STEAMigPOWER

STEAM approaches at higher education for mIGrants, refugees and asylum seekers' emPOWERment

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A3: Final Report on the strategies and methodologies for the STEAMigPOWER Intensive Programs

WP3: STEAMigPOWER Intensive Program

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ABSTRACT

The STEAMigPOWER project focuses on developing STEAM courses tailored for migrants/refugees and asylum seekers (MRAS), with special emphasis on women and upper secondary school pupils who are vulnerable to marginalization. The objective is to address the pressing need for inclusive education and sustainable development. Five STEAM courses will be designed, primarily centered around environmental, climate change, and sustainable development topics. Work Package WP3 seeks to assess the current state of STEAM courses and other Higher Education (HE) initiatives directed towards MRAS in Europe. It aims to understand the needs of the target group and promote their social and cultural integration. The assessment utilizes two tailored questionnaires, complemented by Qualitative Data Analysis, specifically Thematic Analysis, to identify patterns and obtain valuable insights. The investigation of strategies and methodologies for STEAM in Europe (WP3.A1) yielded positive feedback from educators who support innovative teaching using ICT and new pedagogical approaches. However, challenges related to financial support, limited access to hardware, and lack of training were reported, while methods and instruments should be more engaging. The investigation of HE initiatives/courses for MRAS (WP3.A2) highlighted efforts to provide language courses and socio-economic integration programs. However, a lack of specific STEAM courses for the target group was evident. The report stresses the need to carefully design and freely offer STEAM courses to attract learners from the vulnerable groups and address the labor shortages in Europe and the future needs of their home countries. The report emphasizes the Universal Design for Learning (UDL) guidelines as vital tools for optimizing teaching and learning experiences, especially for learners facing exclusion and challenges, like MRAS and women. UDL guidelines do not dictate rigid methods but offer adaptable recommendations to create inclusive learning environments. The report also highlights SDG Academy, an invaluable resource for free, open educational content on sustainable development. Its Mission 4.7 fosters collaboration among various stakeholders to promote Education for Sustainable Development and the importance of education in achieving the Sustainable Development Goals (SDGs). This initiative aligns with the STEAMigPOWER project's goals and methodologies, providing further support for the development of transformative education. STEAMigPOWER seeks to empower marginalized learners by providing tailored STEAM courses that foster inclusive education and sustainable development. The project draws on existing good practices, UDL guidelines, and resources like the SDG Academy to ensure the success of its Blended Intensive Program. By bridging educational gaps and promoting transformative education, STEAMigPOWER aims to create accessible and meaningful learning experiences for all learners, making significant strides toward achieving the SDGs.

1. INTRODUCTION

1.1 STEM/STEAM

Education's history goes back thousands of years. Its primary objective was and is to prepare individuals for success in life. In ancient times, education often prioritized the development of practical skills such as hunting, fishing, and knowledge of agriculture. In the modern era, the goals of education have evolved to include the cultivation of problem-solving abilities, critical thinking skills, and the nurturing of responsible citizens and lifelong learners (Spector et al, 2014).

Educational objectives can be deconstructed into specific learning outcomes (LOs), supported through instruction and performance support. LOs can be categorized into distinct domains or clusters of related knowledge and skill sets, which then form integral parts of a curriculum. For instance, the objective of developing critical thinking can be broken down into sub-goals such as analyzing arguments, identifying assumptions, evaluating evidence, and formulating implications (Fisher & Scriven, 1997). At a certain level of decomposition, it becomes possible to define measures and assessments associated with competent or exemplary performance. This line of thinking, from overall goals to clustered objectives with corresponding assessments, forms the foundation of competency-based curricula implemented in various educational settings, including primary, secondary, and tertiary levels across multiple subject areas (Khine & Areepattamannil, 2019).

The twenty-first century has witnessed remarkable technological advancements and the global spread of globalization, surpassing previous decades' events. A growing emphasis has been given on competency-based curricula derived from societies' efforts to enhance their capacity to create and sustain globally competitive economies (Rust et al, 2010). Educators worldwide are dedicated to preparing the next generation of students to be technologically literate and develop an interest in subjects like science, technology, engineering, and mathematics (STEM). However, the goal is not to teach these subjects in isolation, but rather integrate them through an interdisciplinary approach. This approach seeks to connect different disciplines into a cohesive entity known as STEM. According to Tsupros et al (2009), STEM education involves an interdisciplinary learning approach where rigorous academic concepts are combined with real-world lessons. Students apply science, technology, engineering, and mathematics in contexts that establish connections between school, community, work, and the global sphere. This approach fosters the development of STEM literacy, enabling individuals to compete in the new economy.

Alongside advancements in STEM education, educators are increasingly advocating for equipping the younger generation with twenty-first-century skills such as creativity, innovation, and entrepreneurship to thrive in future society. There is an ongoing debate among educators about integrating "arts" into the STEM curriculum to enhance much-needed creativity and innovation (Guyotte et al, 2014). By incorporating arts and design, STEM can evolve into STEAM (Liao, 2016). Ge et al (2015) define STEAM as the integration of liberal arts and humanities into STEM education. This may involve adding arts and humanities as a fifth discipline area, or adopting a broader transdisciplinary approach that combines liberal arts and humanities with STEM (Nicolescu, 2008; Spector & Anderson, 2000).

The concept of STEAM, encompassing science, technology, engineering, arts, and mathematics, is an emerging discipline that aims to provide a well-rounded approach to education (Rolling, 2016). However, Henriksen (2017) rightfully highlights that viewing STEAM solely as arts integration poses challenges since many science teachers may lack artistic training. Therefore, there is an urgent need to explore meaningful ways to integrate arts into STEM. While there is ample information about STEM education in the literature, the development of theories, best practices, and practical applications in this interdisciplinary field is still limited. Evidence supports the idea that a liberal arts education, enriched with a strong infusion of humanities, can effectively prepare individuals for success in occupations requiring creative and flexible thinking (Ferrall, 2011).

STEAM, championed by the Rhode Island School of Design, is a movement aimed at integrating art and design into STEM curricula (http://stemtosteam.org). Research on the impact of STEAM curricula on learning primarily relies on qualitative approaches, such as case studies, given the relatively young nature of the movement without extensive large-scale empirical studies. The impact of STEAM can be observed in numerous transmedia books that have emerged from several educational institutions (e.g. Bernardo, 2011; Pratten, 2011; Phillips, 2012).

Integrating the liberal arts and humanities into STEM education can highlight the development of skills associated with aesthetics, innovation, and creativity. The success of STEM-related products often depends on

non-technical aspects, such as their aesthetic appeal to users. Familiarity with design arts can significantly enhance the development of various products by engineers and technologists. Moreover, a sense of history provides a foundation for thinking about alternatives and innovative applications. To achieve a balanced emphasis on the educational goals advocated by educators, it is crucial to include an understanding of individuals, groups, cultures, nations, and areas such as design and public service (Dewey, 1916).

1.2 THE STEAMigPOWER PROJECT

1.2.1 PROJECT SUMMARY

UNHCR's 2019 education strategy, "Refugee Education 2030: A strategy for refugee inclusion", states that only 3% of refugees have access to Higher Education (HE) as opposed to the 37% global HE access rate. The STEAMigPOWER project intends to overcome the waste of talent and human potential in the foreseen target group. Taking into account the large number of migrants that partnership countries are receiving during the last years, this is the time for building bridges instead of walls. Efforts should focus on a common goal, not only between the European Union (EU) countries and the communities who are arriving, but also inside and between the EU countries. The consortium intends to attract migrants, refugees and asylum seekers (MRAS) to HE. This way they can acquire the educational tools needed to enter the workforce and develop knowledge, skills, and values that lead to continued wealth and prosperity for themselves and for the communities they will be integrated in.

STEAMigPOWER focuses on the development of STEAM courses to be provided to MSAR, including women and pupils in upper secondary school (15-18 years old), who are particularly vulnerable to being marginalized in STEAM. The consortium will develop five (5) STEAM courses, mainly in the environment, climate change and sustainable development study fields. This aligns not only with EU priorities, but also with their home countries' needs. Participants are prepared to remain in Europe in the future as well as to return to their home countries. When conflicts seize, they can engage in rebuilding them in a sustainable way, now equipped with the appropriate tools and skills.

1.2.2 TARGET GROUPS

The target groups of this research project are:

1) Migrants, refugees and asylum seekers (end-users of the results). They are the final beneficiary of the project, and its results are intended to increase and enhance the opportunities and education quality that they receive when they arrive and settle in European countries. The face-to-face courses will be focused on women and pupils (15-18 y.o.), while the online courses will be available to all.

2) HE Institutes (HEIs) management boards, professors, researchers, administrative staff of the HEIs, who will be provided with a set of tools that will enable them to replicate the STEAMigPOWER Intensive Program at their own institutions, as well as guidelines/good practices reports to create new STEAM courses. They will also be able to contribute to the VLE platform uploading relevant content and courses to be made available to the MSAR, refugees and asylum seekers. A network of European HEIs would be a great final deliverable.

3) Professors, technicians and educators of upper secondary school, who will be able to use the online courses in their classroom as well as to use the guidelines/good practices reports to create new STEAM courses.

4) Public authorities, NGOs, associations, education and training institutions, youth, youth workers and young people in general (stakeholders, experts or practitioners in the field and other interested parties), who will also receive a positive impact from the results of STEAMigPOWER and will foster the implementation of the results of the projects. They will be provided with material and courses to present to the new migrants arriving to their countries.

1.2.3 PROJECT'S MAIN OBJECTIVES

The STEAMigPOWER project's main objectives are:

1. Development of the 2-days STEAMigPOWER Introductory Blended Intensive Program on EU Social Inclusion and Digital Storytelling. The program will be delivered at the partners HEIs to at least 250 MRAS (50 per HEI), focusing on women and pupils in upper secondary school (15–18 years old).

2. Development and delivery of the 5-days on-site STEAMigPOWER Intensive Program on Environment and Fight against Climate Change. This includes delivery of a total of 5 STEAM courses. These will be delivered at the partners HEIs to at least 250 MRAS (50 per HEI), focusing on women and pupils in upper secondary school (15–18 y.o.).

3. Development of an open-access VLE platform to deliver the online courses created within the project, aiming also at the participation and content production by other European and worldwide institutions, who are interested in contributing to this cause after the project's lifetime – creation of the STEAMigPOWER network.

4. Development and delivery of the STEAMigPOWER Intensive Program Modules in online format, to be available at the VLE platform (aiming at reaching at least 500,000 MRAS).

1.3 WORK PACKAGE 3 (WP3)

Work Package 3 (WP3) is directly linked to the project's main objectives 2 and 4. As a result of WP3, the aim is to map and cluster strategies and methodologies for STEAM in Europe, as well as to map and cluster initiatives/courses directed to MRAS in European HEIs. This outcome is expected to provide a current appraisal of the situation regarding STEAM courses and other HE activities specifically designed to MRAS who have arrived in Europe in the last years. This package is therefore designed to provide an in-depth and grounded understanding of the EU current needs in the HE integration of the target group, including also the social and cultural integration. This will support the development and definition of strategies and methodologies for the specific STEAM Intensive Programs.

WP3 typically comprises the following 10 Tasks/Deliverables:

A1. Report on the state of the art of strategies and methodologies for STEAM in Europe

A2. Report on the state-of-the-art of HEI initiatives/courses directed to refugees/asylum seekers in Europe, focusing on women and pupils in upper secondary school.

A3. Final Report on the strategies and methodologies for the STEAM Intensive Programs

A4. Design of five (5) STEAM courses to be delivered in the STEAMigPOWER Intensive Program.

A5. Guidelines to deliver the STEAMigPOWER Intensive Program Modules.

A6. Training of Trainers for delivering the STEAMigPOWER Intensive Program.

A7. Delivering STEAMigPOWER Intensive Program to 250 participants.

A8. Report on best practices for delivering successful online STEAM courses.

A9. Guidelines to create and deliver the online STEAM Intensive Program Modules.

A10. Report on the adaptation of the STEAM Intensive Program Modules to online courses.

The current report, A3, is the final report on the strategies and methodologies for the STEAM Intensive Program, trying to analytically present all results of Reports A1 and A2, as well as merge all valuable relevant conclusions. This report will directly feed the creation of the courses and provide valuable guidelines, from best practices or/and grave shortages and insufficiencies, for the final educational products.

2. METHODOLOGY AND DATA

This section of the final report A3 of WP3 presents the methodology and tools used to discover and document the strategies and methodologies for STEAM in Europe and the initiatives/courses directed to MRAS in Europe. The above constituted the aims and scopes of the reports A1 and A2 and refer to official/typical secondary education and higher education institutions. The methodology of investigating initiatives/courses related to STEAM education or MRAS in a broader range of institutions/providers/carriers is also presented here.

2.1 INVESTIGATING STRATEGIES AND METHODOLOGIES FOR STEAM IN EUROPE

The investigation for strategies and methodologies for STEAM in Europe is linked with report A1 of WP3 of the STEAMigPOWER project. The related research and report authoring was conducted by the University of Perugia (Università degli Studi di Perugia - UNIPG). The authors' team includes E. Di Giacomo, N. Faginas-Lago, M. Fornaciari Da Passano, and M. Rosi.

Report A1 was linked with STEAMigPOWER objectives 2 and 4. Report A1 intended to map and cluster strategies and methodologies for STEAM in Europe. The consortium had proposed to analyse at least 30 HEIs within the project proposal, but during the kick-off meeting all partners unanimously agreed that the analysis should be extended to Secondary Education, considering that courses would be delivered to students from this target group. In the first stage of this activity, the partners carried out desk research to identify HEIs and Schools that provided STEAM courses at the time. These HEIs and Schools constituted the target group that could provide relevant information. In a second stage, quantitative and qualitative data was collected via a detailed questionnaire (Questionnaire 2) that was assigned to the "target group".

2.1.1 QUESTIONNAIRE 1 PRESENTATION

The questionnaire (Questionnaire 1) assigned to the HEIs and Secondary Schools "target group", namely professors and teachers asked questions concerning available STEAM classes in the institution/school and pedagogical approaches and resources available for STEAM teaching, while also documented shortages and inefficiencies in STEAM teaching. It also gathered data regarding support and professional development for STEAM teaching, Information and Communications Technology (ICT) in STEAM teaching. Moreover, open questions were addressed to the interviewees about the ideal profile of the respective teaching personnel, while professors and teachers were asked to share their personal thoughts. Finally, demographic information was also registered. The original form of the questionnaire is presented in ANNEX I.

2.1.2 SAMPLE OF INTERVIEWEES

The sample of interviewees consists of two groups: professors from Higher Education Institutions (HEIs) and teachers from Secondary Education (SE) Schools, from all six countries participating in the project (Portugal, Italy, Spain, Turkey, and Cyprus). A total of 25 HE professors from several specific study fields answered Questionnaire 1 (and the respective question 1, Q1_1). The individual answers were clustered into a more generic study field, resulting in a total of six courses in Chemistry (24%), three in Mathematics and in IT & Informatics (12% each), two in Biology, in Water Resources and in Fluid Mechanics (8% each) and several in different other fields, namely in Sustainability (4%), Industrial Engineering and Management (4%), Anatomy & Physiology (4%), Genetics (4%), Ecohydraulics (4%), Geology (4%), and Civil Engineering (4%). This categorization is graphically presented in Figure 1. As far as SE is concerned, a total of 20 teachers from several study fields answered Questionnaire 2, nine of them teaching Programming and Technology related courses (45%), five lecturing Chemistry and Physics (25%), four in Mathematics and in Biology and Science (20%), and two in Literature (10%). The individual answers were clustered into more generic fields. This categorization is graphically presented in Figure 2. The answers of both education levels were analyzed separately to check if there are similarities and/or differences in the needs and suggestions of both groups.
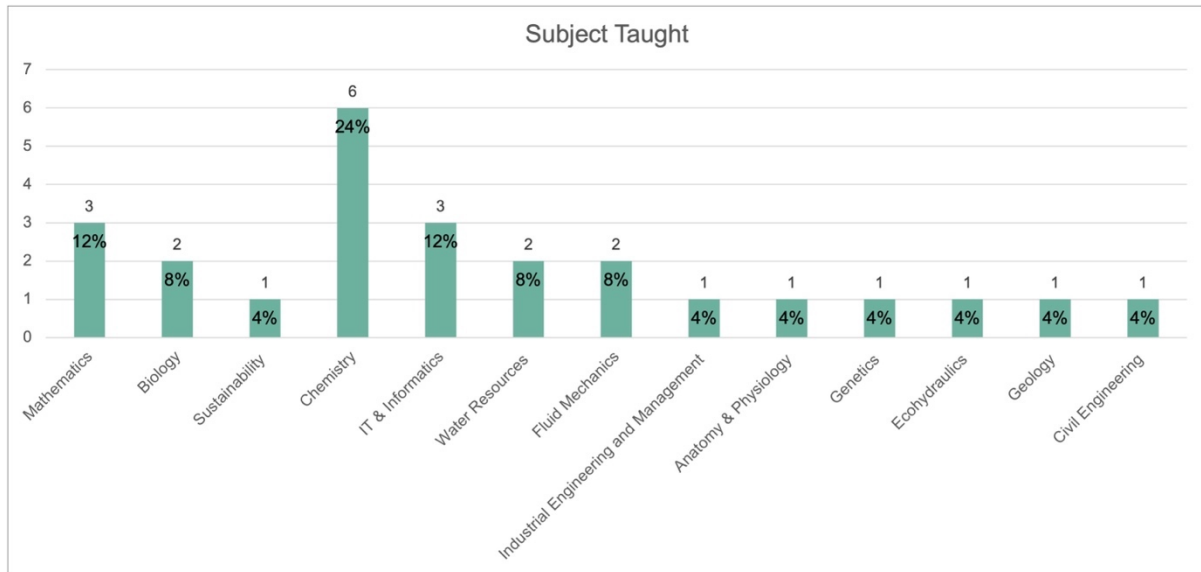
Figure 1. Study fields of Higher Education professors that answered Questionnaire 1 concerning "strategies and methodologies for STEAM in Europe", that is linked with WP3 Report A1.
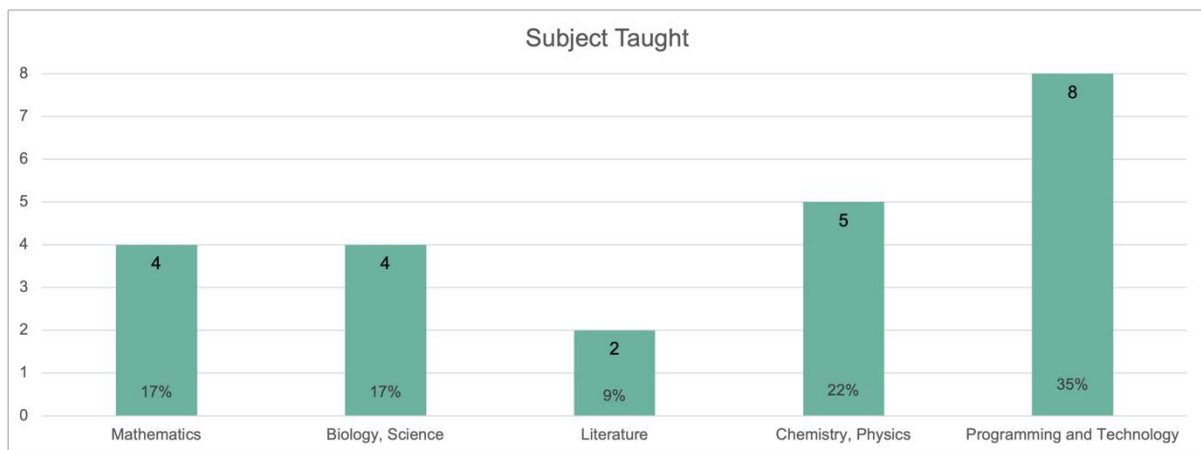
Figure 2. Study fields of Higher Secondary Education teachers that answered Questionnaire 1 concerning "strategies and methodologies for STEAM in Europe", that is linked with WP3 Report A1.

2.1.3   DATA ANALYSIS

Collected data was analysed through Qualitative Analysis. Qualitative data analysis (QDA) is the process of organising, analysing, and interpreting qualitative data — non-numeric, conceptual information and user feedback — to capture themes and patterns, answer research questions, and identify actions to take to improve the product or the current state as for the case of this project. The qualitative method used however was Thematic Analysis that helps identify, analyse, and interpret patterns in qualitative data (Graham Gibbs, 2018).

2.2 INVESTIGATING INITIATIVES/COURSES DIRECTED TO REFUGEES/ASYLUM SEEKERS IN EUROPE

The investigation for initiatives/courses directed to refugees/asylum seekers in Europe is linked with report A2 of WP3 of the STEAMigPOWER project. The related research and report authoring was conducted by the Middle East Technical University (Orta Doğu Yüksek Teknoloji Enstitüsü – METU). The authors' team includes Prof. Dr. Gaye Teksöz and Esra Akgül-Şişli.

Report A2 was linked with STEAMigPOWER objectives 2 and 4. Report A2 intended to map and cluster initiatives/courses targeting MRAS in European HEIs, providing a current assessment of the situation regarding STEAM courses and other higher education activities specifically directed at MRAS who have arrived in Europe in recent years. To achieve this goal, a relevant questionnaire (Questionnaire 2) was delivered to several European HEIs. Due to the limited number of timely responses, all partners conducted desk research

for obtaining the data needed. All quantitative and qualitative data collected via both methods were merged and ready to be analysed.

2.2.1 QUESTIONNAIRE PRESENTATION

The questionnaire (Questionnaire 2) assigned to the "target group" of HEIs, or the questions of which were attempted to be answered via desk research by the partners of STEAMigPOWER, included questions concerning general information, types of initiatives offered, specific initiatives to develop skills for socio-economic integration, courses on environmental issues, and best practices., while it focused on women and/or pupils It consisted of 16 questions, four of them being Multiple Choice and 12, open ended. The original form of the questionnaire is presented in ANNEX II.

2.2.2 SAMPLE OF INTERVIEWEES

As proposed in the project proposal, there should be a group of at least 60 HEIs to be analysed regarding the initiatives/courses directed to migrants, refugees and asylum seekers, focusing on women and pupils. Each partner had to deal with at least 10 HEIs. The list of institutions reached (62) are presented in Table 1, together with the method of data acquisition (answered by a HEI representative or via desk research conducted by one of the partners).

Table 1. The sample of HEIs investigated in Report WP3.A3 and the respective method of data acquisition.

