Emerge
empowering female entrepreneurs in engineering

EMERGE Placement Framework

Methodology & Experience

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

INTRODUCTION

EMERGE is an EU ERASMUS+ project bringing together project partners and experts from Poland, Denmark, Norway, Turkey, and Ireland. This project aims to increase the number of female entrepreneurs in engineering by transforming their access to and the quality of the training they receive from Entrepreneurship, VET & HEI institutions. This document aims at presenting the design and implementation of the EMERGE Training and Internship Program.

The fact that women have different approaches to enterprise development, learn in different ways, and require different support structures is well documented on paper, but often unexplored in action. The "Female Startup in Engineering" training course addresses many of these aspects, using multimedia, interactive formats to generate both attitudinal change and grow confidence in technical skills. We aim not only to enable some selected EMERGE women to benefit from an acceleration of their entrepreneurial skills and mindset, but we also draw on the experience to promote the wider incorporation of this style of training within the wider VET sector. The EMERGE women experiencing work in high growth engineering enterprises for a short but structured placement period resulted in improvements in terms of their entrepreneurial mindset and skills. Our resources and approach were truly enhanced by the inclusion of a 4-week experiential learning opportunity for 45 women in engineering learners. This report introduces apprenticeship-style learning placements with at least 15 engineering female entrepreneurs in each participating region. It marks a radically new path in HE & VET development for Europe.

This report guides interested parties who would like to structure a methodology based on an apprenticeship style-learning placement, including the selection of the trainees and host organizations, evaluation while introducing case internship programs from Europe.

EMERGE was designed to create a new and effective curriculum that contributes to educating young females in engineering start-ups. By creating a new curriculum and delivering it across Europe we have already started to integrate and create dedicated educational EMERGE programs, this demonstrates that responsive education strategies can make a significant difference.

The partners who provided input in the development of the EMERGE Training & Internship Program. are listed in the table.

NOT Poland	Polish Federation of Engineering Associations NOT West-Pomeranian Council bring the expertise of their Centre for Technology Enhanced Learning which focuses on theoretical and practical challenges related to educational uses of technologies for teaching and learning in formal and informal educational settings.
Momentum Ireland	Momentum is one of Ireland's leading entrepreneurship specialists. Although competent in all aspects of training, they especially employ a rigorous approach to curriculum development, authoring tools, and creative content generation.

ZUT Poland	ZUT fosters one of the most progressive learning environments in Poland in terms of technology and innovation. They have a unique ethos that harnesses academic excellence with career-focused practical experience. It is an approach that positions their students for future success in line with their aspirations. Their engagement and partnerships with indigenous and international business leaders strengthen their student's prospects in tandem with the prosperity of their region's economy.
ECWT Norway	The European Centre for Women and Technology (ECWT) is a European multi-stakeholder partnership of more than 130 organizations and a rapidly growing member of individuals representing high-level expertise in women and technology development from government, business, academia, and non-profit sectors working together to measurably and significantly increase the number of girls and women in technology and ICT in specific.
EUEI Denmark	European E-learning Institute (EUEI) specializes in the creation of powerful online platforms, immersive educational environments, and the provision of resources and tools to create truly valuable learning experiences. As an organization, EUEI places tremendous worth on the informal and flexible nature of continuing education and crafting flexible, online learning courses for those wishing to improve themselves and stay ahead in their careers and in business.
EGE University Turkey	EGE University is a public university in İzmir, Turkey. It specializes in a multitude of faculties including science, engineering, and business. EGE University commonly ranks close to the top among research universities in Turkey. With a strong focus on carrying out an engineering education in a global sense with a constantly developing and innovative approach. Maintaining research activities effectively. Keeping and enriching its relations with industry. Providing opportunities and support for innovation initiatives and providing social, environmental, and intellectual responsibilities to its students through multi-faceted information.

Several research activities were carried on to analyse and measure the impact of entrepreneurship education on the entrepreneurial skills and intentions of students. We decided to stick with EntreComp because it is universal and is accepted on the EU level. At its very simplest level, EntreComp is made up of 3 competence areas: Ideas & Opportunities, Resources, and Into Action.

Our idea was to recognize the progression of Entrepreneurship competence by EMERGE's project participants and also candidate interns. The EntreComp Progression Model provided a reference for the development of indicators for EMERGE's qualifications assessment.

