM

What are secondary challenges this method addresses regards to integration of migrants in the STEM field?	☐ unemployment ☐ language barrier ☐ lack of technical language ☐ lack of technical knowledge ☐ lack of cultural competences ☑ lack of competences for job search ☐ lack of competences for application procedures ☐ lack of digital skills for the job market ☐ lack of digital skills for work in STEM
Which skills are required for participation?	☐ technical Language ☐ technical Knowledge ☐ cultural Competences ☑ competences for job search ☑ competences for application procedures ☐ digital Skills for the Job Market ☐ digital Skills for Work in STEM ☐ foreign language
Which skills does the method develop?	☐ technical Language ☐ technical Knowledge ☑ cultural Competences ☐ competences for job search ☐ competences for application procedures ☐ digital Skills for the Job Market ☐ digital Skills for Work in STEM ☐ foreign language
In which way does the method link STEM education with a positive image of the future career?	Incorporation of action learning techniques, coaching and mentoring, combined with career development/self-reflection tools to support women in STEM and improve their employability skills

What would be the expected impacts of the method?	-Better employability chances -Overall background of migrant women prepared for the labour market -Development of STEM skills
When are the first results/ effects of the method noticeable?	☐ immediately ☐ after a few weeks ☐ after months ☑ after years
What kind of assessment methods do you use in order to follow the impact of the method?	The goal setting sheet filled by the participants will show the point they are with their development process. The ultimate impact will be shown by employing the migrant women in the labour market through STEM skills
Indicate if this method is specific to one STEM field.	☐ Natural Sciences (Physics, Chemistry, Biology). ☐ Technology-related field (ICT /Computer Science, other). ☐ Mathematics. ☐ Engineering. ☐ Medicine and jobs on the health sector ☑ Other: all of them connected with the social entrepreneurial aspect of the migrant women
Is the method easily transferable to all STEM fields? How?	Yes because it provides the participants a mentoring process to establish themselves in the set STEM field of their choice
How innovative is the method and what are the innovative aspects of the methods?	The transferability aspect into different target groups and the complexity of the programme to consider also soft skills as valuable assets in the labour market

How does the promotion of the method look like?	Through social media, websites and networks
SWOT	**Strengths** Complete mentoring programme for migrant women development **Weaknesses** Requires the migrant women motivation in the full process to see the final results **Opportunities** Requires the migrant women motivation in the full process to see the final results **Threats** Technical level requirements for the migrant women for high earning positions
Explain why you think this method should be included in the Curriculum for Inclusion of migrants in the STEM labour markets.	Because it offers action learning techniques, coaching and mentoring, combined with career development/self-reflection tools to support women in STEM and improve their employability skills.

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NZEB FOR ENHANCING STEM SKILLS AND MOTIVATING STUDENTS: INQUIRY-BASED LEARNING, LEARNING-BY-DOING AND LEARNING ON THE JOB AND ON THE FIELD METHODS

PART I. GENERAL INFORMATION

Name of the method	**NZEB for Enhancing STEM skills and motivating Students: Inquiry-based learning, Learning-by-doing and Learning on the job and on the field methods**
Type of Method	Training
How many trainers/organisers are needed to perform the method?	Trainers: 2 Organisers: 1
How many participants is the exercise or training constructed for? (Scale)	11 to 30
How long is the Preparation (a) needed to be able to conduct the method? How long does the application of the method take (b)	a) Preparation ☐ Less than an hour ☐ 1-3 hours, ☐ 4-8 hours, ☐ days ☐ 1 week ☐ 2 weeks – 1 month ☑ several month ☐ a year or more b) Implementation ☐ Less than an hour ☐ 1-3 hours, ☐ 4-8 hours, ☐ 2-4 days ☑ 1 week ☐ 2 weeks – 1 month ☐ several month ☐ a year or more

How does the preparation of the method look like? Do you use f. e. fixed curricula or non-formal planning?	The preparation is fixed curricula based adaptable for migrant students interested in the environmental sector, specifically in energy consumption and energy efficiency. The preparation phase consists in monitoring the school (or any building of choice facing energy poverty) energy consumption. -Weekly monitoring of the electricity meter (i.e. from Monday to the last school working day) over a minimum period of three months -Monitoring of heating related energy consumption over a minimum period of three months -Monitoring of possible cooling related energy consumption -Study of the actual costs (monitoring of energy bills) in previous years
How does the documentation of the results look like?	The results comprise with excel sheets of the evaluation of hidden household consumption of electricity and comparative data for reaching better energy consumption.
How would you assess the overall difficulty of the method for the facilitator (a) and the participants (b)	a) Facilitator Level ☐ 1 ☐ 2 ☐ 3 ☑ 4 ☐ 5 b) Participant Level ☐ 1 ☐ 2 ☑ 3 ☐ 4 ☐ 5 Level 1 = no prior knowledge of the subject / similar methods Level 5 =deep experience and knowledge of the subject / similar methods necessary
What is the level of engagement during the activity?	☐ Listen / Learn ☑ Do / Apply ☐ Implement / Create ☐ Other