Nr	Country	Institution	Data obtained by
1	Bulgaria	Sofia university "St. Kliment Ohridski"	Online questionnaire
2	Bulgaria	Sofia university	Online questionnaire
3	Estonia	Tallinn University of Technology	Online questionnaire
4	France	Dauphine-PSL	Online questionnaire
5	Greece	Aristotle University of Thessaloniki	Desk research
6	Greece	University of Macedonia	Desk research
7	Greece	Hellenic Open University	Desk research
8	Greece	University of Ioannina	Desk research
9	Greece	International Hellenic University	Desk research
10	Italy	Sapienza University of Rome	Online questionnaire
11	Italy	Università degli studi di Napoli Federico II	Online questionnaire
12	Italy	University of Perugia	Online questionnaire
13	Italy	CPIA "G. FOTI" VITERBO	Online questionnaire
14	Italy	University of Tuscia	Online questionnaire
15	Italy	UNIVERSITY OF CATANIA	Online questionnaire
16	Italy	University of L'Aquila	Online questionnaire
17	Italy	University of Camerino	Online questionnaire
18	Italy	University of Teramo	Online questionnaire
19	the Netherlands	Wageningen University	Online questionnaire
20	Poland	University of Lodz	Online questionnaire
21	Portugal	Faculdade De Letras De Lisboa	Online questionnaire
22	Portugal	University of Coimbra	Online questionnaire
23	Romania	"Dunărea de Jos" University of Galati	Online questionnaire
24	Romania	Gheorghe Asachi Technical University of Iasi - TUIASI	Online questionnaire
25	Romania	Ovidius University of Constanta	Online questionnaire
26	Spain	Universidad Autónoma de Madrid	Online questionnaire
27	Spain	Universitat Oberta de Catalunya (UOC)	Online questionnaire
28	Spain	Universitat d'Alacant	Online questionnaire
29	Spain	Universitat Autònoma de Barcelona	Online questionnaire
30	Spain	Universidad Politécnica de Madrid	Online questionnaire
31	Spain	Universidad Complutense de Madrid	Online questionnaire
32	Spain	Universidade de A Coruña	Online questionnaire
33	Spain	Universitat de Girona	Online questionnaire
34	Spain	Universitat Politècnica de Catalunya	Online questionnaire

Nr	Country	Institution	Data obtained by
35	Spain	UVigo	Online questionnaire
36	Spain	University of Granada	Online questionnaire
37	Spain	University of Lleida	Online questionnaire
38	Türkiye	Ağrı Ibrahim Çeçen University	Online questionnaire
39	Türkiye	Institution for Migration (Hacettepe University)	Online questionnaire
40	Türkiye	Afyon Kocatepe University	Online questionnaire
41	Türkiye	Ted University	Online questionnaire
42	Türkiye	Middle East Technical University	Online questionnaire
43	Türkiye	Eskişehir Osmangazi University	Online questionnaire
44	Türkiye	Gazi University	Online questionnaire
45	Türkiye	Hasan Kalyoncu University	Online questionnaire
46	Türkiye	Istanbul Medeniyet University	Online questionnaire
47	Türkiye	Gaziantep University	Online questionnaire
48	Türkiye	Van Yüzüncüyıl University	Online questionnaire
49	Cyprus	Open University of Cyprus (State Uni)	Desk research
50	Cyprus	University of Cyprus	Desk research
51	Cyprus	University of Nicosia (Private Uni)	Desk research
52	Cyprus	Cyprus University of Technology	Desk research
53	Cyprus	European University of Cyprus (Private Uni)	Desk research
54	Cyprus	Frederick University (Private Uni)	Desk research
55	Cyprus	Neapolis University Pafos (Private Uni)	Desk research
56	Sweden	Linkoping University	Desk research
57	Germany	Humboldt-Universität zu Berlin (HU)	Desk research
58	Germany	Leipzig University	Desk research
59	Germany	University of Cologne	Desk research
60	Germany	University of Kassel	Desk research
61	Poland	University of Warsaw	Desk research
62	UK	University of East London	Desk research

2.2.3 DATA ANALYSIS

The data analysis is similar to the report A1 case. Collected data was analysed through Qualitative Analysis (QDA). The qualitative method used however was Thematic Analysis that helps identify, analyse, and interpret patterns in qualitative data (Graham Gibbs, 2018).

2.3 INVESTIGATING INITIATIVES/COURSES DIRECTED TO REFUGEES/ASYLUM SEEKERS IN EUROPE OUTSIDE OF THE TYPICAL EDUCATION

The two first stages of WP3 investigated strategies and methodologies for STEAM in Europe (relevant report: A1) as well as initiatives/courses directed to MRAS in Europe (relevant report: A2). The respective research was focused on Secondary Education and Higher Education Institutions. A broader investigation is needed in order to discover and document more good practices on both STEAM education and education directed to MRAS so that the consortium will create a pool of good ideas, practices and guidelines for the creation of the Intensive Program. Desk research is the key tool towards this direction.

2.3.1 SDG ACADEMY

One of the main early findings/tools that is proved to be extremely helpful is the SDG Academy (https://sdgacademy.org/). It comprises free, open educational resources from experts on sustainable development. The SDG Academy is an excellent source of high-quality resources and guidance on education for the Sustainable Development Goals (SDGs), with the mandate to enrich the field of sustainable development and advance Agenda 2030. The SDG Academy is hosted by the SDSN Association, a global initiative for the United Nations, and was launched in September 2016. The SDG Academy represents the education and training division of the Sustainable Development Solutions Network (SDSN; https://www.unsdsn.org/), with the mandate of promoting transformative education through the creation and curation of high-quality content on sustainable development, sharing of innovative pedagogies and training

models, and providing open access to learning resources for a global audience. SDSN was established in 2012 under the auspices of the UN Secretary General to mobilize global academic expertise to promote practical solutions for the SDGs.

SDG Academy brings together the world's leading experts to create and deliver educational material on critical issues for the future of the people and planet. Their communities of practice are mobilizing an educational movement to achieve the SDGs, and their degree and certificate programs are providing essential skills and credentials to a growing cohort of sustainable development practitioners. According to them, education and knowledge is the first step towards achieving the Sustainable Development Goals (SDGs).

An interesting initiative by SDG Academy is Mission 4.7. It was founded by the SDG Academy and the Global Schools Program, both flagship programs of the UN Sustainable Development Solutions Network, in partnership with the Ban Ki-moon Centre for Global Citizens, UNESCO, and the Center for Sustainable Development at Columbia University. Mission 4.7 brings together leaders from government, academia, civil society, and business to accelerate the implementation of Education for Sustainable Development around the world and highlight the critical importance of education in achieving the Sustainable Development Goals (SDGs).

Mission 4.7 recognizes that in order to achieve the SDGs, it is crucial for people to acquire this knowledge, values, and skills, enabling communities to better respond to the external challenges while promoting more equitable, inclusive, and resilient societies. SDG Target 4.7 calls on all governments to ensure all learners acquire the knowledge and skills needed to promote sustainable development, through Education for Sustainable Development and sustainable lifestyles, human rights, gender equality, promotion of peace and non-violence, global citizenship, and appreciation of cultural diversity. Mission 4.7 will build on and draw upon UNESCO's global leadership in Education for Sustainable Development and Global Citizenship Education (GCED), as mandated by its member states and the UN General Assembly, as well as on its responsibility for the monitoring of Target 4.7. The initiative will ensure alignment with UNESCO's global frameworks and conceptualizations, and complement existing programs already underway in this context. In addition to advocating for the achievement of SDG Target 4.7 at global, national, and local levels, Mission 4.7 will also curate and create relevant educational resources, push countries for greater investments in quality education, and identify ways to train and support educators around the world.

Transformative Education is an umbrella term that encompasses the common objectives and methodologies of the types of education outlined in SDG Target 4.7, including education for sustainable development, global citizenship education, environmental education, climate education, peace and human rights education, and others. Transformative Education delivers not only the knowledge, but also the competencies, values, and skills necessary for current and future generations to achieve the goals outlined in the 2030 Agenda and the Paris Climate Agreement. Transformative education applies to learners of all ages and levels.

The SDG Academy website's content includes "Courses" (https://sdgacademy.org/courses), a "Book Club" (https://sdgacademy.org/book-club-with-jeffrey-sachs) and the "SDG Library" (https://sdgacademy.org/sdgacademy-library).

The courses can be browsed by:

- Available courses
- Archived courses
- Self-paced courses
- Instructor-paced courses
- SDG Academy courses
- Partner courses

They can also be browsed by the relevant SDG (Figure 3) or by the expert that created the course.

Figure 3. Sustainable Development Goals as declared by the United Nations (source: https://www.un.org).

The Book Club with Jeffrey Sachs is a free global forum to discuss outstanding, recently-published work that examines the most important topics for humanity. Hosted by Columbia University Professor Jeffrey Sachs, the eminent thought-leader in economics and sustainable development, the Book Club features monthly conversations with renowned authors about their groundbreaking work in sustainability, economics, history, social justice, and more.

The SDG Academy Library provides a platform to expand the reach of high-quality, open educational materials on sustainable development and distribute the knowledge as a global public good with the intention to share, integrate, and contextualize its videos. This video library hosts over 1800 videos on the 17 Sustainable Development Goals. The videos can be browsed by:

- Language (English, Spanish, French, Portuguese)
- Lecturer (alphabetically)
- SDG (see the 17 SDGs in Figure 3)
- Series (presented in Table 2)
- Subject (presented in Table 3)
- Community portal (user-selected subscribed channels)

Table 2. The titles of Series that the user can choose from in the SDG Academy Library generally evaluated concerning relevance to STEAM education and/or MRAS education (data from: https://sdgacademy.org/sdgacademy-library)

Nr	Title of Series	STEAM	MRAS
1	Age of Sustainable Development	X	
2	Alianzas: un vehículo para lograr el desarrollo sostenible	X	
3	Book Club with Jeffrey Sachs		
4	The Best Start in Life: Early Childhood Development		
5	Changing Behaviour for Sustainable Development	X	
6	Cities and the Challenge of Sustainable Development	X	
7	Climate Action: Solutions for a Changing Planet	X	
8	Climate Change Science and Negotiations	X	
9	Climate Change: The Science and Global Impact	X	
10	Conversations with Global Leaders		
11	The COVID-19 Pandemic		
12	Ecosystem-based Adaptation	X	
13	Environmental Security and Sustaining Peace		
14	Equity and Inclusion in Education		X
15	Ethics in Action		X
16	Feeding a Hungry Planet	X	
17	Freedom Now: The Economic and Political Alternative		X
18	From the Ground Up: Managing Our Terrestrial Ecosystems	X	
19	Getting a Good Deal: Negotiating Extractive Contracts		
20	Global Public Health		
21	Globalization: Past and Future	X	
22	Governance for Transboundary Freshwater Security	X	
23	How to Achieve the SDGs	X	
24	Human Rights Human Wrongs		X
25	Industrial Policy in Africa		X
26	Islamic Finance for the Sustainable Development Goals		X
27	The Korean Story: Secrets of an Economic Miracle		
28	Lancet Commission: COVID-19		
29	Laudato Si': Care for Our Common Home	X	
30	Living Heritage and Sustainable Development	X	
31	Macroeconomics for a Sustainable Planet		
32	Making Universal Social Protection a Reality		
33	Measuring Sustainable Development	X	
34	Natural Resources for Sustainable Development	X	
35	Nature-based Solutions for Disaster and Climate Resilience	X	
36	Nuestro Futuro	X	
37	One Health in Practice		
38	One Planet - One Ocean	X	
39	Organising for the SDGs	X	
40	Planetary Boundaries and Human Opportunities		X
41	SDSN Spotlights	X	
42	Siena International School of Sustainable Development	X	
43	Sustainable Cities	X	
44	Sustainable Development: The Post-Capitalist Order	X	
45	Sustainable Food Systems: A Mediterranean Perspective	X	
46	Tech For Good: The Role of ICT in Achieving the SDGs	X	
47	The Turn: From Reactionary Populism to a Progressive Alternative		
48	Transforming Our World: Achieving the SDGs	X	
49	Understanding Poverty and Inequality		
50	Water: Addressing the Global Crisis	X	
51	Webinars	X	
52	Work and Employment for a Sustainable Future		

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Table 3. Subjects and various sub-categories that the user can choose from in the SDG Academy Library generally classified concerning relevance to STEAM education and/or MRAS education (data from: https://sdgacademy.org/sdgacademy-library)

Nr	Subjects	Sub-categories	STEAM	MRAS
1	Business and Management	Business and Management		
2	Economics	Development Economics		
3		Environmental Economics		
4		Finance		
5		Macroeconomics		
6	Education	Early Childhood Education		X
7		Education for Sustainable Development	X	
8		Education Policy	X	
9		Higher Education	X	
10		Primary and Secondary Education	X	
11	Global Studies	Global Governance		
12		Human Rights		X
13		International Security		
14		Migration Studies		X
15	Health	Food and Nutrition		
16		Public Health		
17		Wellness		
18	Information Technology	Information Technology	X	
19	Law	International Investment Law		
20	Policy	Environmental Policy	X	
21		Fiscal Policy		
22		Industrial Policy		
23		Public Policy		
24	Science	Climate Science	X	
25		Earth Science	X	
26		Energy Systems	X	
27		Environmental Science	X	
28		Marine Biology	X	
29		Oceanography	X	
30	Social Sciences	Early Childhood Development	X	
31		Ethics		X
32		Gender Studies		X
33		History		X
34		Philosophy		
35		Psychology		X

The user can also search the whole database of courses, videos etc. using keywords. Section 3.4 presents results of the investigation of courses relevant to the goals of STEAMigPOWER and its STEAM Intensive Program. The creators of the related courses and online educational resources will benefit from the good practices and the accumulated and accumulating experience of the material on the SDG Academy platform.

2.3.2 THE UDL GUIDELINES

The preparation of educational material should be based on guidelines for optimal teaching and learning, especially when the learners belong to the weaker section of societies, experiencing exclusion and other problems, just like migrants, refugees, asylum seekers, women etc. A useful tool towards this direction is the Universal Design for Learning UDL guidelines (https://udlguidelines.cast.org/).

The UDL Guidelines are a tool used in the implementation of Universal Design for Learning, a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn. The guidelines were created by the Center for Applied Special Technology (CAST). CAST is a nonprofit education research and development organization that created the Universal Design for Learning framework

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(https://www.cast.org/impact/universal-design-for-learning-udl) and UDL Guidelines, now used all over the world to make learning more inclusive.

The UDL Guidelines can be used by educators, curriculum developers, researchers, parents, and anyone else who wants to implement the UDL framework in a learning environment. These guidelines offer a set of concrete suggestions that can be applied to any discipline or domain to ensure that all learners can access and participate in meaningful, challenging learning opportunities. The "UDL Guidelines Graphic Organizer" is presented in Figure 4.

Figure 4. The UDL Guidelines Graphic Organiser (source: https://udlguidelines.cast.org).

The UDL Guidelines are a tool that can be used to design learning experiences that meet the needs of all learners. These Guidelines Provide a collection of practical recommendations for applying the UDL framework to practice and help ensure that all learners can access and participate in meaningful, challenging learning opportunities.

The UDL Guidelines are organized both horizontally and vertically. Vertically, the Guidelines are organized according to the three principles of UDL: (1) engagement, (2) representation, and (3) action and expression. The principles are broken down into Guidelines, and each of these Guidelines have corresponding "checkpoints" that provide more detailed suggestions. The Guidelines are also organized horizontally. The "access" row includes the guidelines that suggest ways to increase access to the learning goal by recruiting interest and by offering options for perception and physical action. The "build" row includes the guidelines that suggest ways to develop effort and persistence, language and symbols, and expression and communication. Finally, the "internalize" row includes the guidelines that suggest ways to empower learners through self-regulation, comprehension, and executive function. Taken together, the Guidelines lead to the ultimate goal of UDL: to develop "expert learners" who are, each in their own way, resourceful and knowledgeable, strategic and goal-directed, purposeful and motivated.

The UDL Guidelines are not meant to be a "prescription" but a set of suggestions that can be applied to reduce barriers and maximize learning opportunities for all learners. They can be mixed and matched according to specific learning goals and can be applied to particular content areas and contexts. In many cases, educators find that they are already incorporating some aspects of these guidelines into their practice; however, barriers to the learning goal may still be present. The Guidelines must be seen as a tool to support the development of a shared language in the design of goals, assessments, methods, and materials that lead to accessible, meaningful, and challenging learning experiences for all.

As far as "engagement" is concerned (Figure 5), affect represents a crucial element to learning, and learners differ markedly in the ways in which they can be engaged or motivated to learn. There are a variety of sources that can influence individual variation in affect including neurology, culture, personal relevance, subjectivity, and background knowledge, along with a variety of other factors. Some learners are highly engaged by spontaneity and novelty while others are disengaged, even frightened, by those aspects, preferring strict routine. Some learners might like to work alone, while others prefer to work with their peers. In reality, there is not one means of engagement that will be optimal for all learners in all contexts; providing multiple options for engagement is essential.

As far as "representation" is concerned (Figure 6), learners differ in the ways that they perceive and comprehend information that is presented to them. For example, those with sensory disabilities (e.g., blindness or deafness); learning disabilities (e.g., dyslexia); language or cultural differences, and so forth may all require different ways of approaching content. Others may simply grasp information quicker or more efficiently through visual or auditory means rather than printed text. Also learning, and transfer of learning, occurs when multiple representations are used, because they allow students to make connections within, as well as between, concepts. In short, there is not one means of representation that will be optimal for all learners; providing options for representation is essential.

As far as the principle "action & expression" is concerned (Figure 7), learners differ in the ways that they can navigate a learning environment and express what they know. For example, individuals with significant movement impairments (e.g., cerebral palsy), those who struggle with strategic and organizational abilities (executive function disorders), those who have language barriers, and so forth approach learning tasks very differently. Some may be able to express themselves well in written text but not speech, and vice versa. It should also be recognized that action and expression require a great deal of strategy, practice, and organization, and this is another area in which learners can differ. In reality, there is not one means of action and expression that will be optimal for all learners; providing options for action and expression is essential.

Engagement | Guidelines & Checkpoints

GUIDELINE 7
Recruiting Interest ➡
Spark excitement and curiosity for learning.

CHECKPOINT 7.1
● **Optimize individual choice and autonomy** ›

CHECKPOINT 7.2
● **Optimize relevance, value, and authenticity** ›

CHECKPOINT 7.3
● **Minimize threats and distractions** ›

GUIDELINE 8
Sustaining Effort & Persistence ➡
Tackle challenges with focus and determination.

CHECKPOINT 8.1
● **Heighten salience of goals and objectives** ›

CHECKPOINT 8.2
● **Vary demands and resources to optimize challenge** ›

CHECKPOINT 8.3
● **Foster collaboration and community** ›

CHECKPOINT 8.4
● **Increase mastery-oriented feedback** ›

GUIDELINE 9
Self Regulation ➡
Harness the power of emotions and motivation in learning.

CHECKPOINT 9.1
● **Promote expectations and beliefs that optimize motivation** ›

CHECKPOINT 9.2
● **Facilitate personal coping skills and strategies** ›

CHECKPOINT 9.3
● **Develop self-assessment and reflection** ›

Figure 5. Guidelines and checkpoints of the principle "Engagement" of the UDL Guidelines (source: https://udlguidelines.cast.org/engagement).

Representation | Guidelines & Checkpoints

GUIDELINE 1

Perception ⊙
Interact with flexible content that doesn't depend on a single sense like sight, hearing, movement, or touch.

CHECKPOINT 1.1
- Offer ways of customizing the display of information ›

CHECKPOINT 1.2
- Offer alternatives for auditory information ›

CHECKPOINT 1.3
- Offer alternatives for visual information ›

GUIDELINE 2

Language & Symbols ⊙
Communicate through languages that create a shared understanding.

CHECKPOINT 2.1
- Clarify vocabulary and symbols ›

CHECKPOINT 2.2
- Clarify syntax and structure ›

CHECKPOINT 2.3
- Support decoding of text, mathematical notation, and symbols ›

CHECKPOINT 2.4
- Promote understanding across languages ›

CHECKPOINT 2.5
- Illustrate through multiple media ›

GUIDELINE 3

Comprehension ⊙
Construct meaning and generate new understandings.

CHECKPOINT 3.1
- Activate or supply background knowledge ›

CHECKPOINT 3.2
- Highlight patterns, critical features, big ideas, and relationships ›

CHECKPOINT 3.3
- Guide information processing and visualization ›

CHECKPOINT 3.4
- Maximize transfer and generalization ›

Figure 6. Guidelines and checkpoints of the principle "Representation" of the UDL Guidelines (source: https://udlguidelines.cast.org/representation).

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Action & Expression | Guidelines & Checkpoints

GUIDELINE 4

Physical Action ➡
Interact with accessible materials and tools.

CHECKPOINT 4.1
● Vary the methods for response and navigation >

CHECKPOINT 4.2
● Optimize access to tools and assistive technologies >

GUIDELINE 5

Expression & Communication ➡
Compose and share ideas using tools that help attain learning goals.

CHECKPOINT 5.1
● Use multiple media for communication >

CHECKPOINT 5.2
● Use multiple tools for construction and composition >

CHECKPOINT 5.3
● Build fluencies with graduated levels of support for practice and performance >

GUIDELINE 6

Executive Functions ➡
Develop and act on plans to make the most out of learning.

CHECKPOINT 6.1
● Guide appropriate goal-setting >

CHECKPOINT 6.2
● Support planning and strategy development >

CHECKPOINT 6.3
● Facilitate managing information and resources >

CHECKPOINT 6.4
● Enhance capacity for monitoring progress >

Figure 7. Guidelines and checkpoints of the principle "Action & Expression" of the UDL Guidelines (source: https://udlguidelines.cast.org/action-expression).

3. RESULTS AND DISCUSSION

This section of the final report A3 of WP3 presents the results of the preceding reports A1 and A2, together with the already provided discussion in a uniform fashion. In the framework of providing even more good practices and directions for the creation of courses for the STEAMigPOWER Intensive Program, a broader investigation of initiatives/courses, outside of Secondary or Higher typical Education, related to STEAM education or/and refugees/asylum seekers is conducted; the results are also presented and discussed.

3.1 STATE-OF-THE-ART OF STRATEGIES AND METHODOLOGIES FOR STEAM IN EUROPE – HIGHER EDUCATION

All questions are presented classified in sections/paragraphs, together with the respective answers by those who answered them and the relevant statistics. The order of the questionnaire's (Questionnaire 1) questions and presentation of respective answers and results is adjusted to serve for a more conceptually robust presentation.

3.1.1 AVAILABLE STEAM CLASSES

Q1_1: Please provide information about one STEAM class you teach

As previously presented (section 2.1.2), a total of 25 HE professors from several specific study fields answered concerning the subject taught in STEAM courses, with their individual answers clustered into a more generic study field (Figure 1). As far as the name of the HEI where the interviewees taught the STEAM classes, a total of 16 professors answered, which was optional. Results that were detailed are presented in Table 4.

Table 4. Higher Education Institutions (HEIs) or Departments/Schools of HEIs that were explicitly stated by the interviewees when optionally answering Q1_1 concerning the institution where they provided STEAM courses. Data were acquired from Questionnaire 1, linked with Report WP3.A3 of STEAMigPOWER project. This question was optional.

Nr	Institution
1	Università di Perugia
2	Bilkent University
3	Middle East Technical University (METU)
4	Bilkent Univesity
5	University of Genova
6	Università L'Aquila
7	Università degli Studi di Milano
8	Instituto Universitário de Lisboa (ISCTE)
9	Universidade Portucalense Infante D. Henrique, Porto, Portugal
10	Polytechnic Institute of Cávado and Ave
11	Instituto Politécnico de Viana do Castelo
12	Democritus University of Thrace / Dep. of Civil Engineering
13	Dept. of Icthyology, University of Thessaly, Greece
14	University Barcelona

As far as the age of students is concerned, the students benefiting from the STEAM courses offered in the analysed HEIs were between 18 and 28 years old. More than 80 % of them were of age between 18 to 23 years old. A total of 24 answers to this question was received (Figure 8).
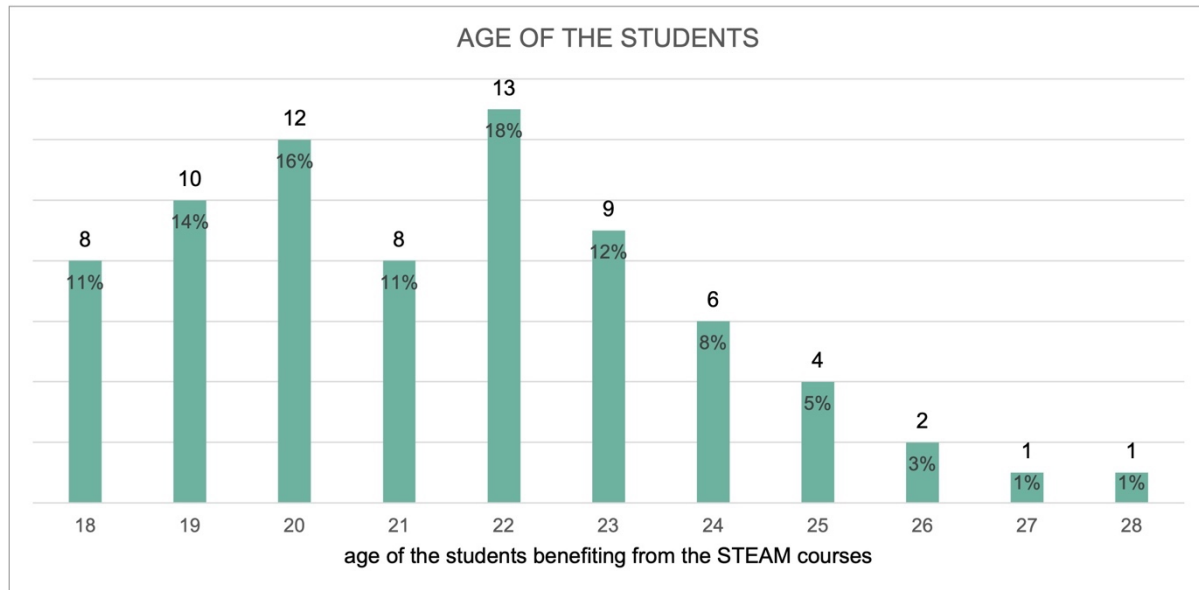
Figure 8. Age of students that were offered STEAM courses in Higher Education Institutions (HEIs) in Europe. Data were acquired from Questionnaire 1, linked with Report WP3.A3 of STEAMigPOWER project..