EMERGE TRAINING & PLACEMENT PROGRAMME

Internship Programme introduction

The EMERGE Placements Programme was designed as a practical approach to facilitate the integration of females in engineering careers and potential entrepreneurship. The candidates of the placements had achieved their technical & engineering qualifications and now needed to learn in a different realistic way by applying their learnings to real-world business practices. The inclusion of host organisations and their valued direction was designed to engage a more interactive and guided format approach to generate the best possible attitudinal change and grow their skills in both engineering and entrepreneurship.

EMERGE has a clear goal: increase the number of female entrepreneurs in engineering by transforming their access to and the quality of the training they receive from Entrepreneurship, VET & HEI institutions. To achieve this, we incorporate several measures into the Internship Programme:

- Reach to engineering students/graduates from VET & HEI institutions and improve their entrepreneurial assets.
- Mentoring/Coaching to female entrepreneurs in engineering
- Matchmaking between female students/engineers to companies to the internship experience
- Creating a learning experiment in companies through their business and engineering challenges

Methodology and approach

To start conceptualization of the placement program the aims and impact criteria had to be defined. The general approach has been defined as followed.

Task	Placement Process
EMERGE Placement Duration	Experiential Opportunity Placement Retaining the placement programme in a period of 4 weeks meant the experiential benefits could be achieved and the EMERGE resources could be enhanced in qualitative and quantitative measures.
EMERGE Candidates and Host Organisations	Female Engineers, Host Organisations Female engineers took the learning placements with engineering entrepreneurs or host organisations in the region. Matching the female engineers with host organisations meant EMERGE could introduce an apprenticeship style learning placement and experience work specific to their interests in high growth engineering enterprises for a short but structured placement period. The benefits to be achieved; new networks, collaboration, education, expert experience, self-development, confidence building, entrepreneurship knowledge…

As entrepreneurship is a competence that is developed through action by individuals or collective entities to create value for others, it was assumed that entrepreneurship develops over time due to two aspects:

- Developing increasing autonomy and responsibility in acting upon ideas and opportunities to create value;
- Developing the capacity to generate value from simple and predictable contexts up to complex, constantly changing environments.

Thus, EMERGE Expected Impacts through the Training & Placements has been defined in relation to three categories:

1. GENERATING AND SCREENING IDEAS AND OPPORTUNITIES
    - Participants can seize and shape opportunities to respond to challenges and create value for others.
    - Participants can transform ideas into solutions that create value for others.
    - Participants can use their vision to guide strategic decision-making.
    - Participants can develop strategies to make the most of the value generated by ideas.
    - Participants act to make sure that their ethical and sustainability goals are met.
2. AGUIRE AND MOBILISE RESOURCES
    - Participants can compensate for their weaknesses by teaming up with others and by further developing their strengths.
    - Participants can stay focused on their passion and keep creating value despite setbacks.
    - Participants can define strategies to mobilize the resources they need to generate value for others.
    - Participants can make a plan for the financial sustainability of a value-creating activity.
    - Participants can inspire others and get them on board for value-creating activities.
3. TAKING ACTION
    - Learners can look for opportunities to take the initiative to add or create value.
    - Learners can refine priorities and plans to adjust to changing circumstances.
    - Learners can weigh-up risks and make decisions despite uncertainty and ambiguity.
    - Learners can build a team and networks based on the needs of their value-creating activity.
    - Learners can improve their abilities to create value by building on their previous experiences and interactions with others.

The catalogue of EMERGE Placement Program rules has been developed. It included the following:

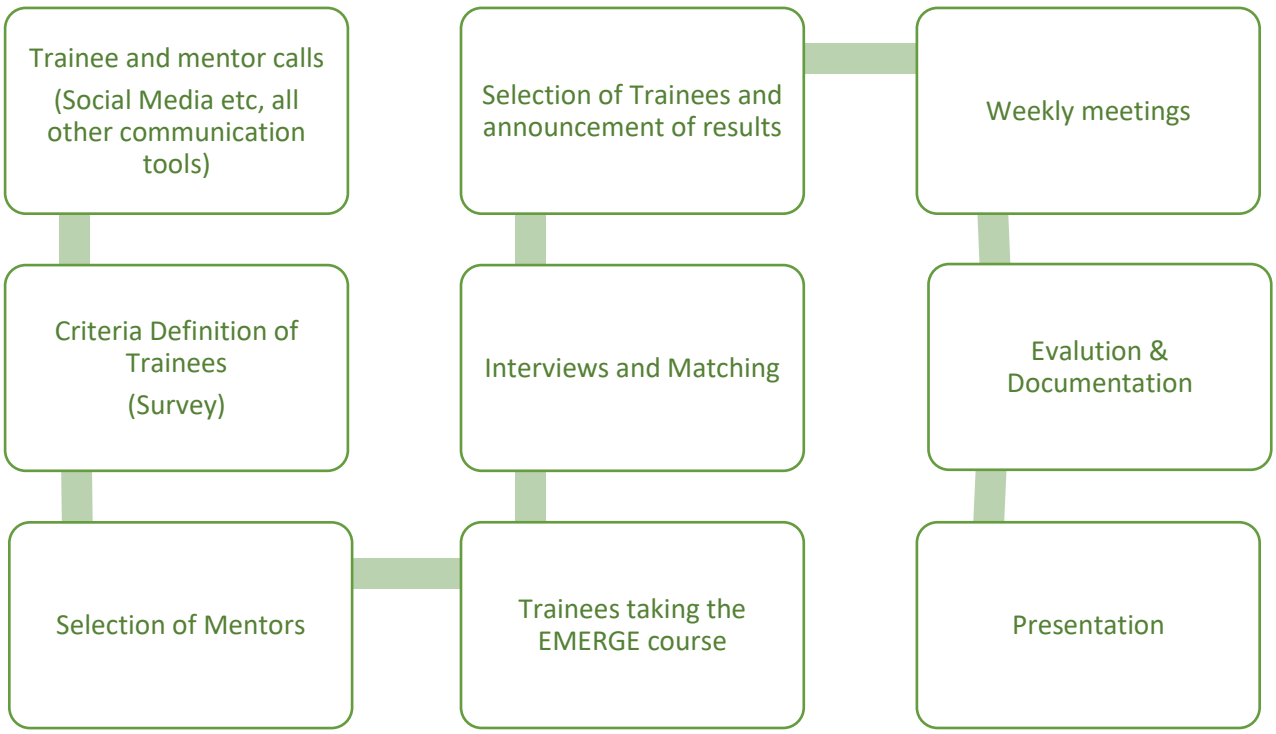
1. The aims of the program is to support entrepreneurial attitudes of technicians and engineers and to gain knowledge in the field of creating and developing innovative technological ventures.
2. The internship program is intended in particular for women who are students of technical faculties who want to develop their entrepreneurial competences.
3. The recruitment of program participants should take into account the following criteria:
    a. diverse technical / engineering areas
    b. previous training and business experience
    c. support or awards obtained in relation to entrepreneurial activity
    d. having a business idea, including an idea related to the area of education, innovation of this idea
    e. motivation to participate in the program
4. In the internship program it is important to match the interns with the companies. In this regard, one should take into account the company's business profile, its technological and entrepreneurial nature, as well as the current and planned innovative activities.
5. It is good for the proper course of the internship to be supervised by a tutor who also acts as a selector, intermediary, moderator, as well as a teacher and mentor.
6. The internship should be focused on business problems in such a way that the trainee has the opportunity to observe business behaviors, challenges and needs related to running the business, and preferably can directly participate in solving real business problems. Therefore, in the course of the internship, it is worth considering a business task that the intern will work on in the course of his cooperation with the company, such as:
    f. Company X aims to digitize some of its work, this problem is due to the global Covid-19 blockade.

What will be the best strategy in this regard if the budget that the company can allocate to this task?.

g. Company Y outsources some of its engineering activities but seeks to build a team to integrate it into internal structures. How does the company need to modify its business model to make this idea come true? How to build the right team?
h. Company Z is planning to launch its new product later this year, which requires careful market research. A market analysis should be performed based on the available data.

Placement process agenda

The organization of the internship program is a complex process, involving many parties. Taking into account reasonable timeframes, the workflow has been designed as a 14-weeks process structured in a way that is presented at the picture below.



The general timelines for placement activity has been defined as follows:

1st Month:

- **Recruitment, Evaluation, Selection, and Matching of Candidates and Host Organizations**

  Commencement of the selection of candidates and host companies to start in the first month. Partners select, engage and recruit selected participants independently in their countries with the priority to accommodate the approach to their specific regional needs and conditions.

2nd Month

- **Candidates Take the EMERGE Entrepreneurship Training Course Asynchronously**

  Selected placement candidates complete the EMERGE training course as an induction to the programme. Trainees who took 60 out of 100 were considered as successful. They were then asked to evaluate the course. Candidates were encouraged to ask questions to partners and mentors.

3rd Month

- **EMERGE Placement Programme Commenced (4 weeks)**

  The placement programme starts. Candidates and host companies are asked to track their activities and upon finalization, prepare reports summarizing the work done, conclusions, lessons learned, and recommendations. Organizers are active throughout the placement, ensuring an enriched experience and where necessary, enhancing the placement with some interactive and building activities if useful.