How do you motivate your participants to apply the method or the learned material beyond the duration of the activity?	- Organize peer-training activities based on a training schedule - set up a project blog/site as well as a discussion group - organize surveys/interviews in the schools and within the local community; moreover, initiate and implement raising awareness campaigns addressed to the schoolmates, relatives, neighbours, etc.
How do you measure the impact of the method on the participants?	The impact on the participant is measured by the level of impact they can provide for the energy efficiency in their households, schools or any building facing energy poverty, providing a relevant curricula as energy advisors able to monitor and offer solutions to the issue.
If there is published material on previous implementation, please share the link.	https://ec.europa.eu/programmes/erasmus-plus/project-result-content/64364d7d-e85e-4456-a712-342fa33943df/NZEB_Modulo%204._PUB.pdf

PART II. RELEVANCE FOR STEM TRAINING FOR MIGRANTS

What is the main challenge this method addresses regards to integration of migrants in the STEM field?	☐ unemployment ☐ language barrier ☐ lack of technical language ☑ lack of technical knowledge ☐ lack of cultural competences ☐ lack of competences for job search ☐ lack of competences for application procedures ☐ lack of digital skills for the job market ☐ lack of digital skills for work in STEM

What are secondary challenges this method addresses regards to integration of migrants in the STEM field?	☑ unemployment ☐ language barrier ☐ lack of technical language ☐ lack of technical knowledge ☐ lack of cultural competences ☐ lack of competences for job search ☐ lack of competences for application procedures ☐ lack of digital skills for the job market ☑ lack of digital skills for work in STEM
Which skills are required for participation?	☑ technical Language ☐ technical Knowledge ☐ cultural Competences ☐ competences for job search ☐ competences for application procedures ☐ digital Skills for the Job Market ☐ digital Skills for Work in STEM ☐ foreign language
Which skills does the method develop?	☐ technical Language ☑ technical Knowledge ☐ cultural Competences ☐ competences for job search ☑ competences for application procedures ☐ digital Skills for the Job Market ☐ digital Skills for Work in STEM ☐ foreign language
In which way does the method link STEM education with a positive image of the future career?	The training on the job requires that stakeholders inviting classes to make study visits and practical workshops to enable pupils to understand the various concrete applications of the topics they are working on, giving them an outlook for the future choice of university and work.

	At the end of the activities the students will have acquired skills in STEM, basic and transversal, as self-employment, skills and digital English language.
What would be the expected impacts of the method?	-Training curricula as energy advisors -Integration in the labour market -Increased participation in community problems related to energy efficiency -Developed technical knowledge
When are the first results/ effects of the method noticeable?	☐ immediately ☐ after a few weeks ☑ after months ☐ after years
What kind of assessment methods do you use in order to follow the impact of the method?	A survey can be sent to the participants to the activities to report their situation in terms of STEM career and how useful was the activity into their upskilling process.
Indicate if this method is specific to one STEM field.	☐ Natural Sciences (Physics, Chemistry, Biology). ☐ Technology-related field (ICT /Computer Science, other). ☑ Mathematics. ☑ Engineering. ☐ Medicine and jobs on the health sector
Is the method easily transferable to all STEM fields? How?	Excel to visualize the energy consumption per student in each country
How innovative is the method and what are the innovative aspects of the methods?	The energy efficiency sector as an all is underdeveloped and requires experts. Secondly the fact that migrant students will be able to impact a variety of buildings facing energy poverty with the same positive impact solutions.

How does the promotion of the method look like?	Through distribution in all the several buildings facing energy poverty as an innovative solution benefiting the community as an all and the integration of migrants in those communities through relevant work requirements.
SWOT	**Strengths** Pre set excel sheet for the data collected **Weaknesses** Lack of skills **Opportunities** Employability **Threats** Difficultiesin calculation process or comparative data
Explain why you think this method should be included in the Curriculum for Inclusion of migrants in the STEM labour markets.	Because it offers relevant technical skills for the further development of migrant by integrating them in community based solutions where they can provide monitoring and proper solutions to fix the energy poverty through efficient solutions.

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