Regarding the number of boys per class, according to the data collected, around 700 boys were benefiting from the STEAM courses offered by the 24 HEIs professors who responded to this question. The mentioned result did not consider the following two answers: "Class size ranging from 30-300. Usually, more boys than girls but not a huge difference" and "70%".

According to the data collected, more than 610 girls were benefiting from the STEAM courses offered by the 24 HEIs professors who responded to this question. The mentioned result did not consider the following two answers: "Class size ranging from 30-300. Usually, more boys than girls but not a huge difference" and "70%".

Concerning the number of lessons/lectures per week, out of a total of 24 answers, the number ranges from 1 to 28 hours.

3.1.2 PEDAGOGICAL APPROACHES AND RESOURCES AVAILABLE FOR STEAM TEACHING

Q1_2: Which pedagogical approaches are you using in your STEAM teaching for this class?

The most popular pedagogical approach was the following which received 21 positive answers:

- Traditional direct instruction (lessons are focused on the delivery of content by the teacher and the acquisition of content knowledge by the students)

Then, with 15 positive answers, follow these approaches:

- Collaborative learning (students are involved in joint intellectual efforts with their peers or with their teachers and peers)
- Project-/Problem-based approach (students are engaged in learning through the investigation of real-world challenges and problems)

The following approaches received 13 positive answers:

- Teaching with experiments (experiments are used in the classroom to explain the subject matter)

The following approaches received more than 10 positive answers:

- Integrated learning (learning brings together content and skills from more than one subject area
- Summative assessment (student learning is evaluated at the end of an instructional unit and compared against a benchmark or standard)
- Formative assessment, including self-assessment (student learning is constantly monitored and ongoing feedback is provided; students are provided with opportunities to reflect on their own learning)

The other approaches received fewer positive answers. All answers are presented in Figure 9.
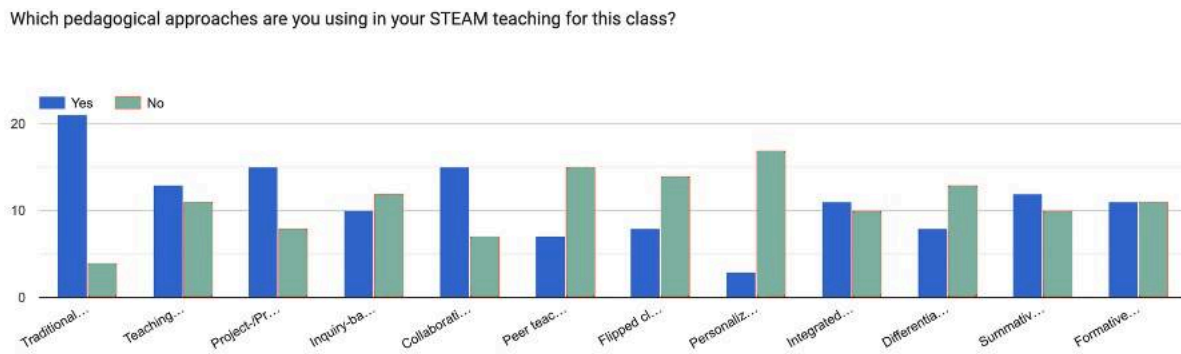
Figure 9. Answers to question 2 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project.

Q1_3: To what extent do you use the following aspects of teaching and learning (with or without ICT) when teaching the class?

The most used aspects of teaching seem to be the following, which received at least 15 full positive answers:

- I present and explain scientific ideas to the whole class
- I use different types of materials (visual, audio, written) in my classes
- I use content from different subjects to explain scientific concepts
- I give feedback to my students during a learning activity

Q1_4: Which learning resources/materials are you currently using when teaching the class?

The most used resources were the following:

- Presentations (Power Point, Libre Office, etc.) (16 answers)
- Audio/video materials (12 answers)
- Word processors (Word, Libre Office Write, OneNote, etc.) (10 answers)
- Paper-based materials (8 answers)
- Spreadsheets (Excel, Libre Office Calc, etc.) (8 answers)
- Online collaborative tools (Padlet, Kahoot, etc.) (6 answers)
- Web-based or computer-based simulations (6 answers)

Q1_5: How do you usually learn about the teaching resources you are using in class?

According to the received answers, the Web stands out as an important teaching resource:

- I actively search the Web for relevant teaching resources (18 answers)
- I actively search for resources in repositories of educational resources (15 answers)
- They are shared by the educational authorities in my country (10 answers)
- They are shared by my network of peers (9 answers)

3.1.3 Shortages and inefficiencies in STEAM teaching

Q1_6 - Which learning resources/materials would you like to use, but do not have at your disposal?

According to the received answers, the most needed resources were the following:

- Resources for personalized learning   (9 answers)
- Resources for special needs learners (9 answers)
- Resources published by private companies operating in STEAM fields (8 answers)
- Augmented reality / virtual reality tools / virtual labs (8 answers)

Q1_7 - You would like to see more support for schools from private companies operating in STEAM fields in:

According to the received answers, the most wanted support is:

- Allowing access to hardware and equipment (13 answers)
- Financial support (11 answers)
- Offering student placements (9 answers)
- Professional development (9 answers)
- Making teaching resources available to schools (8 answers)
- Having STEAM professionals presenting to pupils in school (8 answers)

Q1_8 - Is your use of STEAM teaching affected by the following?

In what concerns/problems affect the STEAM teaching, the most selected options were:

- Budget constraints in accessing adequate content / material for teaching (7 answers)
- Pressure to prepare students for exams and tests (5 answers)
- Insufficient technical support for teachers (5 answers).

The other possible answers were not representative.

Q1_9 - In your country, STEAM teacher training for teachers in your subject is:

Out of 25 answers, only 4% of the inquired teachers confirmed that STEAM lecturers/professors/teachers training for teachers in their subject is compulsory, with 56% replying that it is not compulsory but recommended, and 40 % at their own discretion (Figure 10).
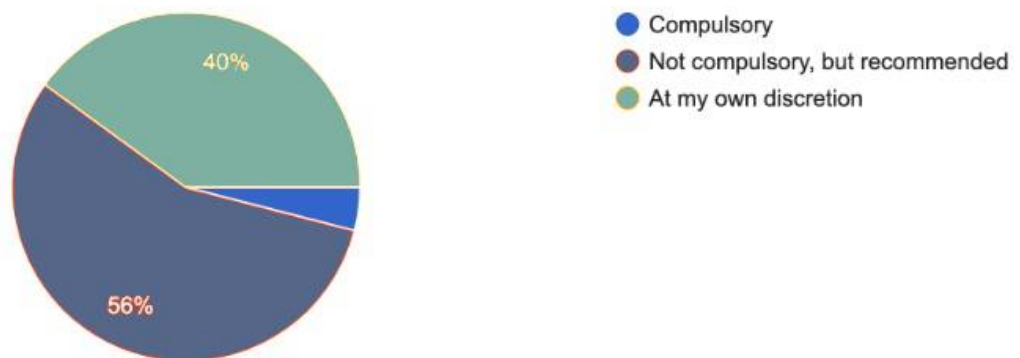
Figure 10. Answers to question 9 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project.

3.1.4 Support and professional development for STEAM teaching

Q1_10 - In the past two school years, have you undertaken professional development of the following type?

The answers which received most preferences were the following:

- Courses on the pedagogical use of ICT in teaching and learning (10 answers)
- Participate in communities for professional discussions with other teachers (9 answers)
- Advanced courses on Internet use (creating websites, video conferencing, etc.) (8 answers)
- Personal learning about innovative STEAM teaching in your own time (7 answers)
- Advanced courses on applications (advanced word-processing, virtual learning environments, etc.) (7 answers)

- Other professional development opportunities related to innovative STEAM teaching (6 answers)

Q1_11 - Do you use a computer/tablet/smartphone and the Internet to update your subject knowledge or undertake personal or professional development in any subject?

The answers which received most preferences were the following:

- To actively search for information and update my knowledge/teaching resources (news articles, etc.) (18 answers)
- To create new materials either for personal use (personal website, calendar, etc.) or for my lessons (I create my own digital learning materials for students) (19 answers)

However, the other two answers were also preferred:

- To undertake professional development courses (8 answers)
- To participate in online communities (10 answers)

Q1_12 - To what extent do you receive the support of the following groups to improve your STEAM teaching?

From the answers, it was clear that lecturers/professors/teachers receive little or no support with the exception of the other teacher's support (Figure 11).
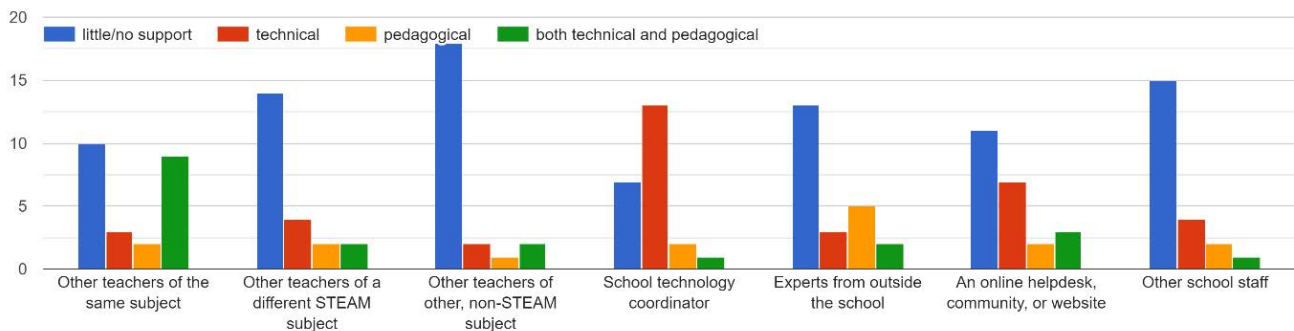
Figure 11. Answers to question 12 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project.

3.1.5 Information and Communications Technology (ICT) in STEAM teaching

Q1_13 - Do your colleagues and head of school share a positive vision about innovative STEAM teaching (Flipped classrooms, the use of ICT tools, project-based learning, etc.) at your school?

According to the provided answers, around 70% of the colleagues and heads of school of the respondents shared a positive vision about innovative STEAM teaching, as presented in Figure 12.

Do your colleagues and head of school share a positive vision about innovative STEAM teaching (Flipped classrooms, the use of ICT tools, project-based learning, etc.) at your school?

25 responses

- Yes
- No

32%

68%
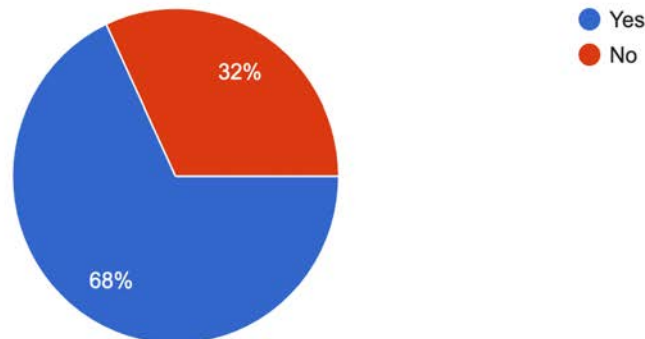
Figure 12. Answers to question 13 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project.

Q1_14 – In your opinion, does innovative STEAM teaching (using ICT and innovative pedagogical approaches) have a positive impact on the following?

In the opinion of the interviewees (25 answers), the positive impact of innovative STEAM teaching (using ICT and innovative pedagogical approaches) is significant (a lot/ to some extent) on all aspects considered, namely:

- Students concentrate more on their learning (a lot: 12; to some extent: 10)
- Students try harder in what they are learning (a lot: 8; to some extent: 11)
- Students feel more autonomous in their learning (a lot: 10; to some extent: 8)
- Students understand more easily what they learn (a lot: 8; to some extent: 11)
- Students remember more easily what they have learnt (a lot: 8; to some extent: 11)
- Students develop their critical thinking (a lot: 10; to some extent: 12)
- Students become more interested in STEAM careers (a lot: 6; to some extent: 13)
- ICT facilitates collaborative work among students (a lot: 8; to some extent: 11)
- ICT improves the class climate (students are more engaged, less disturbing) (a lot: 9; to some extent: 9)

Q1_15 – To what extent do you disagree or agree with each of the following statements about the use of ICT for STEAM teaching at school?

The respective answers are presented in Figures Figure 13, Figure 14 and Figure 15.

ICT should be used for students to:
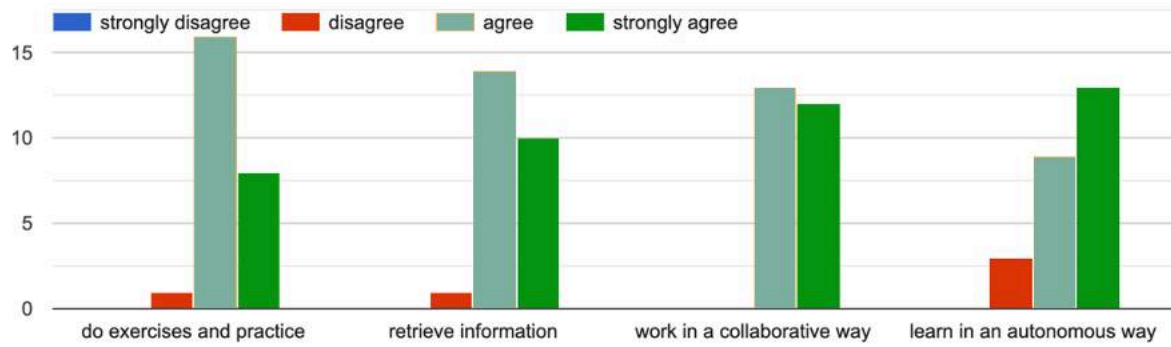
Figure 13. Answers to question 15 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project, part A.

ICT use in learning and teaching positively impacts on students':
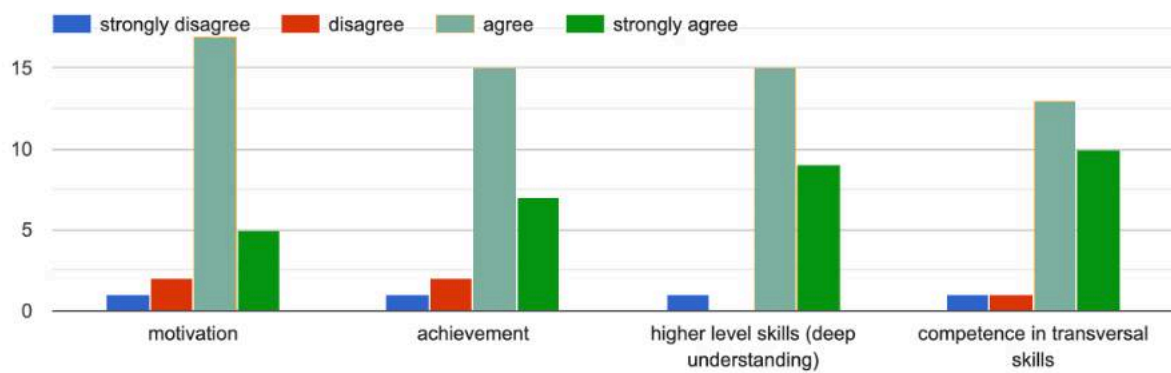
Figure 14. Answers to question 15 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project, part B.

ICT use in learning and teaching is essential:
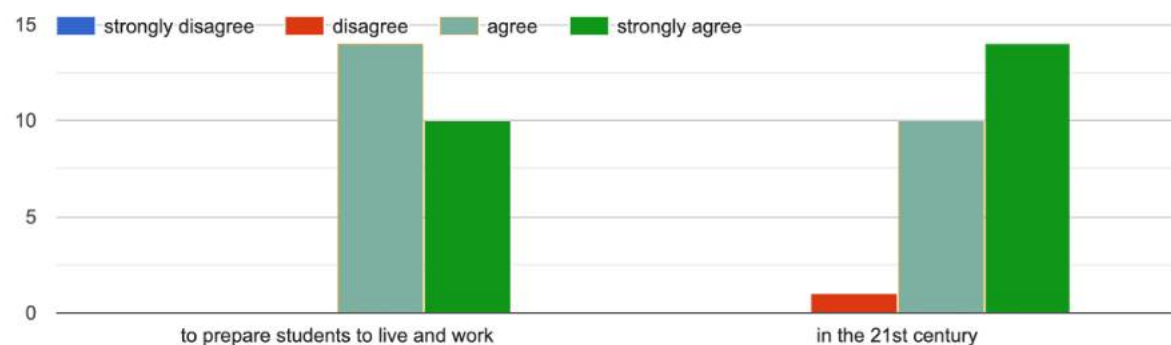
Figure 15. Answers to question 15 of Questionnaire 1 (HE) of report WP3.A1 of the STEAMigPOWER project, part C.

3.1.6 IDEAL PROFILE OF TEACHING PERSONNEL (OPEN QUESTIONS)

The following section of Questionnaire 1 was an open section with no predefined answers the interviewee could choose from. The questions are marked here (sections 3.1.6 and 3.1.7) as QO (Questions Open) and enumerated from the start (QO1_1 to QO1_7).

QO1_1: Which competencies lecturers in your discipline need to have?

The answers to this question were very diversified, with competencies like multi and interdisciplinarity, innovation, time management and organizational skills, communication skills, knowledge, flexibility and team work being mentioned several times.

QO1_2: Which habits / characteristics all lecturers should have?

This question, as expected in an open question, received very different answers. One could pick the innovation capacity, availability, ability to motivate students, engagement, and be supportive as the most often stated.

QO1_3: What kind of professional development activities (MOOCs, interactive learning, ...) do you think could be useful?

Based on the provided answers, one can highlight interactive learning, MOOCs, and VLEs, but also seminars and tutorials or demonstrations and simulations.

3.1.7 PERSONAL THOUGHTS (PARTS 2-4 AND FOUR MORE "PERSONAL INFORMATION" QUESTIONS OF ADDITIONAL PRACTICAL QUESTIONS)

QO1_4: Do you think there is enough interaction with your colleagues?

Most of the interviewees stated that there was not enough interaction with their colleagues and/or that there is room for improvement.

QO1_5: Do you feel confident about your teaching skills?

Most of the interviewees felt confident about their teaching skills, except for three; they did not feel confident.

QO1_6: If a STEAM school will be organized in order to know new tools to learn/help the teachers how to teach better, would you recommend your colleagues to participate to this STEAM school?

Most of the interviewees answered positively to this question.

QO1_7: How applicable could be new gained knowledge on STEAM to your teaching activity?

Most of the teachers consider that new gained knowledge on STEAM would be applicable to their teaching activity.

3.1.8 DEMOGRAPHIC INFORMATION (PART 1 OF ADDITIONAL PRACTICAL QUESTIONS)

In Part 1 of this additional section of Questionnaire 1 (HE), interviewees were asked to answer to questions regarding their subject discipline, country, School or University, duration of teaching in HE, gender, age, preparation for teaching at a University level, the part of their work that is teaching, teaching role, effectiveness as a teacher, and the need or not for training to become a more effective lecturer. All summed answers/results are presented in Figures Figure 16-Figure 26.

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My subject discipline is

25 responses
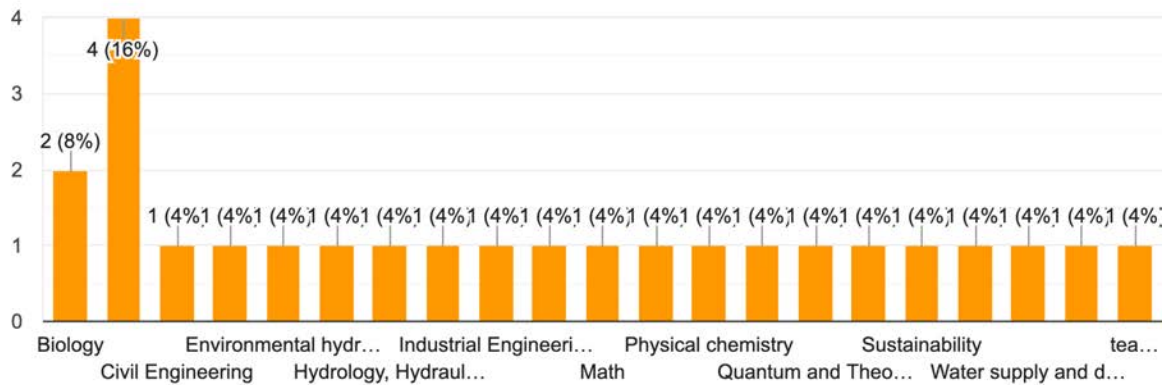
Figure 16. Answers to question 1 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

Country

25 responses
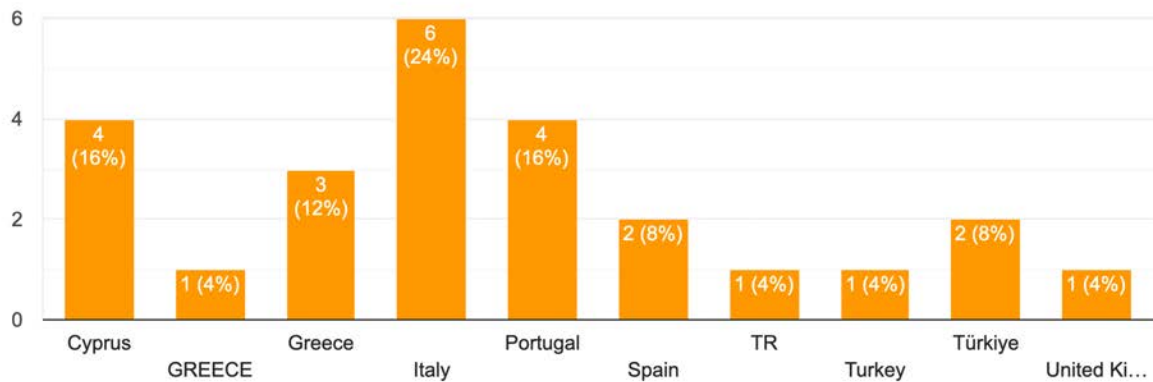
Figure 17. Answers to question 2 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

School or University

25 responses
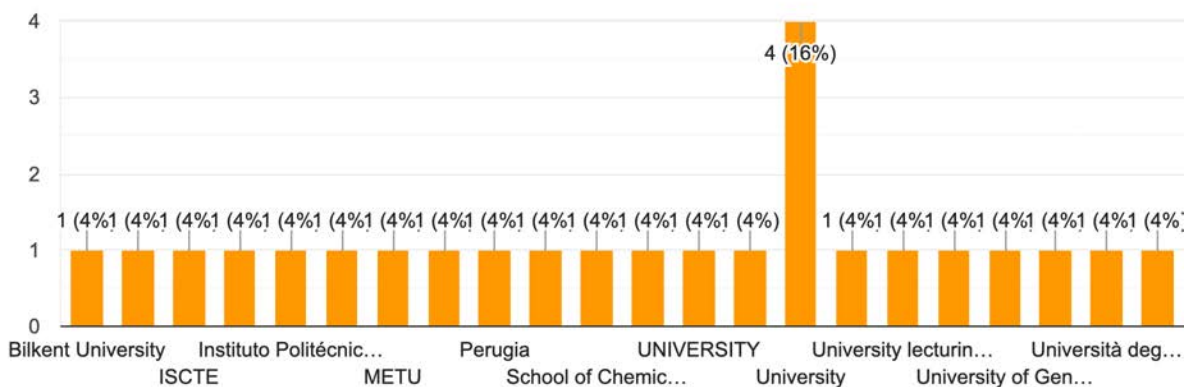
Figure 18. Answers to question 3 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

I've been teaching in higher education/school for...
25 responses

- Less than 2 years
- 2-5 years
- 6-10 years
- 11-20 years
- more than 20 years

40%
24%
16%
16%
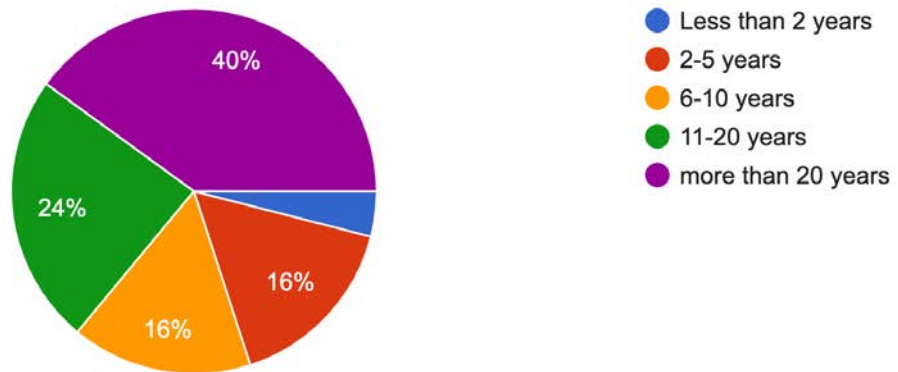
Figure 19. Answers to question 4 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

I identify my gender as
25 responses

- male
- female
- other
- I don't want to answer

48%
52%
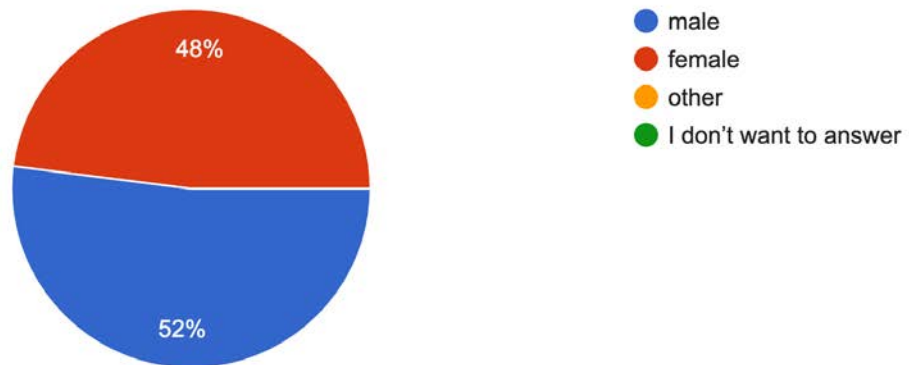
Figure 20. Answers to question 5 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

My age is
25 responses

- less than 25
- 26-35
- 36-45
- 46-55
- 56-65
- more than 65

16%
8%
44%
28%
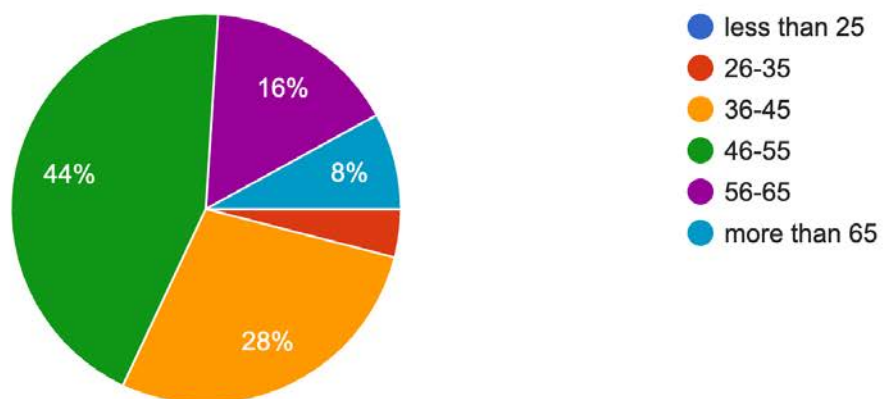
Figure 21. Answers to question 6 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

My preparation for teaching at university level is:
24 responses

- I have obtained the University teaching certificate:
- Pedagogical training < 250 workload hours
- Pedagogical training between 250 and 650 workload hours
- Pedagogical training > 650 workload hours
- I didn't have any pedagogical training yet
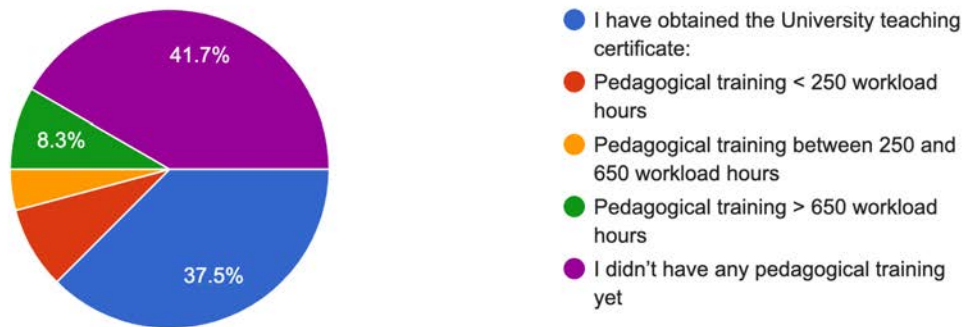
Figure 22. Answers to question 7 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

What part of your work is teaching?
25 responses

- Teaching duties represent 100% of my working tasks
- Teaching duties represent substantial part of my working tasks
- Teaching duties are about 50% of my working tasks
- Teaching duties are a minor part of my working tasks
- I only teach very occasionally as a guest lecturer / guest supervisor
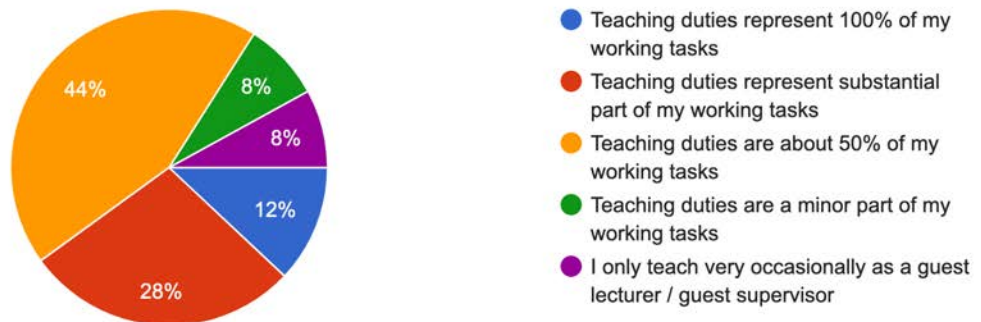
Figure 23. Answers to question 8 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1..

What is your teaching role (more than one answer is possible)
24 responses

Lab teaching	11 (45.8%)
Lecturing	21 (87.5%)
Teaching in tutorials / seminars…	9 (37.5%)
Supporting problem based lear…	4 (16.7%)
Care about professional interns…	3 (12.5%)
Mentoring/tutoring	9 (37.5%)
Member of examination board	11 (45.8%)
Member of programme committ…	8 (33.3%)
Developing teaching materials f…	4 (16.7%)
Advising about teaching	3 (12.5%)
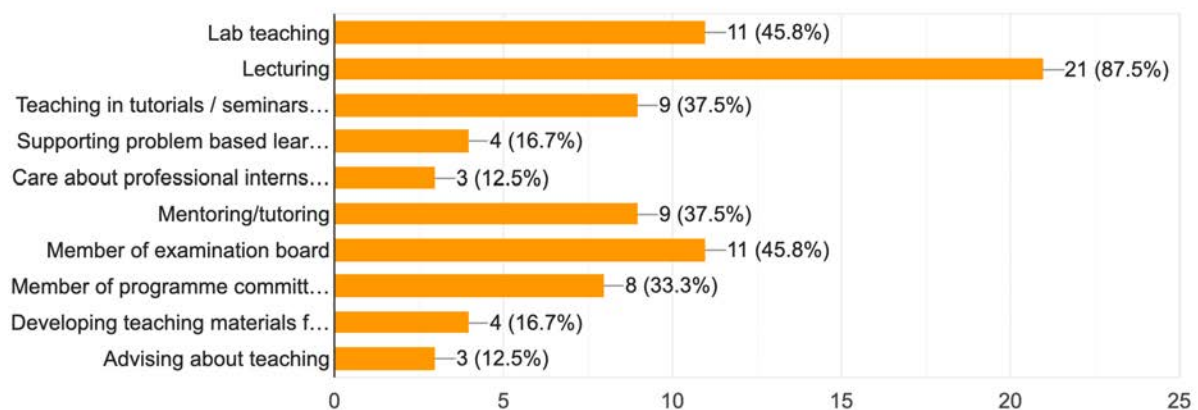
Figure 24. Answers to question 9 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

Do you think you are an effective lecturer?

25 responses

- Yes
- Not always

40%

60%
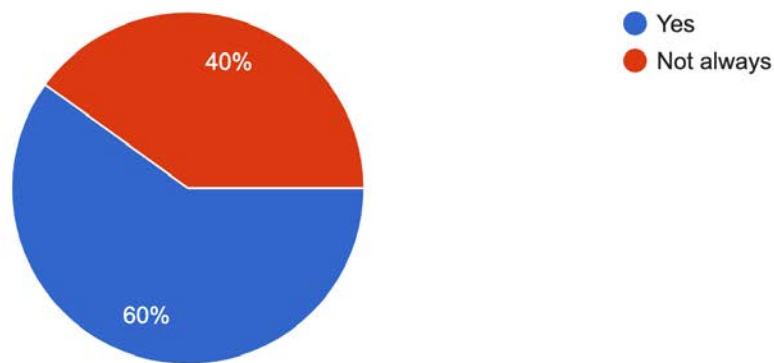
Figure 25. Answers to question 10 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1 of STEAMigPOWER.

Do you think you need training to become a more effective lecturer?

24 responses

- Yes, I do. I'm not effective enough now
- Yes, I do. I'm already an effective lecturer but there is always room for improvement
- No, I don't. I'm already effective enough
- No, I don't. I have no time for training

79.2%

8.3%
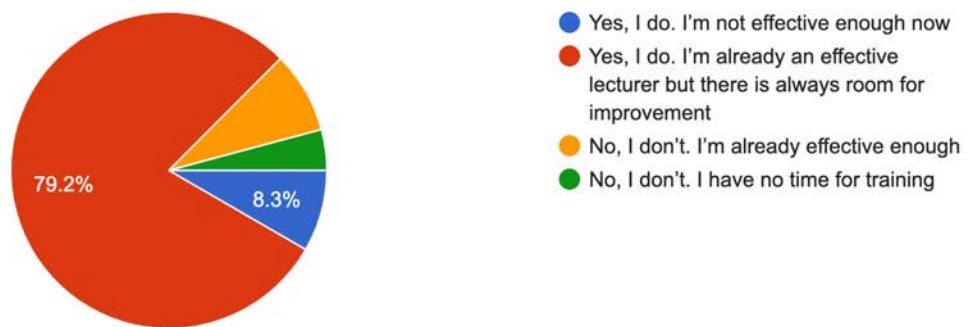
Figure 26. Answers to question 11 of Part 1 of additional questions of Questionnaire 1 (HE), report WP3.A1.

3.2 STATE-OF-THE-ART OF STRATEGIES AND METHODOLOGIES FOR STEAM IN EUROPE – SECONDARY EDUCATION

In this section the questions and answers provided by teachers teaching in Secondary Schools are presented and analysed. All questions are presented classified in sections/paragraphs, together with the respective answers by those who answered them and the relevant statistics. The order of the questionnaire's (Questionnaire 1) questions and presentation of respective answers and results is adjusted to serve for a more conceptually robust presentation.

3.2.1 AVAILABLE STEAM CLASSES

Q1_1: Please provide information about one STEAM class you teach

As previously presented (section 2.1.2), a total of 20 teachers from several study fields answered concerning the subject taught in STEAM courses (Figure 2). Most of the names of Schools are known but are not publicly shared.

As far as the age of students is concerned, the students benefiting from the STEAM courses offered in the analysed schools were between 12 and 19 years old (Figure 27). More than 80 % of them were of age between 12 to 27 years old.
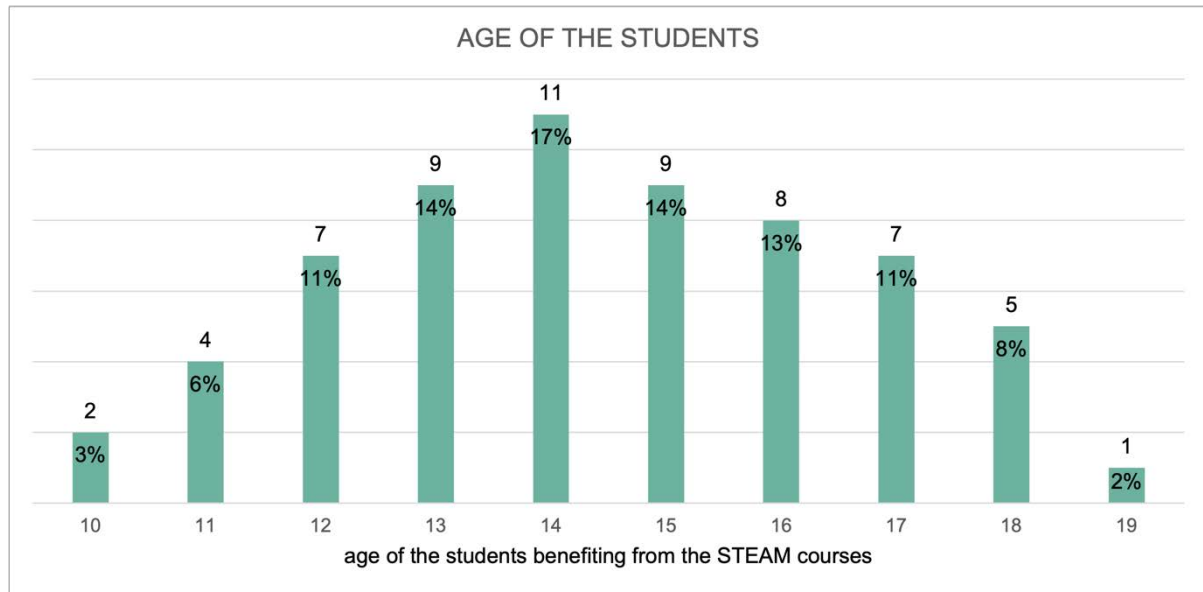
Figure 27. Age of students that were offered STEAM courses in Secondary Education schools in Europe. Data were acquired from Questionnaire 1, linked with Report WP3.A3 of STEAMigPOWER project.

Regarding the number of boys per class, according to the data collected, around 300 boys were benefiting from the STEAM courses offered by the 20 schools' teachers who responded to this question.

According to the data collected, more than 230 girls were benefiting from the STEAM courses offered by the 20 schools' teachers who responded to this question. Comparing the answers received in 1.4 and 1.5, there is not a significative difference between the number of girls (44 %) and boys (56 %) attending to the courses, although boys are slightly more represented.

Concerning the number of lessons/lectures per week, out of a total of 20 answers, the number ranges from 1 to 18 hours.

3.2.2 PEDAGOGICAL APPROACHES AND RESOURCES AVAILABLE FOR STEAM TEACHING

Q1_2: Which pedagogical approaches are you using in your STEAM teaching for this class?

The most popular pedagogical approaches were the following:

- Formative assessment, including self-assessment (student learning is constantly monitored and ongoing feedback is provided; students are provided with opportunities to reflect on their own learning) (20 answers)
- Project-/Problem-based approach (students are engaged in learning through the investigation of real-world challenges and problems) (19 answers)
- Integrated learning (learning brings together content and skills from more than one subject area) (18 answers)
- Teaching with experiments (experiments are used in the classroom to explain the subject matter) (17 answers)
- Collaborative learning (students are involved in joint intellectual efforts with their peers or with their teachers and peers) (17 answers)
- Traditional direct instruction (lessons are focused on the delivery of content by the teacher and the acquisition of content knowledge by the students) (14 answers).

The following approaches received more than 10 answers:

- Personalized learning (students gain the first exposure to new material outside of class, and then use classroom time to discuss, challenge and apply ideas of knowledge) (13 answers).
- Differentiated instruction (classroom activities are designed to address a range of learning styles, abilities, and readiness) (13 answers).

- Summative assessment (student learning is evaluated at the end of an instructional unit and compared against a benchmark or standard) (12 answers).
- Peer teaching (students are provided with opportunities to teach other students) (11 answers).

The other approaches received 9 answers each.

Q1_3: To what extent do you use the following aspects of teaching and learning (with or without ICT) when teaching the class?

The most used aspects of teaching were the following, which received at least 10 full positive answers:

- I use different types of materials (visual, audio, written) in my classes (11 answers).
- I use content from different subjects to explain scientific concepts (10 answers).

The other aspects seem to be less popular and received less than 9 positive answers.

Q1_4: Which learning resources/materials are you currently using when teaching the class?

The most used resources were the following:

- Presentations (Power Point, Libre Office, etc.) (7 answers).
- Audio/video materials (7 answers).
- Paper-based materials (7 answers).
- Web-based or computer-based simulations (6 answers).

The other options received less than 5 full answers.

Q1_5: How do you usually learn about the teaching resources you are using in class?

According to the received answers, the Web stands out as an important teaching resource:

- I actively search the Web for relevant teaching resources (17 answers)
- I actively search for resources in repositories of educational resources (14 answers)
- They are shared by the educational authorities in my country (11 answers)
- They are shared by my network of peers (11 answers)

3.2.3 SHORTAGES AND INEFFICIENCIES IN STEAM TEACHING

Q1_6 - Which learning resources/materials would you like to use, but do not have at your disposal?

According to the received answers, the most needed resources are the following:

- Web-based or computer-based simulations   (12 answers)
- Calculators (10 answers)
- Experimental laboratory (9 answers)

Q1_7 - You would like to see more support for schools from private companies operating in STEAM fields in:

According to the received answers, the most wanted support is:

- Allowing access to hardware and equipment (12 answers)
- Making teaching resources available to schools (12 answers)

The remaining options received less than 10 answers.

Q1_8 - Is your use of STEAM teaching affected by the following?

In what concerns/problems affect the STEAM teaching, the most selected options were:

- Pressure to prepare students for exams and tests (9 answers)
- School time organisation (fixed lesson time, etc.) (8 answers)
- Lack of pedagogical models on how to teach STEAM in an attractive way (7 answers).

The other possible answers are not representative.

Q1_9 - In your country, STEAM teacher training for teachers in your subject is:

Out of 20 answers, only 10% of the inquired teachers confirmed that STEAM training for teachers in their subject is compulsory, with 55% replying that it is not compulsory but recommended, and 35% at their own discretion (Figure 28).
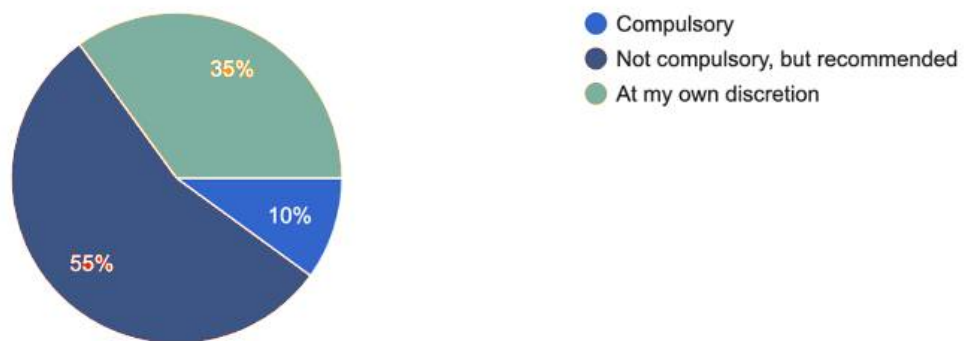
Figure 28. Answers to question 9 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project.

3.2.4 SUPPORT AND PROFESSIONAL DEVELOPMENT FOR STEAM TEACHING

Q1_10 - In the past two school years, have you undertaken professional development of the following type?

The answers which received most preferences were the following:

- Personal learning about innovative STEAM teaching in your own time (11 answers)
- Equipment-specific training (laptop, interactive whiteboard, etc.) (10 answers)
- Introductory courses on Internet use and general applications (basic-word-processing, spreadsheets, presentations, databases, etc.) (9 answers)
- Advanced courses on Internet use (creating websites, video conferencing, etc.) (9 answers)
- Subject-specific training on learning applications (tutorials, simulations, etc.) (8 answers)
- Courses on the pedagogical use of ICT in teaching and learning (6 answers)
- Course on multimedia (using digital video, audio equipment, etc.) (7 answers)
- Advanced courses on applications (advanced word-processing, virtual learning environments, etc.) (7 answers)
- Courses on the pedagogical use of ICT in teaching and learning (6 answers)
- Other professional development opportunities related to innovative STEAM teaching (6 answers)
- Participate in communities for professional discussions with other teachers (5 answers)

Q1_11 - Do you use a computer/tablet/smartphone and the Internet to update your subject knowledge or undertake personal or professional development in any subject?

The answers which received most preferences were the following:

- To actively search for information and update my knowledge/teaching resources (news articles, etc.) (16 answers)
- To create new materials either for personal use (personal website, calendar, etc.) or for my lessons (I create my own digital learning materials for students) (12 answers)

However, the other two answers were also preferred:

- To undertake professional development courses (9 answers)

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- To participate in online communities (7 answers)

Q1_12 - To what extent do you receive the support of the following groups to improve your STEAM teaching?

From the answers, it was clear that teachers receive little or no support with the exception of the other teacher's support (Figure 29).

To what extent do you receive the support of the following groups to improve your STEAM teaching?
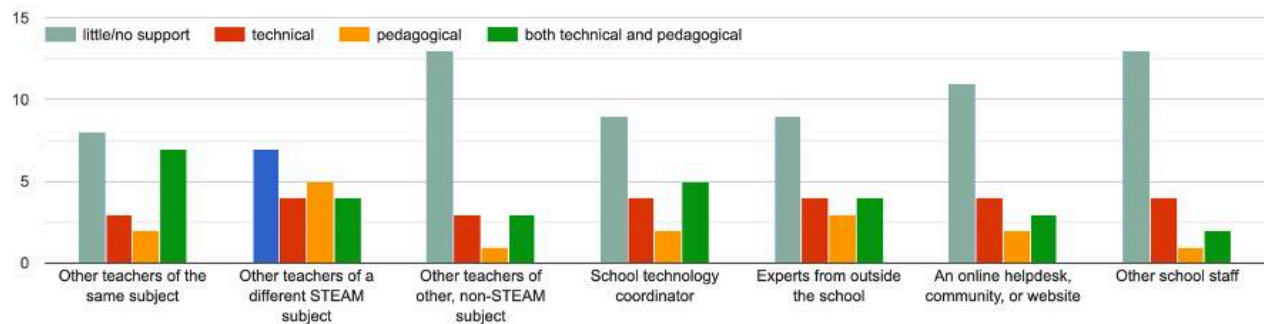
Figure 29. Answers to question 12 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project.

3.2.5 INFORMATION AND COMMUNICATIONS TECHNOLOGY (ICT) IN STEAM TEACHING

Q1_13 - Do your colleagues and head of school share a positive vision about innovative STEAM teaching (Flipped classrooms, the use of ICT tools, project-based learning, etc.) at your school?

According to the provided answers, around 65% of the colleagues and heads of school of the respondents shared a positive vision about innovative STEAM teaching, as presented in Figure 30.

Do your colleagues and head of school share a positive vision about innovative STEAM teaching (Flipped classrooms, the use of ICT tools, project-based learning, etc.) at your school?

20 responses
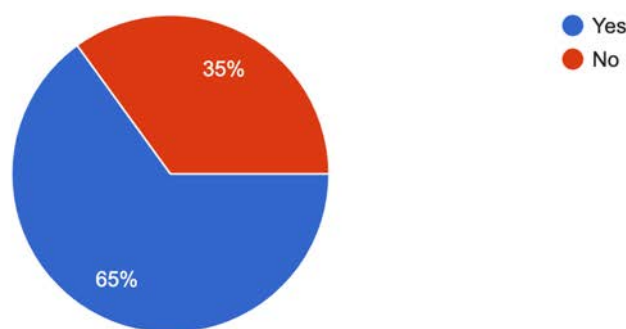
Figure 30. Answers to question 13 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project.

Q1_14 - In your opinion, does innovative STEAM teaching (using ICT and innovative pedagogical approaches) have a positive impact on the following?

In the opinion of the interviewees (20 answers), the positive impact of innovative STEAM teaching (using ICT and innovative pedagogical approaches) is significant (a lot/ to some extent) on all aspects considered.

Q1_15 - To what extent do you disagree or agree with each of the following statements about the use of ICT for STEAM teaching at school?

The respective answers are presented in Figures Figure 31, and .

ICT should be used for students to:
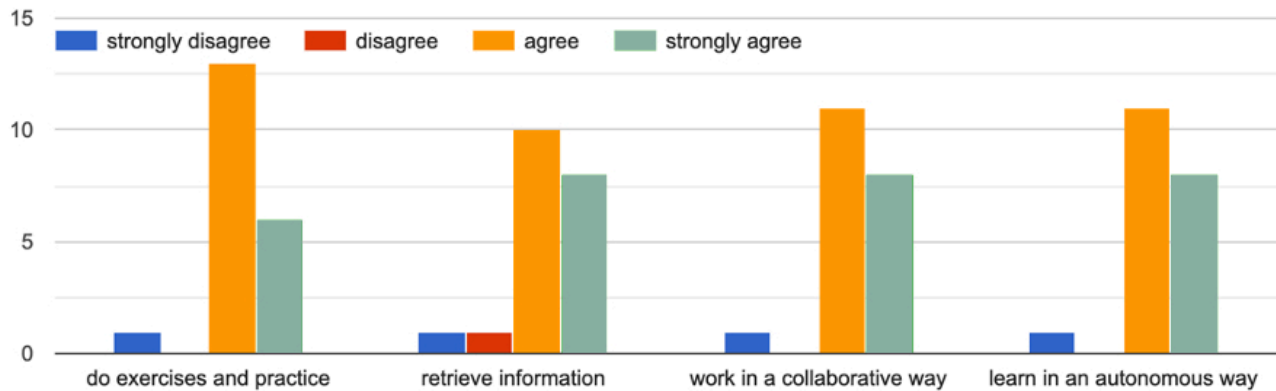
Figure 31. Answers to question 15 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project, part A.

ICT use in learning and teaching positively impacts on students':
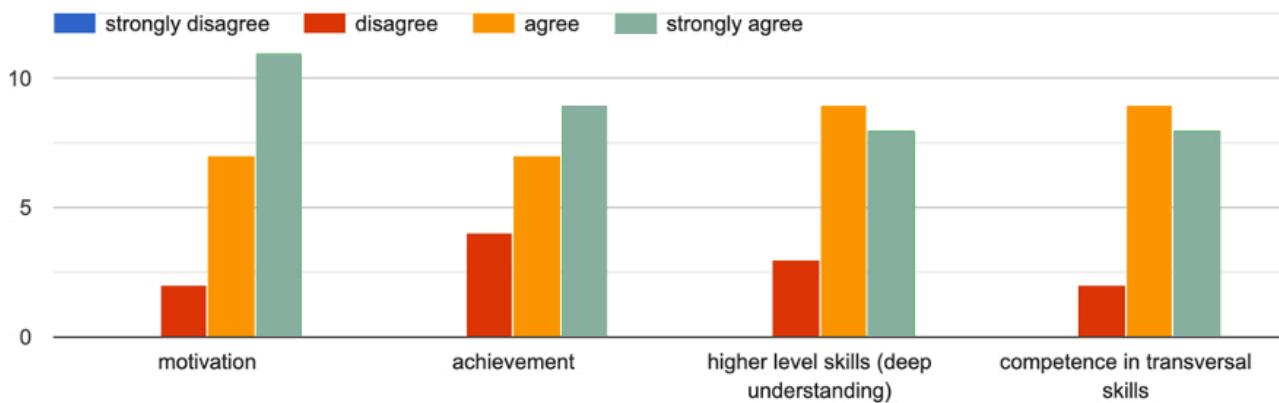
Figure 32. Answers to question 15 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project, part B.

ICT use in learning and teaching is essential:
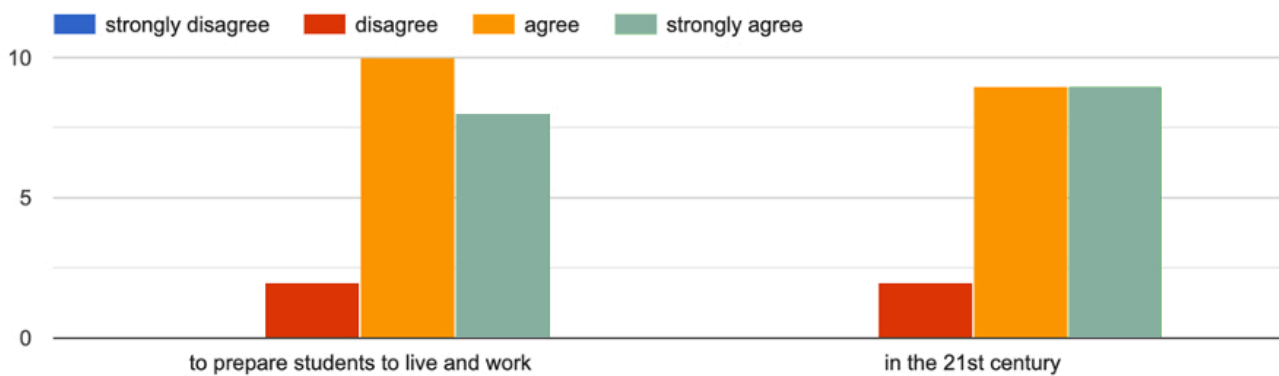
Figure 33. Answers to question 15 of Questionnaire 1 (SE) of report WP3.A1 of the STEAMigPOWER project, part C.

3.2.6 IDEAL PROFILE OF TEACHING PERSONNEL (OPEN QUESTIONS)

The following section of Questionnaire 1 was an open section with no predefined answers the interviewee could choose from. The questions are marked here (sections 3.2.6 and 3.2.7) as QO (Questions Open) and enumerated from the start (QO1_1 to QO1_7).

QO1_1: Which competencies lecturers in your discipline need to have?

The answers to this question were very diversified, with competencies like knowledge, communication skills, innovation, flexibility, time management and organizational skills being mentioned more than once.

QO1_2: Which habits / characteristics all lecturers should have?

This question, as expected in an open question, received very different answers. One could pick inclusion, patience, innovation and engagement as the most often stated.

QO1_3: What kind of professional development activities (MOOCs, interactive learning, …) do you think could be useful?

Based on the provided answers, one can highlight interactive learning, STEAM training, project-based learning, and cooperation.

3.2.7 PERSONAL THOUGHTS

QO1_4: Do you think there is enough interaction with your colleagues?

Most of the interviewees stated that there was not enough interaction with their colleagues and/or that there is room for improvement.

QO1_5: Do you feel confident about your teaching skills?

Most of the interviewees felt confident about their teaching skills, although recognizing that this could be improved.

QO1_6: If a STEAM school will be organized in order to know new tools to learn/help the teachers how to teach better, would you recommend your colleagues to participate to this STEAM school?

Most of the interviewees answered positively to this question.

QO1_7: How applicable could be new gained knowledge on STEAM to your teaching activity?

Most of the teachers consider that new gained knowledge on STEAM would be applicable to their teaching activity.

3.2.8 DEMOGRAPHIC INFORMATION

In Part 1 of this additional section of Questionnaire 1 (SE), interviewees were asked to answer to questions regarding their subject discipline, country, School or University, duration of teaching in HE, gender, age, preparation for teaching at a University level, the part of their work that is teaching, teaching role, effectiveness as a teacher, and the need or not for training to become a more effective lecturer. All summed answers/results are presented in Figures Figure 34-Figure 44.

My subject discipline is
19 responses
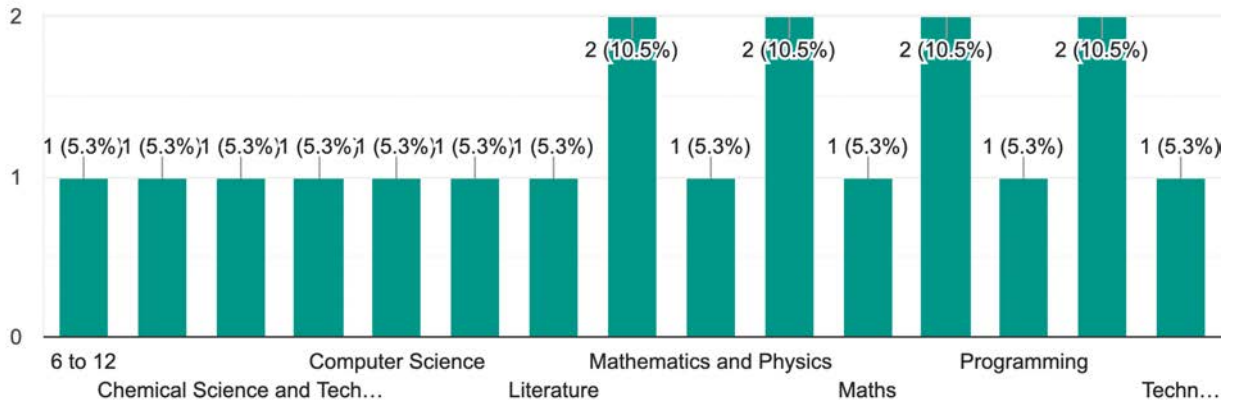
Figure 34. Answers to question 1 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

Country
20 responses
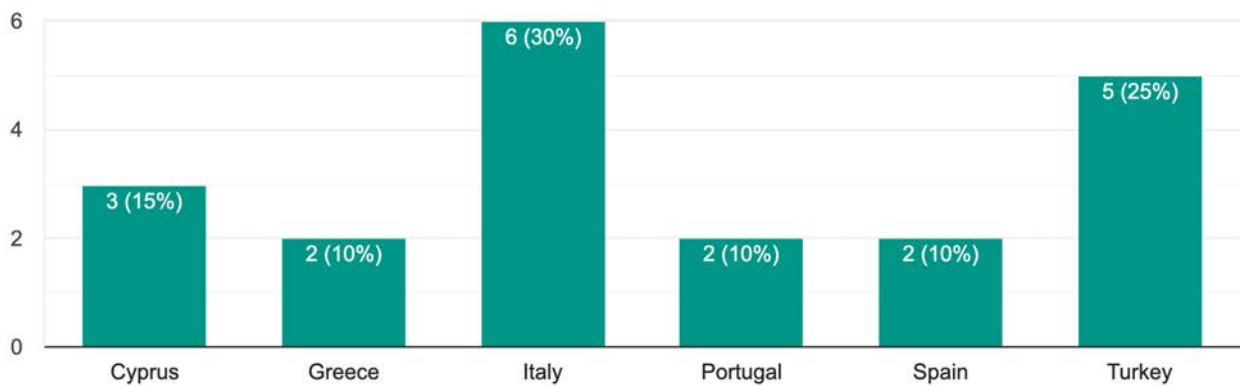
Figure 35. Answers to question 2 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

School or University
19 responses
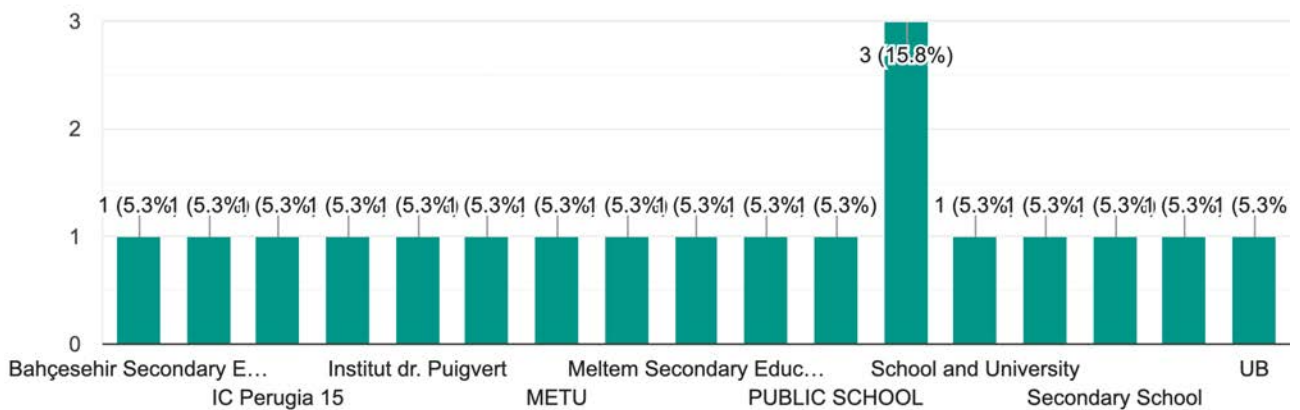
Figure 36. Answers to question 3 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

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I've been teaching in higher education/school for…
18 responses

Legend:
- Less than 2 years
- 2-5 years
- 6-10 years
- 11-20 years
- more than 20 years

Values: 38.9%, 22.2%, 11.1%, 11.1%, 16.7%
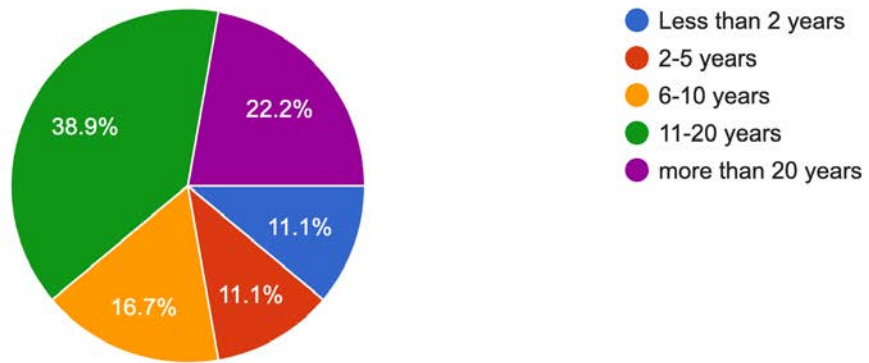
Figure 37. Answers to question 4 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

I identify my gender as
20 responses

Legend:
- male
- female
- other
- I don't want to answer

Values: 75%, 25%
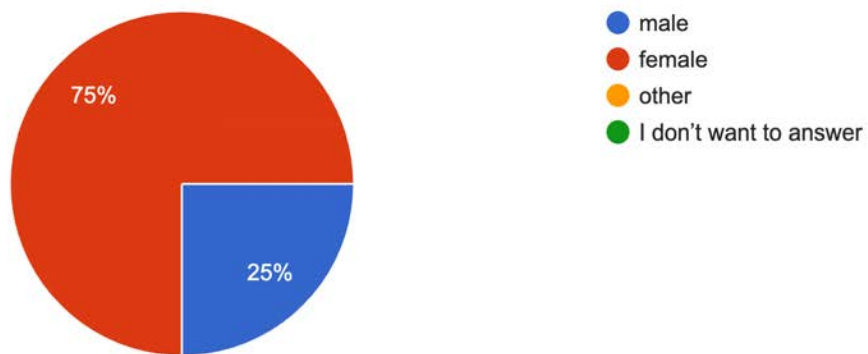
Figure 38. Answers to question 5 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

My age is
20 responses

Legend:
- less than 25
- 26-35
- 36-45
- 46-55
- 56-65
- more than 65

Values: 25%, 50%, 20%
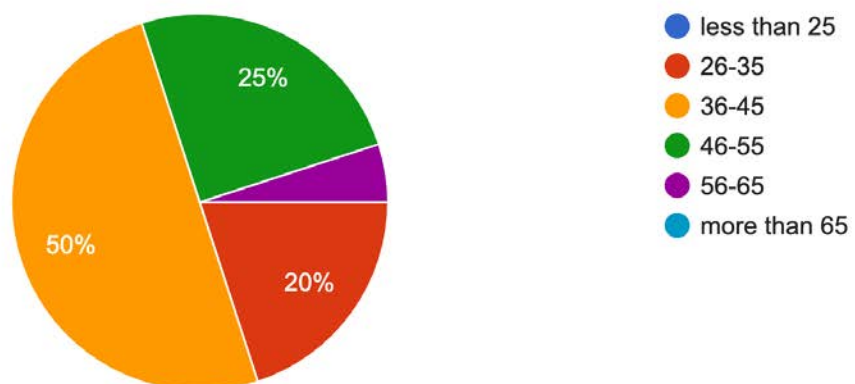
Figure 39. Answers to question 6 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

My preparation for teaching at university level is:

19 responses

- ● I have obtained the University teaching certificate:
- ● Pedagogical training < 250 workload hours
- ● Pedagogical training between 250 and 650 workload hours
- ● Pedagogical training > 650 workload hours
- ● I didn't have any pedagogical training yet
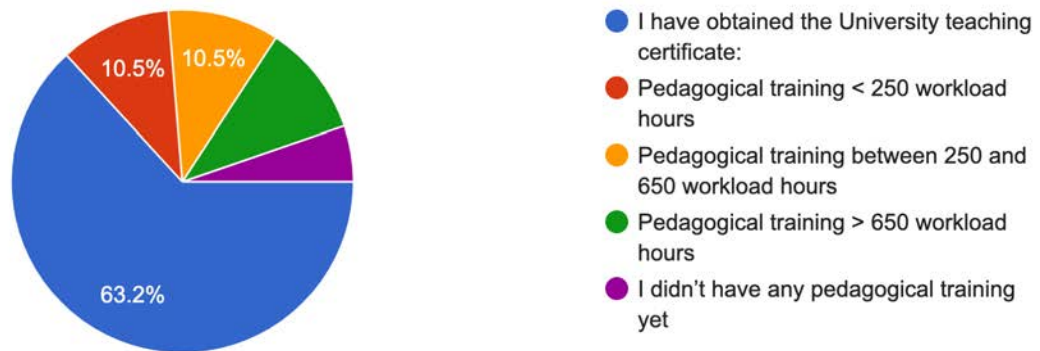
Figure 40. Answers to question 7 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

What part of your work is teaching?

20 responses

- ● Teaching duties represent 100% of my working tasks
- ● Teaching duties represent substantial part of my working tasks
- ● Teaching duties are about 50% of my working tasks
- ● Teaching duties are a minor part of my working tasks
- ● I only teach very occasionally as a guest lecturer / guest supervisor
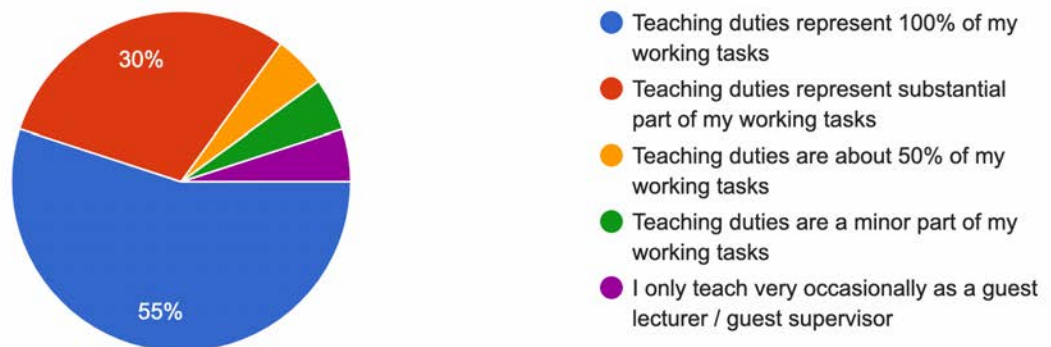
Figure 41. Answers to question 8 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

What is your teaching role (more than one answer is possible)

20 responses

Lab teaching	12 (60%)
Lecturing	15 (75%)
Teaching in tutorials / seminars…	3 (15%)
Supporting problem based lear…	2 (10%)
Care about professional interns…	5 (25%)
Mentoring/tutoring	7 (35%)
Member of examination board	7 (35%)
Member of programme committ…	1 (5%)
Developing teaching materials f…	5 (25%)
Advising about teaching	3 (15%)
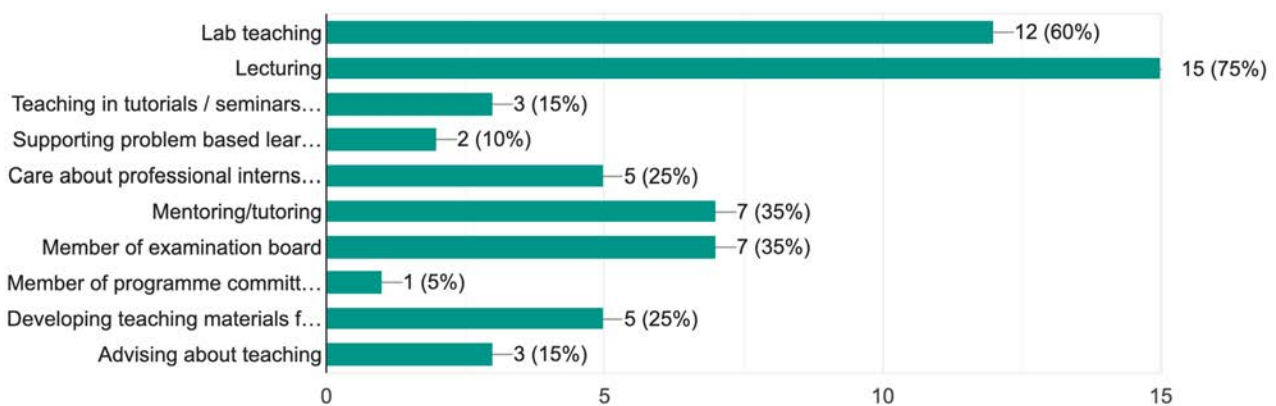
Figure 42. Answers to question 9 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

Do you think you are an effective lecturer?
20 responses

- ● Yes
- ● Not always
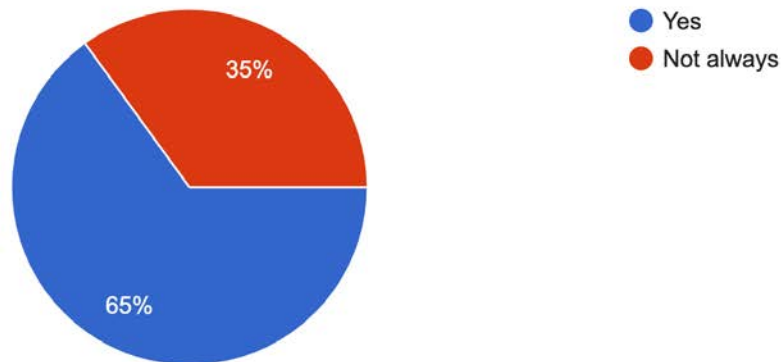
Figure 43. Answers to question 10 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

Do you think you need training to become a more effective lecturer?
20 responses

- ● Yes, I do. I'm not effective enough now
- ● Yes, I do. I'm already an effective lecturer but there is always room for improvement
- ● No, I don't. I'm already effective enough
- ● No, I don't. I have no time for training
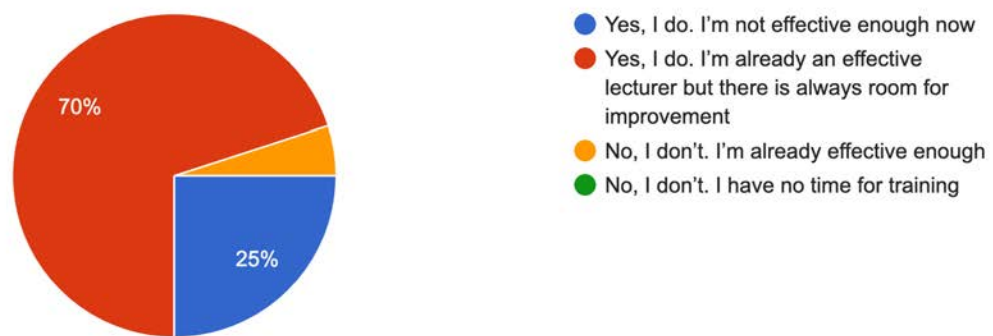
Figure 44. Answers to question 11 of Part 1 of additional questions of Questionnaire 1 (SE), report WP3.A1.

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3.3 INITIATIVES/COURSES DIRECTED TO REFUGEES/ASYLUM SEEKERS IN EUROPE

All questions are presented classified in sections/paragraphs, together with the respective answers by those who answered them and the relevant statistics.

3.3.1 GENERAL INFORMATION

The status of answers for each question is presented in Table 5 and Figure 45. Eight questions out of 16 were not answered by most of the respondents. The unanswered questions are mainly related to STEAM courses focused on women and pupils. Consequently, it can be concluded that although there are courses available for migrants in the HEIs in Europe, they generally lack a specific focus on women and/or pupils. For 39 institutions out of 60, the question regarding the emphasis on the impacts of issues related to environment, sustainability, and climate change on women and pupils was left unanswered. It can be also concluded that 39 out of 60 institutions have no data related to the number of migrants in their institution.

Table 5. Number of questions of Questionnaire 2 of report WP3.A2 that were not answered by the interviewees.

Nr	Question	Nr of HEIs that did not answer*
1	Please tell the number of registered migrants/refugees and asylum seeker students/researchers in your institution, if any? (Optional)	39
2	What kinds of initiatives (projects, orientation courses concerning the host country, language courses etc.) do your institution offer? Please provide examples, if any.	5
3	Are there any courses focusing on enabling migrants/refugees and asylum seekers to develop skills for integrating themselves into the socio-economic life of the host countries?	3
4	If your answer is yes, what initiatives/courses etc. do you provide to reach the following goals within the framework of socio-economic integration? [Knowledge of the socio-economic structure of the cultural life of the host country]	40
5	Are you specifically offering STEM/STEAM courses in one of the following branches/topics to migrants, refugees and asylum seekers? [STEAM courses related with Environment]	51
6	If you answer "yes" to any of the options, please specify with the name of the STEM/STEAM course.	52
7	Please add the syllabus/content of the course, if available.	57
8	If the document of the course syllabus/content is not available, please provide a link or information about the course.	52
9	Do these courses have any specific focus on women and pupils? [Women]	55
10	Do these courses have any specific focus on women and pupils? [Pupils]	55
11	Do these courses have any specific focus on women and pupils? [No]	35
12	If yes, please provide further information on how it is focusing on women and pupils.	54
13	Are you aware of any initiatives/courses/projects specifically focused on women and/or pupils? If yes, please specify (if possible, provide a link for further information).	37
14	If you are offering courses on Climate Change/Environment/Sustainable Development, to which extent are these courses dealing with the impacts of these issues on women and pupils' lives?	43
15	In your opinion, which are the nominees for the best practices on courses/seminars/other initiatives offered by your institution to migrant/refugee women and/or pupils? Please specify the reasons for considering them as best practices.	39

*The numbers include the received response to Questionnaire 2 as well as information collected via desk research.
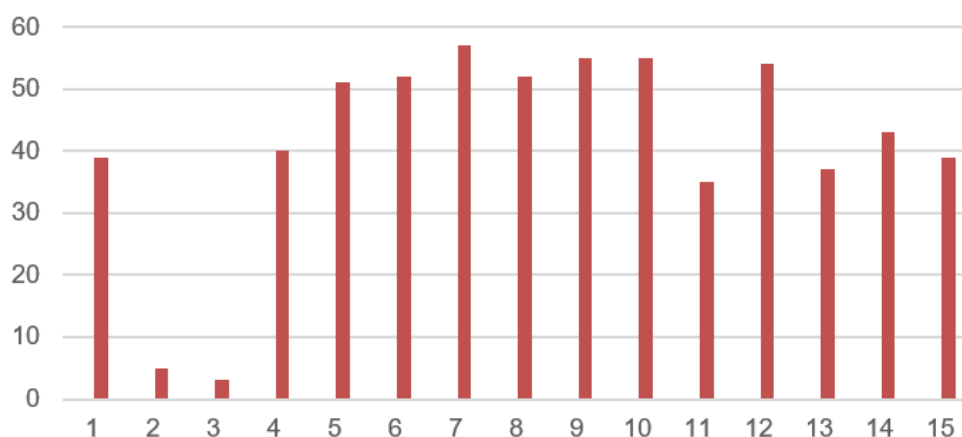
Figure 45. Questions of Questionnaire 2 of report WP3.A2 that were not answered by the interviewees.

Q2_1: Nr of registered migrants/refugees and asylum seeker students/researchers (MRASSR) in your institution, if any? (Optional)

As presented in Table 6, the highest number of migrants are registered in Spain, with 3,596 MRASSR enrolled in Universitat Oberta de Catalunya. Türkiye (Afyon Kocatepe University) follows with 1681, and Bulgaria (Sofia university St. Kliment Ohridski) with 692. The numbers are between 1 to 350 in other countries, as far as the collected data is considered.

Table 6. Number of registered migrants/refugees and asylum seeker students/researchers (MRASSR) in the HEIs that participated in the research.

Nr	Country	Institution	Nr of registered MRASSR
1	Bulgaria	Sofia university "St. Kliment Ohridski"	692
2	Estonia	Tallinn University of Technology	-
3	FR	Dauphine-PSL	About 60
4	Greece	Aristotle University of Thessaloniki	-
5	Italy	Sapienza University of Rome	6 -25 refugees
6	Italy	Università degli studi di Napoli Federico II	20 - 30
7	Italy	University of Perugia	-
8	the Netherlands	Wageningen University	17
9	Poland	University of Lodz	few dozens
10	Portugal	Faculdade De Letras De Lisboa	350
11	Portugal	University of Coimbra	81
12	Romania	"Dunărea de Jos" University of Galati	over 55 thousand persons-days of accommodation
13	Romania	Gheorghe Asachi Technical University of Iasi - TUIASI	3 migrants
14	Spain	Universidad Autónoma de Madrid	5
15	Spain	Universitat Oberta de Catalunya (UOC)	27 asylum seekers/refugees, 3,569 migrants
16	Spain	Universitat d'Alacant	35 students, 4 professors
17	Spain	Universitat Autònoma de Barcelona	50
18	Spain	Universidad Politécnica de Madrid	> 10
19	Spain	Universidad Complutense de Madrid	38
20	Spain	Universidade de A Coruña	7
21	Spain	Universitat de Girona	10
22	Spain	Universitat Politècnica de Catalunya	10
23	Turkey	Ağrı Ibrahim Çeçen University	-
24	Turkey	Institution for Migration	50
25	Turkey	Afyon Kocatepe University	1681
26	Turkey	Ted University	-
27	Italy	University of L'Aquila	-
28	Italy	University of Camerino	-
29	Italy	University of Teramo	-
30	Turkey	Afyon Kocatepe University	-
31	Turkey	Ted University	-
32	Turkey	Middle East Technical University	-
33	Turkey	Eskişehir Osmangazi University	-
34	Cyprus	Open University of Cyprus (State Uni)	-
35	Cyprus	University of Nicosia (Private Uni)	-
36	Cyprus	European University of Cyprus (Private Uni)	-
37	Cyprus	Frederick University (Private Uni)	-
38	Cyprus	Neapolis University Pafos (Private Uni)	-
39	Sweden	Linkoping University	-
40	Germany	Humboldt-Universität zu Berlin (HU)	-

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Nr	Country	Institution	Nr of registered MRASSR
41	Germany	Leipzig University	-
42	Germany	University of Cologne	-
43	Poland	University of Warsaw	-
44	UK	University of East London	-

3.3.2 TYPES OF INITIATIVES OFFERED BY THE EUROPEAN HEIS

Q2_2: What kinds of initiatives (projects, orientation courses concerning the host country, language courses etc.) do your institution offer? Please provide examples, if any.

Several of the institutions that completed the questionnaire offer language courses to migrants, including Bulgaria, Cyprus, Estonia, Poland, Romania, Spain, Turkey and Portugal.

In France, there are programs of adaptation for students coming from Ukraine and countries affected by war.

In Greece, there are several types of projects and training programs, including:

- Projects and educational programs that offer guidelines, training material, improved skills and training of practitioners.
- Projects that offer accommodation and support.
- Projects that support and facilitate volunteering among immigrants and strengthen networks and exchange of knowledge in the field of migrant volunteering, especially on a transnational European level.
- Open courses especially directed to MRASSR concerning language courses.

In Italy, there are programs such as:

- University corridors for refugees.
- SAR - Scholars at risk.
- Autonomous initiatives to support Afghan students as well as Ukrainian students.

There are also some specific initiatives to grant support and special services to migrant students and asylum seekers as well as refugees (Tandem, Mentorship, Salass, etc.).

In Romania, refugees have full access to courses, possibilities to register to the existing study programs, dedicated training courses on Romanian Language.

3.3.3 INITIATIVES/COURSES TO DEVELOP SKILLS FOR SOCIO-ECONOMIC INTEGRATION

Q2_3: Are there any courses focusing on enabling migrants/refugees and asylum seekers to develop skills for integrating themselves into the socio-economic life of the host countries?

Depending on the answers given, 23 institutions in Europe offer courses focusing on enabling MRAS to develop skills for integrating themselves into the socio-economic life of the host countries. These countries are, Cyprus, France, Greece, Italy, Nederland, Poland, Romania, Spain, Turkey and Germany.

Q2_4: If yes, what initiatives/courses etc. do you provide to reach the following goals within the framework of socio-economic integration?

> **A) Knowledge of the socio-economic structure of the cultural life of the host country,**

> **B) Enabling digital skills for reaching online educational contents and courses,**

> **C) Other**

Although 23 institutions reported that there are courses in their institutions focusing on enabling migrants/refugees and asylum seekers to develop skills for integrating themselves into the socio-economic life of the host countries, only a few reported course details. Several examples are listed below:

Cyprus: Module on the History of Cyprus, where the students can become familiar with all periods of Cypriot history, from ancient times to modern one.

Cyprus: The Occupational Therapy Program has the aim to teach migrants the socio-economic culture of Cyprus.

Germany: Social counselling service; German free language courses.

Germany:

- Project "Zukunft gestalten" ("Shaping future")
- Project CampusClub
- Project Buddy Programme

Germany & Spain: Mentoring programme.

3.3.4 COURSES ON ENVIRONMENTAL ISSUES

Q2_5: Are you specifically offering STEM/STEAM courses in one of the following branches/topics to migrants, refugees and asylum seekers?

> **A) STEAM courses related with Environment,**
>
> **B) STEAM courses related with Climate Change,**
>
> **C) STEAM courses related with Sustainable Development study fields**

There are courses on environmental issues offered to MRAS by HEIs like Sofia university "St. Kliment Ohridski" and University of East London, such as:

- Ecology and Environmental Protection
- Bioresources and their conservation
- Biogeography
- Landscape ecology
- Hydrology Courses from master's programs
- Zooecology
- Hydroecology
- Natural ecosystems
- Agroecosystems and their conservation
- Habitat diversity
- Climate Change Courses from undergraduate programs
- Sustainable Development study fields
- Settlements and urbanization processes
- Academic English, English for IELTS
- Education and Employability Pathways, A-Z on How to Apply for University
- Academic Tutoring, Public Speaking
- IT Access, IT Microsoft Certification
- Creative Writing and Storytelling, Podcasting

There are several relevant syllabus links provided by HEIs like:

Linköping University (Sweden):
https://liu.se/en/education/course/714g45
https://liu.se/en/education/course/761g34
https://liu.se/en/article/qualifying-course-in-swedish-for-citizens-outside-eu-eea

Cyprus University of Technology (Cyprus):
https://www.cut.ac.cy/faculties/languagecentre/courses/other-programmes/)
https://www.cut.ac.cy/students/news-and-events/article/?languageId=1&contentId=482300

Wageningen University (Netherlands):
https://wur.osiris-student.nl/#/onderwijscatalogus/extern/cursus

Faculdade de Letras de Lisboa (Portugal):
https://www.iclp.letras.ulisboa.pt/curso-gratuito-de-portugues-para-refugiados-da-ucrania/

The following course titles are reported by the TED University:
- Sustainability in education
- initiative that focuses on promoting sustainable practices

3.3.5 FOCUS ON WOMEN AND/OR PUPILS

Q2_6: Are you aware of any initiatives/courses/projects specifically focused on women and/or pupils? If yes, please specify (if possible provide a link for further information).

There are just a few answers related to the given courses focused on women and pupils. Some examples are presented below.

- Counselling for women – The equal opportunities office at the University of Kassel advises (future) students of all genders and support to combine university studies with mother-/fatherhood and child care or in case of discrimination.
- STEAM Courses held in secondary schools at Universitat Politècnica de Catalunya.
- Courses with the purpose to allow the integration of migrants are offered by secondary schools (University of Teramo, University of Camerino, University L'Aquila).

Q2_7: If you are offering courses on Climate Change/Environment/Sustainable Development, to which extent are these courses dealing with the impacts of these issues on women and pupils' lives?

The following course titles are reported by TED University:

- Sustainability in education
- Initiative that focuses on promoting sustainable practices

3.3.6 NOMINEES FOR THE BEST PRACTICES

No data/results are available for this question in Report A2.

3.4 SDG ACADEMY RESOURCES RELATED TO STEAMIGPOWER INTENSIVE PROGRAM

The SDG Academy is a rich resource of educational material, STEAM related or not. It is also a good source for educational material regarding climate change and environmental issues, but also concerning migration and refugee-related issues. One can only benefit from the resources, which is also the case for researchers of the STEAMigPOWER project that aim to setup and implement an Intensive Program directed to MRAS.

3.4.1 EDUCATIONAL COURSES RELATED TO CLIMATE CHANGE, MIGRATION AND THE SDGS

As discussed by Jessica Crist in a post titled "Climate Change, Migration, and the SDGs" one of the connections of SDGs to modern day issues is the increased occurrence of persons displaced due to the effects of climate change (https://sdgacademy.org/climate-change-migration-and-the-sdgs). Climate change can trigger displacement for those who are forced to flee their homes due to climate change events such as floods, drought, and extreme weather or it can worsen the situation of those who have already fled their country and are seeking shelter as refugees in another nation, usually in an already vulnerable area. According to the United Nations High Commissioner for Refugees (UNHCR), lack of safe drinking water (SDG6), limited natural resources (SDG7), struggling crops and livestock (SDG2), and other effects of climate change will only continue to displace persons from their homes.

Through comprehensive research, Duke University's Program on Climate-Related Migration (PCRM; https://dcid.sanford.duke.edu/climate-migration) is attempting to bring greater awareness to this growing issue. PCRM serves as a cross-disciplinary platform that brings together researchers, practitioners, and policymakers to look more deeply into the interconnected nature of climate change and global migration. With ongoing research projects around the world, the team strives to include findings from both the social and natural sciences. As an invited guest to the 2023 Conference on Climate Change & Migration hosted by the Duke

program in Washington, DC, the SDG Academy heard from top scholars, experts, and policymakers about the impact climate change has on migration. The main solutions and recommendations to come from the conference included taking action to mitigate the impacts of climate change (SDG13), creating welcoming policies for those who are displaced, and reducing inequalities that make populations more vulnerable to climate-related displacement (SDG10).

It is obvious that overall, climate change-related migration is a timely issue that will increase over the years. Various SDGs could address the devastating effects of climate change that displace persons from their homes. At the midpoint of Agenda 2030, policymakers must consider how to move forward to achieve the SDGs and mitigate further displacement due to climate change.

Education concerning SDGs is the first step to creating innovative solutions for climate change-related global challenges. The SDG Academy recommends the following courses for a greater understanding of climate change, human rights, inequality, and the impact climate change has on communities:

SDG Course 1: Climate Change: The Science and Global Impact: This course teaches the science behind global warming to avoid the most damaging and irreversible climate change impacts on people and planet. It is an 8-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's Learning Objectives (LOs) are:

- Principles of atmospheric science
- Climate data collection and interpretation
- Zero-dimensional Energy Balance Models
- One-dimensional Energy Balanced Models
- General Circulation Models
- Carbon emissions scenarios
- Future climate change projections
- Impacts on human systems
- Emissions reduction pathways

The syllabus of the course is presented below:

Module 1: Introduction to Climate and Climate Change

1.0 Course Introduction

1.1 What is climate change

1.2 What should we care about climate change?

1.3 Overview of the climate system: How is the climate system constructed?

1.4 Overview of the climate system: How do energy balances work?

1.5 Overview of the climate system: Global circulation systems

1.6 Other fundamental principles: Feedback mechanisms and the carbon cycle

Module 2: Observing and Measuring Anthropogenic Climate Change

2.1 Changes in atmospheric greenhouse gases

2.2 Modern surface temperature trends

2.3 The oceans

2.4 Extreme weather

2.5 Sea ice, glaciers and global sea level

2.6 Paleoclimate evidence of climate change

Module 3: Modeling the Climate System: The Basics

3.1 Introduction to climate modeling

More information regarding this course can be found at: https://sdgacademy.org/course/climate-change-the-science-and-global-impact

SDG Course 2: Understanding Poverty and Inequality: This course dives deep into the relationships between poverty, inequality, and well-being and explores how poverty and inequality link to issues like climate change, migration, and conflict. It is a 6-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- Global poverty and exclusion as a multidimensional set of deprivations
- Key elements of the history, achievements, and remaining challenges of poverty and inequality around the world
- Causes of poverty and inequality
- Tradeoffs and synergies across dimensions of sustainable development, including identity-based discrimination, climate vulnerability, and more

The syllabus of the course is presented below:

Module 1: An Introduction to Poverty and Inequality

Chapter 1: What do we mean by "poverty" & "inequality"?

Chapter 2: Measurement, trends, and rates of change

Chapter 3: How does economic growth affect poverty and inequality?

Chapter 4: Case study: Poverty reduction in East Asia

Chapter 5: Case study: Broad-based growth in Ethiopia

Module 2: Multidimensional Measures of Poverty

Chapter 1: Multidimensional poverty vs. income poverty: why it matters

Chapter 2: Measuring multidimensional poverty

Chapter 3: The MPI information platform

Chapter 4: Policy approaches to multidimensional poverty

Module 3: Explaining Global Inequality

Chapter 1: Defining inequality

Chapter 2: Measuring income inequality

Chapter 3: Global versus within-country inequality

Chapter 4: Winners and losers in the global economy

Chapter 5: Convergence and poverty hotspots

Chapter 6: Tackling inequality

Module 4: Poverty and Subjective Well-being

Chapter 1: Introducing well-being

Chapter 2: Measures of well-being

Chapter 3: The U Curve

Chapter 4: The Adaptation Conundrum and Progress Paradoxes

Module 5: Identity and Exclusion

Chapter 1: Inequality, poverty, and social identity

Chapter 2: Race and financial inequality

Chapter 3: Gendered dimensions of poverty

Chapter 4: Inequality and indigenous experience

Chapter 5: Case study: Exclusion and inequality in South Africa

Chapter 6: Case study: Policing, racism, and colorism in America and beyond

Chapter 7: Case study: Worthy of investment: The devaluation of assets in Black American communities

Module 6: Poverty and Inequality, Today and Tomorrow

  Chapter 1: New inequalities of the 21st-century

  Chapter 2: Poverty, inequality, and the COVID-19 pandemic

  Chapter 3: Why climate matters for poverty and inequality

  Chapter 4: The evolution of the global middle class

  Chapter 5: Mobility, migration, and opportunity

  Chapter 6A: Fiscal policy, inequality and poverty in low and middle income countries

  Chapter 6B: Fiscal policy reforms: is UBI a good idea?

  Chapter 7: Cash transfers for poverty alleviation

Conclusion

More information regarding this course can be found at: https://www.edx.org/course/understanding-poverty-and-inequality

SDG Course 3: Ecosystem-based Adaptation: Working with nature to adapt to a changing climate: Ecosystem-based Adaptation (EbA) helps people adapt to the diverse effects of climate change and this course teaches the principles of EbA to be applied to various sectors. It is a 9-week, 1-2 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- Understand the role of EbA within an overall climate change adaptation strategy.
- Be able to plan EbA activities in a logical order and apply EbA best practices.
- Consider and integrate social aspects, such as gender, livelihoods, and traditional knowledge, into EbA projects.
- Understand how to mainstream EbA across sectors.

The syllabus of the course is presented below:

Module 1: Introduction to the Course - A brief introduction and rationale for the course.

Module 2: What is EbA? - Introduces the concept of EbA and its basic elements and provides an overview of common terms used in the EbA realm.

  2.1 Terminology and concepts

  2.2 What is EbA?

  2.3 EbA helps people adapt to climate change

  2.4 EbA makes use of biodiversity and ecosystem services

  2.5 EbA is part of an overall adaptation strategy

  2.6 EbA in the context of sustainable development

Module 2 Case Study: Restoring mangroves, Mexico

Module 3: The EbA Mainstreaming Framework - Presents a framework for developing and mainstreaming an EbA project and highlights five cross-cutting topics of EbA.

  3.1 Mainstreaming an EbA project

  3.2 Conceptualising an EbA project

  3.3 Climate justice

  3.4 Governance

  3.5 Gender

  3.6 Traditional knowledge and Indigenous and local knowledge

3.7 Communications

Module 3 Case Study: Forest resilience and livelihoods, Nepal

Module 4: Assessing Climate Risks - Guidance on the process of preparing a climate risk assessment and its importance in identifying potential EbA actions.

4.1 Assessing climate risks

4.2 Preparing a climate risk assessment

4.3 Identifying and adding indicators

4.4 Identifying EbA options

Module 4 Case Study: Flood risk assessment, Togo and Benin

Module 5: EbA Valuation - Focuses on the valuation process of EbA, including its costs, benefits and impacts. The ability of valuation to prioritise EbA actions is also discussed.

5.1 What is EbA valuation and why is it importance?

5.2 The basic elements of EbA value

5.3 Valuation in the EbA Mainstreaming Framework

Module 5 Case Study: Cost-benefit analysis, Vanuatu

Module 6: From Theory to Practice: Implementing EbA - Highlights the importance of aligning EbA with relevant policies, and provides examples from different ecosystems and sectors.

6.1 Learning objectives

6.2 Stakeholder analysis

6.3 Reviewing the policy context

6.4 EbA in action: Examples from different ecosystems

6.5 EbA in action: Examples from different sectors

6.6 Funding for EbA

Module 6 Case Study: Land restoration, Inner Mongolia

Module 7: Tracking the Progress of EbA Implementation: Monitoring, Evaluation and Learning - Discusses a four-step process for monitoring and evaluation in EbA projects and its importance in EbA.

7.1 Introduction to monitoring and evaluation

7.2 Developing a results framework

7.3 Defining indicators, baselines, and targets

7.4 Operationalising monitoring and evaluation

7.5 Using and communicating results

Module 7 Case Study: Monitoring and evaluation, South Africa

Module 8: Cross-cutting Inisghts - Allows participants to progress through four insight units, which offer further information on the cross-cutting themes of governance, gender, Traditional Knowledge and Indigenous and Local Knowledge, and biodiversity.

8.1 EbA and Governance

8.2 EbA and Gender

8.3 EbA and Traditional Knowledge (TK) and Indigenous and local knowledge (ILK)

8.4 EbA and Biodiversity

Module 9: Sectoral Insights - An option to select additional sector-specific insight units from any combination of the following topics: EbA and agriculture, EbA and water, and urban EbA.

9.1 EbA and Agriculture

9.2 EbA and Water

9.3 Urban EbA

More information regarding this course can be found at: https://www.edx.org/course/ecosystem-based-adaptation-working-with-nature-to-adapt-to-a-changing-climate

SDG Course 4: Human Rights, Human Wrongs: This course examines the many human rights abuses that exist in the world and teaches the establishment of human rights and their linkages to many other global issues in sustainable development. It is a 11-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- International agreements in place to support marginalized groups
- How global politics shape the conversation – and the law
- Gender, ethnicity and other factors that intersect – and interfere – with rights worldwide
- How new approaches to humanitarian assistance hurt and help

The syllabus of the course is presented below:

Module 1: Why Does the World Need Human Rights?

Human Rights and Why We Need Them

From Economic Growth to People-Centered Development

The "Rise of Rights" in Development

Creating Human Rights

Are Rights Enough?

Module 2: International Legal Frameworks, Institutions and Development

Underlying Concepts of International Law

United Nations Institutions

International Law and Standards

Regional Systems for Human Rights

Social Inclusion

Module 3: International Human Rights Frameworks

Special Rights for Some

Convention on the Rights of the Child

Convention on the Elimination of All Forms of Discrimination Against Women

International Rights Treaties

Limitations of Existing Standards

Module 4: Underlying Frameworks for Social Inclusion

Subject vs Object in Law

Equality of Opportunity

Affirmative Action

Autonomy as Protection

Lawand Combatting Inequality

Module 5: Contested Rights and the Co-option of the Rights Discourse

Hierarchy of Rights

Human Rights and the Economy

The SDGs and Beyond

More information regarding this course can be found at: https://www.edx.org/course/human-rights-human-wrongs-challenging-poverty-vuln?utm_medium=partner%20marketing&utm_source=webpage&utm_campaign=sdgacademyx&utm_content=get_started_human_rights_human_wrongs

3.4.2 EDUCATIONAL COURSES RELATED TO MRAS

An analytical search in all available courses of SDG Academy reveals other courses that are directly or indirectly linked to MRAS issues:

SDG Course 5: Equity and Inclusion in Education: This course equitable education online course aims to educate, raise awareness and build capacity on ten core aspects of equitable education, why they are important, and what can be done in order to implement them in practice. It is directed at a broad audience of education experts and practitioners, namely policy-makers, government officials, NGOs/CBOs in the education sector, educators and university students. The course will be composed of short, narrated videos, with accompanying exercises, collaborative discussions, quizzes, worksheets, personal reflections and suggestions for further reading. It is a 10-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

- The course's LOs are:
- Explain the key concepts of inclusion, equity, and marginalization in education
- Justify why EE concepts are important
- Identify how to apply EE concepts in their context
- Implement innovative approaches to equitable education
- Advocate to achieve more inclusive and equitable education

The syllabus of the course is presented below:

Module 1: What is equitable education?

Chapter 1: What is equitable education?

Chapter 2: Why is equitable education so important?

Chapter 3: How is equitable education implemented in practice?

Module 2: Equitable education laws and policies

Chapter 1: How is equitable education is reflected in laws and policies?

Chapter 2: What are the law and policy gaps in equitable education?

Chapter 3: How can a rights-based perspective be applied to influence equitable education laws and policies?

Module 3: Innovative financing for Equitable Education

Chapter 1: What is equitable education financing and resource allocation?

Chapter 2: What are the different financing concepts, models and mechanisms?

Chapter 3: How can innovative financial approaches help lessen disparities and increase equity?

Module 4: Decentralized education provision

Chapter 1: Why is decentralized equity education important?

Chapter 2: How can decentralized equity education be achieved?

Chapter 3: What can you do to facilitate decentralized equity education?

Module 5: Education leadership

Chapter 1: Leadership in implementing equitable and inclusive education, and why it is important for everyone

Chapter 2: How does leadership enable successful equitable and inclusive education?

Chapter 3: What can you do to facilitate leadership of equity and inclusive education in your context?

Module 6: Teacher professional development

Chapter 1: How do teacher qualifications, skills, and standards help equity and inclusion in education?

Chapter 2: What approaches can establish, develop and support teacher professional competencies?

Chapter 3: How is the Critically Reflective Practitioner approach to teacher professional development useful?

Module 7: Equitable and inclusive education in the classroom

Chapter 1: What does equitable and inclusive education in the classroom mean?

Chapter 2: What does learner-centred learning look like in practice, and what difference does it make?

Chapter 3: Who is most affected by a lack of equity and inclusion in education?

Module 8: Skills Development and Lifelong learning

Chapter 1: Lifelong learning: Developing skills for life and work

Chapter 2: Adult Learning and Education & Lifelong Learning system

Chapter 3: Our response and contribution to education and training change

Module 9: Data and technology for Equitable Education

Chapter 1: What are the data and technology gaps?

Chapter 2: What are the different data approaches and technologies available?

Chapter 3: How can data and technology increase equity and reduce disparities?

Module 10: Partnership for effective collaboration

Chapter 1: Why are partnerships so important for equitable education?

Chapter 2: What are the different models and levels of effective partnerships?

Chapter 3: How can partnerships be harnessed and applied effectively?

More information regarding this course can be found at: https://www.edx.org/course/equitable-education

SDG Course 6: Transforming Development: The Science and Practice of Resilience Thinking: This course explores how concepts from resilience may help us rethink and transform current development practice. It is a 7-week, 3-5 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- Identify, explain, and analyse the latest key issues and debates regarding global environmental change, sustainability, and resilience in relationship to development
- Identify concrete, cutting-edge, and perhaps surprising ways that core concepts of resilience thinking can be applied in practice.
- Possess a general understanding of complexity and complex systems in ways that help in analyzing the world and diverse development contexts.
- Understand the recent and ongoing evolution of resilience thinking tools used in development practice, and master those that can support your own activities.

The syllabus of the course is presented below:

Module 1: Setting the Scene - Development in a changing world - We have entered the geological epoch of the Anthropocene, the age of humans. Humanity is now the largest driving force of change on the planet. What does this mean for development? In this new reality, development must be able to navigate slow and rapid change, complexity, and surprise.

Module 2: Why does the world seem so complex? - In the Anthropocene, why does the world seem so complex? We define what we mean by complexity, and some ways to think about complexity in the context of development.

Module 3: Transformations and innovation for rethinking development practice - Development practice as we know it needs to be able to navigate uncertainties. However, the business-as-usual approach is not working in the Anthropocene. A new way of thinking about innovation and the capacity to transform is necessary in order to thrive in the face of uncertainty. This module defines transformation, outlines some of the science around transformation, provides examples of transformative development practice and reimagines the role of innovation.

Module 4: The journey from theory to practice - Modules 1-3 provide a strong foundation for why, theoretically, resilience thinking could help transform development practice in the Anthropocene. Module 4 highlights a number of approaches and tools that can help practitioners, policymakers, and others rethink their development interventions.

Module 5: Reconnecting the social-ecological-cultural for rethinking development practice - This module highlights the importance of seeing the social, ecological, and cultural as inseparable. It also emphasizes that for development to succeed in the Anthropocene, all of these dimensions must be considered together in development practice.

Module 6: Why the global matters for transforming development practice - This module explores how humanity's actions in one place and time, can have surprising consequences for other places and times. This module explores why the global matters for local development and how changes at the local level can scale up and have global implications.

Module 7: Alternative futures for development practice - Knowing all this, where do we go from here? This final module uses "futures thinking" as an approach towards development practice. The different chapters present ways of thinking that can help us change the present for the better, through imagining positive alternative futures for development and indeed, for humanity.

More information regarding this course can be found at: https://www.edx.org/course/transforming-development-the-science-and-practice?webview=false&campaign=Transforming+Development%3A+The+Science+and+Practice+of+Resilience+Thinking&source=edx&product_category=course&placement_url=https%3A%2F%2Fwww.edx.org%2Fschool%2Fsdgacademyx

SDG Course 7: The Best Start in Life: Early Childhood Development for Sustainable Development: This course explores how neuroscience, sociology, anthropology and other studies have influenced our understanding of early childhood development. It is an 8-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- All about the brain: how neurological makeup affects children's development
- The intersection of childcare, education and other programming with policies at the national level and beyond
- Case studies: how factors such as forced migration impact a child's future

The syllabus of the course is presented below:

Module 1: Introduction

      Early Childhood Development for Sustainable Development

      The State of the World's Children

      How Brain Architecture Develops

      The Impact of Adversity & Toxic Stress

      Resilience & How to Foster It

Module 2: Child Development: Prenatal to Age 3

      Development in Culture & Context

Physical Development

Cognitive Development and Perception

Language Development

Social Development

Emotional Development & Temperament

Module 3: Child Development: Ages 3 to 8

Physical Development

Cognitive Development & Executive Function

Language

Socio-emotional Development

Module 4: Tour of ECD Programs and Sectors Part 1

Introduction to Multi-sector Aspects

Health Programs

Nutrition & Parenting Programs

Module 5: Tour of ECD Programs and Sectors Part 2

Social Protection Programs

Early Care & Education Programs

Child Protection Programs

Module 6: Communities and Situations of Conflict and Migration

Uganda Case Study

Community Based Programs

Conflict & Migration

Module 7: From Programs to Policies

How is Policy Created?

Quality, Governance & Sustainability

Financing ECD Policies

Module 8: The Future: Innovations and Growth

Innovation in ECD

Innovation from Around the World

Conclusion: The Future of ECD

More information regarding this course can be found at: https://www.edx.org/course/the-best-start-in-life-early-childhood-development?utm_medium=partner-marketing&utm_source=webpage&utm_campaign=sdgacademyx&utm_content=get_started_the_best_start_in_life_early_childhood_development_for_sustainable_development

SDG Course 8: Understanding Poverty and Inequality: This course explores the many facets and faces of poverty and inequality, and discover opportunities for individuals, countries, and a global community to help ensure that no one is left behind. It is a 6-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- Global poverty and exclusion as a multidimensional set of deprivations

- Key elements of the history, achievements, and remaining challenges of poverty and inequality around the world
- Causes of poverty and inequality
- Tradeoffs and synergies across dimensions of sustainable development, including identity-based discrimination, climate vulnerability, and more

The syllabus of the course is presented below:

Module 1: An Introduction to Poverty and Inequality

Chapter 1: What do we mean by "poverty" & "inequality"?

Chapter 2: Measurement, trends, and rates of change

Chapter 3: How does economic growth affect poverty and inequality?

Chapter 4: Case study: Poverty reduction in East Asia

Chapter 5: Case study: Broad-based growth in Ethiopia

Module 2: Multidimensional Measures of Poverty

Chapter 1: Multidimensional poverty vs. income poverty: why it matters

Chapter 2: Measuring multidimensional poverty

Chapter 3: The MPI information platform

Chapter 4: Policy approaches to multidimensional poverty

Module 3: Explaining Global Inequality

Chapter 1: Defining inequality

Chapter 2: Measuring income inequality

Chapter 3: Global versus within-country inequality

Chapter 4: Winners and losers in the global economy

Chapter 5: Convergence and poverty hotspots

Chapter 6: Tackling inequality

Module 4: Poverty and Subjective Well-being

Chapter 1: Introducing well-being

Chapter 2: Measures of well-being

Chapter 3: The U Curve

Chapter 4: The Adaptation Conundrum and Progress Paradoxes

Module 5: Identity and Exclusion

Chapter 1: Inequality, poverty, and social identity

Chapter 2: Race and financial inequality

Chapter 3: Gendered dimensions of poverty

Chapter 4: Inequality and indigenous experience

Chapter 5: Case study: Exclusion and inequality in South Africa

Chapter 6: Case study: Policing, racism, and colorism in America and beyond

Chapter 7: Case study: Worthy of investment: The devaluation of assets in Black American communities

Module 6: Poverty and Inequality, Today and Tomorrow

Chapter 1: New inequalities of the 21st-century

Chapter 2: Poverty, inequality, and the COVID-19 pandemic

Chapter 3: Why climate matters for poverty and inequality

Chapter 4: The evolution of the global middle class

Chapter 5: Mobility, migration, and opportunity

Chapter 6A: Fiscal policy, inequality and poverty in low and middle income countries

Chapter 6B: Fiscal policy reforms: is UBI a good idea?

Chapter 7: Cash transfers for poverty alleviation

Conclusion

More information regarding this course can be found at: https://www.edx.org/course/understanding-poverty-and-inequality

SDG Course 9: Making Universal Social Protection a Reality: This course provides an introduction to social protection, covering different issues including the human right to social security, the need for social protection over the life cycle, the process of building universal social protection systems and the key role of social protection in confronting the major challenges that the world is facing. It is a 4-week, 2-4 hr/week, self-paced (progress at your own speed), free course.

The course's LOs are:

- What the human right to social security entails and the state of social protection coverage around the world;
- The concept of universal social protection and how countries ensure that everyone have access to health care and income guarantee over the life cycle;
- How countries design, implement and manage their social protection systems; and
- The role of social protection to face the current challenges of a world in transformation.

The syllabus of the course is presented below:

Introduction: Universal social protection at the crossroads - A brief introduction and rationale for the course.

Module 1: Social protection: A human right, but not a reality yet all over the world - Discusses on what the right to social security entails and why no society or economy can expect to prosper without social protection.

Chapter 1. Social protection: A human right, socio-economic necessity and cornerstone of the 2030 Agenda for Sustainable Development.

Chapter 2. Social protection around the world: Who is covered against what, how and where?

Module 2: Universal social protection over the life cycle - Explains the concept of universal social protection and examines the protection over the complete life cycle.

Chapter 1. Building comprehensive social protection systems with a solid social protection floor.

Chapter 2. Social health protection and access to health care without hardship for all.

Chapter 3. Social protection for families.

Chapter 4. Social protection and risks during the working life.

Chapter 5. Social protection during old age.

Chapter 6. Long-term care.

Module 3: From social protection policies to solid and inclusive social protection systems. - Focuses on the process of building and maintaining inclusive and solid universal social protection systems.

Chapter 1. A shared vision to build social protection systems.

Chapter 2. Ensuring gender-responsiveness and disability-inclusiveness.

Chapter 3. Financing social protection.

Chapter 4. Coordination within and beyond social protection systems.

Chapter 5. Good governance of social protection systems.

Module 4: Social protection in a changing world - Analyses social protection in the light of the major forces that have been reconfiguring the world.

Chapter 1. Making work decent.

Chapter 2. Social protection across countries.

Chapter 3. Social protection and climate change.

Chapter 4. Social protection at the crossroads: Shaping the future of social protection.

More information regarding this course can be found at: https://www.edx.org/course/making-universal-social-protection-a-reality

3.4.3 OTHER EDUCATIONAL RESOURCES OF INTEREST TO STEAMIGPOWER RESEARCHERS

Other educational resources that are of interest to STEAMigPOWER researchers can be found at:

- The material linked with the subject "Education for Sustainable Development", that comprises 40 media resources. The respective url is:
  https://sdgacademylibrary.mediaspace.kaltura.com/category/By+Subject%3EEducation%3EEducation+for+Sustainable+Development/160690321
- The material linked with the subject Migration Studies"", that comprises 16 media resources. The respective url is:
  https://sdgacademylibrary.mediaspace.kaltura.com/category/By+Subject%3EGlobal+Studies%3EMigration+Studies/123651631
- The results of a search in the SDG Academy Library using the keyword "migrants", that comprises 135 media resources. The respective url is:
  https://sdgacademylibrary.mediaspace.kaltura.com/esearch/search?keyword=migrants
- The results of a search in the SDG Academy Library using the keyword "refugees", that comprises 54 media resources. The respective url is:
  https://sdgacademylibrary.mediaspace.kaltura.com/esearch/search?keyword=refugees
- The results of a search in the SDG Academy Library using the keyword "asylum seekers", that comprises 2 media resources. The respective url is:
  https://sdgacademylibrary.mediaspace.kaltura.com/esearch/search?keyword=asylum%20seekers

4. CONCLUDING REMARKS

STEAMigPOWER focuses on the development of STEAM courses to be provided to migrants/refugees and asylum seekers, including women and pupils in upper secondary school, who are particularly vulnerable to being marginalized in STEAM. Five STEAM courses are to be developed, mainly concerning the environment, climate change and sustainable development. This not only corresponds to the objectives set by the EU but also addresses the specific requirements of their respective home countries. Participants are ready to commit themselves to Europe in the long run while also being prepared to return to their homelands. After the end of conflicts, they will possess the necessary tools and skills to participate in sustainable reconstruction efforts.

Work Package WP3 aims to provide a current assessment on the situation in STEAM courses and other Higher Education activities especially directed to the migrants, refugees and asylum seekers (MRAS) in Europe. This package is designed to provide a comprehensive and grounded understanding of the EU current needs in the Higher Education integration of the target group, including also the social and cultural integration. This is expected to support and facilitate the development and definition of strategies and methodologies for the specific STEAM Intensive Programs that will be created within the project.

The methodologies implemented in order to address the first three stages of WP3 were presented, including the use of carefully tailored to the objectives questionnaires (1 and 2), followed by Qualitative Data Analysis (QDA). Specifically, Thematic Analysis was used to help identify, analyse, and interpret patterns in the incoming qualitative data, conceptual information, and user feedback. Moreover, as the questionnaires did not receive the expected response or they were partially addressed by interviewees, desk research, mainly web-based, carried out by all partners, supported the findings; in many cases, it was important for perception of the full picture.

The investigation of the state-of-the-art of strategies and methodologies for STEAM in Europe (WP3.A1) delivered useful conclusions. The use of a specifically tailored to the objectives' Questionnaire 1 facilitated the process. The quantitative and qualitative analysis of the sample of questionnaires demonstrated that, according to the majority of professors and teachers, innovative STEAM teaching, using ICT and innovative pedagogical approaches, has a positive impact on the concentration of the students/pupils, their critical thinking, their autonomy, their interest, their spirit of cooperation, and on the classroom environment. Nevertheless, there were complaints regarding the lack of financial support and a limited access to hardware and equipment, as well as regarding support from other teachers or other school's staff. It seems that most teachers and professors use traditional pedagogical approaches, also because STEAM teacher training is not compulsory and because educators most of the times improve their teaching tools by themselves, using the Web's available resources in their own time. The quality of the STEAM teaching could be also affected by the pressure to prepare students for exams and tests and the school time organization, according to a large proportion of teachers. The same impact could be delivered by the lack of learning resources/materials for personalized learning and for special needs learners. However, a positive vision about innovative teaching seems to be prevalent in most of the schools; the use of ICT for STEAM teaching at schools has a positive impact for students and is essential for learning and teaching.

Generally, the responses to Questionnaire 1 demonstrated that educators from different European countries support STEAM teaching and the use of new teaching instruments. The main idea that emerges is the need of a method/instrument that makes STEAM classes more interesting. There is a documented lack of knowledge on how to implement new instruments and how to use them, though. The planning and implementation of special training courses for trainers/educators concerning new technologies could be a requirement for many teachers. This is established from the feedback from both Higher Education and Secondary Education professors and teachers.

The investigation of the state-of-the-art of Higher Education Institutions' initiatives/courses directed to refugees/asylum seekers in Europe, with an extra focus on women and pupils in upper secondary school (WP3.A2), also yielded extremely interesting results. Not only the answers to the specifically tailored to the objectives' Questionnaire B, but also the not so random lack of answers at specific questions are indicative of the poorly organized initiatives directly directed to MRAS or better the general lack of carefully planned and organized initiatives/courses. The situation is even worse concerning STEAM courses for MRAS.

Specifically, regarding language courses, institutions in Bulgaria, Cyprus, Estonia, Poland, Romania, Spain, Turkey, and Portugal offer such programs specifically to migrants. Additionally, a French HEI that responded to the questionnaire provides adaptation programs specifically for students from Ukraine and war-affected

countries. Various educational activities were available for Ukrainian refugees, including open classes in Physics, Mathematics, and Sociology, in University of Warsaw (UoW). Additionally, lectures are provided for unenrolled students at the Faculty of Economic Studies of UoW. Courses in Polish as a foreign language are also offered. There are also workshops focusing on psychological well-being, with online meetings on mindfulness and compassion during crisis situations. The HEIs in Greece offer a range of projects and training programs, including educational programs, accommodation and support services, as well as language courses tailored for migrants. The majority of the programs though, are actually training for trainers, educators and caretakers of MRAS rather than MRAS themselves directly. Italian HEIs have a range of initiatives, such as University corridors for refugees, support programs for Afghan and Ukrainian students, and specific services for migrant students and asylum seekers. Additionally, Romanian institutions grant full access to courses and training programs on the Romanian language for refugees, with a focus on developing skills for socio-economic integration. University of East London offers Open Learning Initiative (OLIve): 12-week course for refugees and asylum seekers in the UK to introduce refugees and asylum seekers to Higher Education. They also have an Information and Research Hub (in conjunction with the OLIve) to act as an accessible online hub for refugees and asylum seekers living in the UK who are interested in accessing training and further details in relation to seeking HE within the UK.

Courses focusing on socio-economic integration were also reported by the participant institutions. Some examples include content related to STEM/STEAM courses, environment, climate change, sustainable development, settlement and urbanization processes, academic English, employability pathways, IT access, creative writing, and storytelling.

The quantitative and qualitative analysis of the answers to Questionnaire 2 generally highlights the efforts made by European institutions. These efforts aim to provide language courses, socio-economic integration programs, and educational opportunities to support the integration of migrants, refugees, and asylum seekers into their host countries. These initiatives seek to enhance their skills, language proficiency, and overall chances of successful integration into the local societies. However, the overall results obtained from the questionnaire reveal a significant gap: there is no defined strategy for educating MRAS in the HEIs in Europe in terms of STEM/STEAM. At the same time, the initiatives directed to pupils and woman, who are more likely to experience challenging integration processes, are barely existent. There are numerous activities specifically aimed at Ukrainian refugees rather than individuals with refugee status, regardless of their country of origin. This highlights some disparity in the treatment of this community. WP3.A2 results demonstrate that a strong need to carefully design and freely offer STEAM courses to attract the targeted groups to study in the designated study fields. This need is particularly crucial due to the shortage of skilled labour in Europe, as well as the future needs of the home countries of MRAS after the end of conflicts, unrest or any unsettling conditions that forced people out of their countries. In this regard, the outcomes of STEAMigPOWER project show great promise in addressing this demand and fulfilling the identified need.

The current report (A3) also delivers useful and important guidelines for optimal teaching and learning, specifically the Universal Design for Learning or UDL guidelines. Guidelines like that are even more crucial when the learners belong to the weaker section of societies, experiencing exclusion and other problems, just like migrants, refugees, asylum seekers, women, etc. The UDL Guidelines do not function as a rigid "prescription" but rather as a collection of recommendations that can be implemented to minimize obstacles and enhance learning opportunities for all learners. These guidelines can be customized and combined based on specific learning objectives, content areas, and circumstances. They should be regarded as a valuable resource/tool to foster a common language in designing goals, assessments, methods, and materials that facilitate inclusive, purposeful, and engaging learning experiences for everyone.

Finally, this report goes beyond the search of good practices in Higher Education Institutions and Secondary Education Schools. It analytically presents the SDG Academy as a useful pool of free, open educational resources from experts on sustainable development. It represents the education and training division of the Sustainable Development Solutions Network promoting transformative education through the creation and curation of high-quality content on sustainable development, sharing of innovative pedagogies and training models, and providing open access to learning resources for a global audience. Specifically, SDG Academy's Mission 4.7 is an extremely interesting initiative for the creators of STEAMigPOWER Blended Intensive Program. It fosters collaboration among government officials, academics, members of civil society, and business leaders to expedite the global adoption of Education for Sustainable Development and underscore the vital role of education in attaining the SDGs. Apart from helping to achieve SDG Target 4.7, Mission 4.7 also curates and creates relevant educational resources, push countries for greater investments in quality education,

and identify ways to train and support educators around the world under the umbrella of the so called Transformative Education, encompassing the common objectives and methodologies of the types of education outlined in SDG Target 4.7. This report analyses the key tools and operations of the SDG Academy platform that creators of STEAMigPOWER courses can build upon, while also highlighting any specific educational resources related to STEAM in general, migrants/refugees and asylum seekers, as well as education of MRAS and training of trainers of MRAS.

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Science, Technology, Engineering, Art and Mathematics Education Practices
Teacher questionnaire

1 – Please provide information about one STEAM class you teach:

Subject taught _____

Age of the students _____

How many boys per class _____

How many girls per class _____

How many lessons a week do you teach in this class _____

2 – Which pedagogical approaches are you using in your STEAM teaching for this class and how much?

Traditional direct instruction (lessons are focused on the delivery of content by the teacher and the acquisition of content knowledge by the students) ☐ yes ☐ no

Teaching with experiments (experiments are used in the classroom to explain the subject matter) ☐ yes ☐ no

Project-/Problem-based approach (students are engaged in learning through the investigation of real-world challenges and problems) ☐ yes ☐ no

Inquiry-based science education (students design and conduct their own scientific investigations) ☐ yes ☐ no

Collaborative learning (students are involved in joint intellectual efforts with their peers or with their teachers and peers) ☐ yes ☐ no

Peer teaching (students are provided with opportunities to teach other students) ☐ yes ☐ no

Flipped classroom (students gain the first exposure to new material outside of class, and then use classroom time to discuss, challenge and apply ideas of knowledge) ☐ yes ☐ no

Personalized learning (teaching and learning are tailored to meet students' individual interests and aspirations as well as their learning needs) ☐ yes ☐ no

Integrated learning (learning brings together content and skills from more than one subject area) ☐ yes ☐ no

Differentiated instruction (classroom activities are designed to address a range of learning styles, abilities, and readiness) ☐ yes ☐ no

Summative assessment (student learning is evaluated at the end of an instructional unit and compared against a benchmark or standard) □ yes □ no

Formative assessment, including self-assessment (student learning is constantly monitored and ongoing feedback is provided; students are provided with opportunities to reflect on their own learning) □ yes □ no

3 – To what extent do you use the following aspects of teaching and learning (with or without ICT) when teaching the class? (1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

I present and explain scientific ideas to the whole class □ 1 □ 2 □ 3 □ 4

Students work alone at their own pace □ 1 □ 2 □ 3 □ 4

Students work on exercises or tasks individually at the same time □ 1 □ 2 □ 3 □ 4

I demonstrate a scientific idea to the whole class □ 1 □ 2 □ 3 □ 4

Students conduct experiments □ 1 □ 2 □ 3 □ 4

Students discuss ideas with other students and the teacher □ 1 □ 2 □ 3 □ 4

Students make decisions about how they learn □ 1 □ 2 □ 3 □ 4

Students conduct their own scientific study and research activities □ 1 □ 2 □ 3 □ 4

Students work in groups with well-defined tasks □ 1 □ 2 □ 3 □ 4

Students work together to find solutions to problems □ 1 □ 2 □ 3 □ 4

Students reflect on their learning □ 1 □ 2 □ 3 □ 4

I support and explain things to individual students □ 1 □ 2 □ 3 □ 4

I use different types of materials (visual, audio, written) in my classes

□ 1 □ 2 □ 3 □ 4

I use content from different subjects to explain scientific concepts □ 1 □ 2 □ 3 □ 4

I invite other STEAM teachers of different disciplines to coordinate our teaching of certain common topics □ 1 □ 2 □ 3 □ 4

I organise visits to museums or companies to contextualize scientific concepts

□ 1 □ 2 □ 3 □ 4

Students take tests and assessments □ 1 □ 2 □ 3 □ 4

I give feedback to my students during a learning activity □ 1 □ 2 □ 3 □ 4

Students participate in assessing their own work and the work of their peers

□ 1 □ 2 □ 3 □ 4

Students give presentations to the whole class □ 1 □ 2 □ 3 □ 4

I integrate Arts into my STEM (STEAM) teaching to increase student engagement

□ 1 □ 2 □ 3 □ 4

4 – Which learning resources/materials are you currently using when teaching the class?

(1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

Paper-based materials	□ 1	□ 2	□ 3	□ 4
Audio/video materials	□ 1	□ 2	□ 3	□ 4
Presentations (Power Point, Libre Office, etc.)	□ 1	□ 2	□ 3	□ 4
Robots	□ 1	□ 2	□ 3	□ 4
Sensors	□ 1	□ 2	□ 3	□ 4
Calculators	□ 1	□ 2	□ 3	□ 4
Graphing calculators	□ 1	□ 2	□ 3	□ 4
Manipulation in an experimental laboratory	□ 1	□ 2	□ 3	□ 4
Web-based or computer-based simulations	□ 1	□ 2	□ 3	□ 4
STEAM specific software (Geogebra, Maths online function plotter, Graph plotter, etc.)	□ 1	□ 2	□ 3	□ 4
Spreadsheets (Excel, Libre Office Calc, etc.)	□ 1	□ 2	□ 3	□ 4
Word processors (Word, Libre Office Write, OneNote, etc.)	□ 1	□ 2	□ 3	□ 4
Online collaborative tools (Padlet, Kahoot, etc.)	□ 1	□ 2	□ 3	□ 4
Resources published by private companies operating in STEAM fields	□ 1	□ 2	□ 3	□ 4
Resources for special needs learners	□ 1	□ 2	□ 3	□ 4
Resources for personalized learning	□ 1	□ 2	□ 3	□ 4

5 – How do you usually learn about the teaching resources you are using in class? (More than one answer is allowed)

They are shared by the educational authorities in my country	□
They are shared by my network of peers	□
I actively search for resources in repositories of educational resources	□
I actively search the Web for relevant teaching resources	□
I subscribe to the information channels of national and international STEAM education projects, which are publicly funded (social media, newsletters, etc.)	□

I subscribe to the international channels of private companies who publish STEAM education resources (social media, newsletters, etc.) ☐

6 – Which learning resources/materials would you like to use, but do not have at your disposal?
(1 – I will not use; 2 – I could use; 3 – I need; 4 – I already have)

Robots	☐ 1	☐ 2	☐ 3	☐ 4
Sensors	☐ 1	☐ 2	☐ 3	☐ 4
Calculators	☐ 1	☐ 2	☐ 3	☐ 4
Graphing calculators	☐ 1	☐ 2	☐ 3	☐ 4
Experimental laboratory	☐ 1	☐ 2	☐ 3	☐ 4
Web-based or computer-based simulations	☐ 1	☐ 2	☐ 3	☐ 4
STEAM-specific software (GeoGebra, Remote Labs, etc.)	☐ 1	☐ 2	☐ 3	☐ 4
Augmented reality/Virtual reality tools/Virtual Labs	☐ 1	☐ 2	☐ 3	☐ 4
Resources for personalized learning	☐ 1	☐ 2	☐ 3	☐ 4
Resources for special needs learners	☐ 1	☐ 2	☐ 3	☐ 4
Resources published by private companies operating in STEAM fields	☐ 1	☐ 2	☐ 3	☐ 4

7 – You would like to see more support for schools from private companies operating in STEAM fields in: (1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

Facilitating company visits	☐ 1	☐ 2	☐ 3	☐ 4
Having STEAM professionals presenting to pupils in school	☐ 1	☐ 2	☐ 3	☐ 4
Offering teachers placements	☐ 1	☐ 2	☐ 3	☐ 4
Offering student placements	☐ 1	☐ 2	☐ 3	☐ 4
Making teaching resources available to schools	☐ 1	☐ 2	☐ 3	☐ 4
Allowing access to hardware and equipment	☐ 1	☐ 2	☐ 3	☐ 4
Professional development	☐ 1	☐ 2	☐ 3	☐ 4
Other financial support	☐ 1	☐ 2	☐ 3	☐ 4

8 – Is your use of STEAM teaching affected by the following?
(1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

Insufficient number of computers	☐ 1	☐ 2	☐ 3	☐ 4
Insufficient number of internet-connected computers	☐ 1	☐ 2	☐ 3	☐ 4

Insufficient internet bandwidth or speed   □ 1   □ 2   □ 3   □ 4

Insufficient number of interactive whiteboards   □ 1   □ 2   □ 3   □ 4

Insufficient number of portable computers   □ 1   □ 2   □ 3   □ 4

School computers out of date and needing repair   □ 1   □ 2   □ 3   □ 4

Lack of adequate training of teachers   □ 1   □ 2   □ 3   □ 4

Insufficient technical support for teachers   □ 1   □ 2   □ 3   □ 4

Insufficient pedagogical support for teachers   □ 1   □ 2   □ 3   □ 4

Lack of content in national language   □ 1   □ 2   □ 3   □ 4

Lack of pedagogical models on how to teach STEAM in an attractive way

    □ 1   □ 2   □ 3   □ 4

School time organization (fixed lesson time, etc.)   □ 1   □ 2   □ 3   □ 4

School space organization (classroom size and/or furniture, etc.)   □ 1   □ 2   □ 3   □ 4

Pressure to prepare students for exams and tests   □ 1   □ 2   □ 3   □ 4

Lack of interest of teachers   □ 1   □ 2   □ 3   □ 4

Insufficient cross-curricular support from my school colleagues   □ 1   □ 2   □ 3   □ 4

Unclear benefit from using ICT for STEAM teaching   □ 1   □ 2   □ 3   □ 4

Using ICT in teaching and learning not a goal in my school   □ 1   □ 2   □ 3   □ 4

Administrative constraints in accessing adequate content/material for teaching

    □ 1   □ 2   □ 3   □ 4

Budget constraints in accessing adequate content/material for teaching

    □ 1   □ 2   □ 3   □ 4

9 – In your country, STEAM teacher training for teachers in your subject is:

Compulsory   □

Not compulsory, but recommended   □

At my own discretion   □

10 – In the past two school years, have you undertaken professional development of the following type?

Introductory courses on Internet use and general applications (basic word-processing, spreadsheets, presentations, databases, etc.)   □

Advanced courses on applications (advanced word-processing, virtual learning environments, etc.)   □

Advanced courses on Internet use (creating websites, video conferencing, etc.) ☐

Equipment-specific training (laptop, interactive whiteboard, etc.) ☐

Courses on the pedagogical use of ICT in teaching and learning ☐

Subject-specific training on learning applications (tutorials, simulations, etc.) ☐

Course on multimedia (using digital video, audio equipment, etc.) ☐

Participate in communities for professional discussions with other teachers ☐

Personal learning about innovative STEAM teaching in your own time ☐

Cooperation with industry for the contextualization of STEAM teaching ☐

Other professional development opportunities related to innovative STEAM teaching ☐

11 – Do you use a computer/tablet/smartphone and the Internet to update your subject knowledge or undertake personal or professional development in any subject?

(1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

To actively search for information and update my knowledge/teaching resources (news articles, etc.) ☐ 1 ☐ 2 ☐ 3 ☐ 4

To undertake professional development courses ☐ 1 ☐ 2 ☐ 3 ☐ 4

To participate in online communities ☐ 1 ☐ 2 ☐ 3 ☐ 4

To create new materials either for personal use (personal website, calendar, etc.) or for my lessons (I create my own digital learning materials for students)

☐ 1 ☐ 2 ☐ 3 ☐ 4

12 – To what extent do you receive the support of the following groups to improve your STEAM teaching?

(1 – little/no support; 2 – technical; 3 – pedagogical; 4 – both technical and pedagogical)

Other teachers of the same subject ☐ 1 ☐ 2 ☐ 3 ☐ 4

Other teachers of a different STEAM subject ☐ 1 ☐ 2 ☐ 3 ☐ 4

Other teachers of other, non-STEAM subject ☐ 1 ☐ 2 ☐ 3 ☐ 4

School technology coordinator ☐ 1 ☐ 2 ☐ 3 ☐ 4

Experts from outside the school ☐ 1 ☐ 2 ☐ 3 ☐ 4

An online helpdesk, community, or website ☐ 1 ☐ 2 ☐ 3 ☐ 4

Other school staff ☐ 1 ☐ 2 ☐ 3 ☐ 4

13 – Do your colleagues and head of school share a positive vision about innovative STEAM teaching (Flipped classrooms, the use of ICT tools, project-based learning, etc.) at your school?

Yes   □

No   □

14 – In your opinion, does innovative STEAM teaching (using ICT and innovative pedagogical approaches) have a positive impact on the following?
(1 – not at all; 2 – very little; 3 – to some extent; 4 – a lot)

	1	2	3	4
Students concentrate more on their learning	□ 1	□ 2	□ 3	□ 4
Students try harder in what they are learning	□ 1	□ 2	□ 3	□ 4
Students feel more autonomous in their learning	□ 1	□ 2	□ 3	□ 4
Students understand more easily what they learn	□ 1	□ 2	□ 3	□ 4
Students remember more easily what they have learnt	□ 1	□ 2	□ 3	□ 4
Students develop their critical thinking	□ 1	□ 2	□ 3	□ 4
Students become more interested in STEAM careers	□ 1	□ 2	□ 3	□ 4
ICT facilitates collaborative work among students	□ 1	□ 2	□ 3	□ 4
ICT improves the class climate (students are more engaged, less disturbing)	□ 1	□ 2	□ 3	□ 4

15 – To what extent do you disagree or agree with each of the following statements about the use of ICT for STEAM teaching at school?
(1 – strongly disagree; 2 – disagree; 3 – agree; 4 – strongly agree)

ICT should be used for students to:

	1	2	3	4
do exercises and practice	□ 1	□ 2	□ 3	□ 4
retrieve information	□ 1	□ 2	□ 3	□ 4
work in a collaborative way	□ 1	□ 2	□ 3	□ 4
learn in an autonomous way	□ 1	□ 2	□ 3	□ 4

ICT use in learning and teaching positively impacts on students':

	1	2	3	4
motivation	□ 1	□ 2	□ 3	□ 4
achievement	□ 1	□ 2	□ 3	□ 4
higher level skills (deep understanding)	□ 1	□ 2	□ 3	□ 4
competence in transversal skills	□ 1	□ 2	□ 3	□ 4

ICT use in learning and teaching is essential:

to prepare students to live and work   □ 1   □ 2   □ 3   □ 4

in the 21st century   □ 1   □ 2   □ 3   □ 4

Some practical questions devoted to define the **new tools to apply to the project:**

Part 1: Demographic information

1. My subject discipline is _____

2. Country _____

3. School or University _____

4. I've been teaching in higher education for…

Less than 2 years	☐
2-5 years	☐
6-10 years	☐
11-20 years	☐
more than 20 years	☐

5. I identify my gender as

male	☐
female	☐
other	☐
i don't want to answer	☐

6. My age is

less than 25	☐
26-35	☐
36-45	☐
46-55	☐
56-65;	☐
more than 65	☐

7. My preparation for teaching at university level is:

I have obtained the University teaching certificate:

Pedagogical training < 250 workload hours ☐

Pedagogical training between 250 and 650 workload hours ☐

Pedagogical training > 650 workload hours ☐

I didn't have any pedagogical training yet ☐

8. What part of your work is teaching? (find some suggestions and an open field to describe your personal situation)

Teaching duties represent 100% of my working tasks ☐

Teaching duties represent substantial part of my working tasks ☐

Teaching duties are about 50% of my working tasks ☐

Teaching duties are a minor part of my working tasks ☐

I only teach very occasionally as a guest lecturer / guest supervisor ☐

Other ☐

9. What is your teaching role (more than one answer is possible)

Lab teaching ☐

Lecturing ☐

Teaching in tutorials / seminars / working sessions ☐

Supporting problem based learning (PBL) sessions ☐

Care about professional internships ☐

Mentoring/tutoring ☐

Member of examination board ☐

Member of programme committee ☐

Developing teaching materials for other lecturers ☐

Advising about teaching ☐

Other ☐

10. Do you think you are an effective lecturer?

Yes ☐

Not always ☐

11. Do you think you need training to become a more effective lecturer?

Yes, I do. I'm not effective enough now ☐

Yes, I do. I'm already an effective lecturer but there is always room for improvement ☐

No, I don't. I'm already effective enough ☐

No, I don't. I have no time for training ☐

Part 2: Which competencies lecturers in your discipline need to have?

_____

_____

_____

_____

Part 3: Which habits / characteristics all lecturers should have?

_____

_____

_____

_____

Part 4: What kind of professional development activities work good?

_____

_____

_____

_____

Personal information:

Do you think there was enough interaction with other colleagues?

_____

_____

_____

_____

Do you feel more confident about your teaching skills?

_____

_____

_____

_____

If we organise a STEAM school to propose the new tools to learn/help to the teachers how teach better, would you recommend your colleagues to participate in the STEAM school?

_____

_____

_____

_____

How applicable is the gained knowledge to your teaching practice?

_____

_____

_____

_____

7. ANNEX II - QUESTIONNAIRE 2

STEAMigPOWER Intensive Program: Initiatives/courses directed to migrants, refugees and asylum seekers_Questionnaire

Glossary of Terms:

1. **Migrant:** At the international level, no universally accepted definition for "migrant" exists. In the EU/EFTA context, a migrant is a person who establishes their usual residence in the territory of an EU/EFTA Member State for a period that is, or is expected to be, of at least 12 months, having previously been usually resident in another EU/EFTA Member State or a third country. (*Please consider that regular international students are not considered migrants in the context of this questionnaire. For the definition of "international student", please refer to: https://www.migrationdataportal.org/themes/international-students)

2. **Refugee:**

   A refugee is a person who has fled their own country because they are at risk of serious human rights violations and persecution there. The risks to their safety and life were so great that they felt they had no choice but to leave and seek safety outside their country because their own government cannot or will not protect them from those dangers. Refugees have a right to international protection. (Definition by Amnesty International)

3. **Asylum Seeker:**

   An asylum seeker is a person who has left their country and is seeking protection from persecution and serious human rights violations in another country, but who hasn't yet been legally recognized as a refugee and is waiting to receive a decision on their asylum claim. (Definition by Amnesty International)

kaydedilir. E-posta adresiniz yanıtınızın bir parçası değildir.

Country

Yanıtınız

The name of Higher Education Institution

Yanıtınız

Please tell the number of registered migrants/refugees and asylum seeker students/researchers in your institution, if any? (Optional)

Yanıtınız

What kinds of initiatives (projects, orientation courses concerning the host country, language courses etc.) do your institution offer? Please provide examples, if any.

Yanıtınız

Are there any courses focusing on enabling migrants/refugees and asylum seekers to develop skills for integrating themselves into the socio-economic life of the host countries?

○ Yes

○ No

If your answer is yes, what initiatives/courses etc. do you provide to reach the following goals within the framework of socio-economic integration?

	1. Column
Knowledge of the socio-economic structure of the cultural life of the host country	○
Enabling digital skills for reaching online educational contents and courses	○
Other	○

Are you specifically offering STEM/STEAM courses in one of the following branches/topics to migrants, refugees and asylum seekers?

	1. Column
STEAM courses related with Environment	○
STEAM courses related with Climate Change	○
STEAM courses related with Sustainable Development study fields	○

If you answer "yes" to any of the options, please specify with the name of the STEM/STEAM course.

Yanıtınız

Please add the syllabus/content of the course, if available.

⬆ Dosya ekle

If the document of the course syllabus/content is not available, please provide a link or information about the course.

Yanıtınız

Do these courses have any specific focus on women and pupils?

	1. Column
Women	○
Pupils	○
No	○

If yes, please provide further information on how it is focusing on women and pupils.

Yanıtınız

Are you aware of any initiatives/courses/projects specifically focused on women and/or pupils? If yes, please specify (if possible provide a link for further information).

Yanıtınız

If you are offering courses on Climate Change/Environment/Sustainable Development, to which extent are these courses dealing with the impacts of these issues on women and pupils' lives?

Yanıtınız

In your opinion, which are the nominees for the best practices on courses/seminars/other initiatives offered by your institution to migrant/refugee women and/or pupils? Please specify the reasons for considering them as best practices.

Yanıtınız

Additional Comments/Suggestions

Yanıtınız

Country

Yanıtınız

The name of Higher Education Institution

Yanıtınız

Please tell the number of registered migrants/refugees and asylum seeker students/researchers in your institution, if any? (Optional)

Yanıtınız

What kinds of initiatives (projects, orientation courses concerning the host country, language courses etc.) do your institution offer? Please provide examples, if any.

Yanıtınız

Are there any courses focusing on enabling migrants/refugees and asylum seekers to develop skills for integrating themselves into the socio-economic life of the host countries?

○ Yes

○ No

If your answer is yes, what initiatives/courses etc. do you provide to reach the following goals within the framework of socio-economic integration?

	1. Column
Knowledge of the socio-economic structure of the cultural life of the host country	○
Enabling digital skills for reaching online educational contents and courses	○
Other	○

Are you specifically offering STEM/STEAM courses in one of the following branches/topics to migrants, refugees and asylum seekers?

	1. Column
STEAM courses related with Environment	○
STEAM courses related with Climate Change	○
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If you answer "yes" to any of the options, please specify with the name of the STEM/STEAM course.

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Please add the syllabus/content of the course, if available.

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If the document of the course syllabus/content is not available, please provide a link or information about the course.

Yanıtınız

Do these courses have any specific focus on women and pupils?

	1. Column
Women	○
Pupils	○
No	○

If yes, please provide further information on how it is focusing on women and pupils.

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In your opinion, which are the nominees for the best practices on courses/seminars/other initiatives offered by your institution to migrant/refugee women and/or pupils? Please specify the reasons for considering them as best practices.

Yanıtınız

Additional Comments/Suggestions

Yanıtınız