4th Month

- **Reporting, Certification, Awards, Follow-up for Ideas, and Pre-Incubation Support**

  After the Internship Programme, students complete their reports, they receive certificates, best interns are selected for awards. At this time, idea collection, reporting from interns, and pre-incubation support is possible. In addition, the business partners are informed about the internship progress and their ideas and comments are taken as feedback.

Internship Placements affected by COVID-19

Discussions to initiate the placements commenced at the beginning during the multiple partnership meetings conducted by the project partner countries. At this stage, the outline changed with Covid-19 pandemic effect. To gain maximum impact, the placements in host organizations were planned to be on-site so students could benefit from direct communication, learning, and coaching direction. Due to COVID restrictions from March 2020, the opportunity was opened to move from on-site to an online placement program. Within the restrictions, online placement was progressed as a viable alternative for the physical placement model.

TRAINING & PLACEMENT IMPLEMENTATION

Implementation and practice

Once the general common approach to placements organization has been agreed, the partners has started intensive discussions in their regions on how to apply them in the real context. Thus the final program recommendations could have been built on different experiences from Poland, Turkey and Ireland.

The case: Poland

Implementation of the internship programme started with understanding of needs that are in front of the region. Thus the first step was to contact local stakeholders, mostly those committed to Regional EMERGE Partnership and some additional locally located companies and business associations to ask their opinions about the methodology and approach that was developed within EMERGE partnership. Thus several individual meetings and on-line consultations has been organized.

The consultations has confirmed that there are many internships programs in the regions, and universities and technical schools are very active in providing placement opportunities for their students. However these are directed towards development of technical skills in practice, not business competences. Thus it would be beneficial to include EMERGE programme component in existing placement initiatives.

Therefore, the implementation of placement programme started at ZUT (West-Pomeranian University of Technology), as a project partner, and as organisation with well-established internships procedures and business relationships as well as with huge experience in supporting and developing career paths of its students in the field of engineering.

Firstly the placement programme guide was developed and shared with university internship programs coordinators. They were instructed on type of information to be provided for students and companies hosting them. The main instruction was to include business component in the placement programme, thus giving an opportunity to observe entrepreneurial behaviors for at least 4 weeks by participating in board meetings, meetings with customers, facing directly business-related challenges.

Due to Covid-19 pandemic restrictions, the option has been opened to include on-line internship participation for students.

As the recruitment process has started, the internship coordinators has been encouraged to motivate especially women to take part in the programme. The EMERGE training resources has been given to them with the aim to support entrepreneurial insights into hosting companies. As there are not that many women studying at ZUT, Faculty of Information Technology, men were also included in the business-focused internship programme. The aim was to avoid discrimination and also include a reference group in the process.

Thanks to intensification of EMERGE dissemination and promotion activities, students and companies could have hear more about project objectives, women support activities and placements assumptions. For this purpose, events taking place directly in educational institutions and in social media such as Facebook or websites were utilized.

Once the students were recruited, internship coordinator made it possible for participants to choose the appropriate host organization for them. Appropriate internship coordinators were appointed to every student at both university and host organizations.

Once the appropriate internship procedure has been established, other educational institutions has been also contacted and proposed to participate. Here dedicated cooperation agreements were signed with the entire West-Pomeranian University, Marine Academy and University of Szczecin. Unofficially the programme has been also distributed to university carrier offices, local VET schools, secondary technical schools, etc. – these were also given the recommendations to include EMERGE guide in implementing internship programs.

While other organisations were invited to participate actively in EMERGE placement programme, an idea has arisen to include a competition approach in the process, at the same time adding some more motivation in the learning process. NOT as Federation of Engineering Associations, with its mission to promote local development, has introduced a new type of the award in the previous awarding scheme, prize for the "Emerging Entrepreneurial Technician / Engineer". It was established as one of the prizes awarded at the Great Gala of West-Pomeranian Technology Days organised by NOT. The objective of foundation of this award was to promote, in local communities, as well as in the supra-regional arena, young people with technical education, demonstrating natural entrepreneurial competences, with extended abilities to lead the development of fast-growing technology companies.

The case: Turkey

The initial recruitment engagement with the female student engineers was to attract those interested in participating in placement for engineering as an entrepreneurial opportunity and to commit to the 4 weeks during September 2020 with a partner selected host engineering organization. This involved the production and development of various marketing materials, engagement in multiple partnership meetings, and a continually active social media and communication engagement campaign. Partners used Facebook, Twitter, LinkedIn, Email, Newsletters, IO1 Partnership Meetings, etc. to raise awareness and solicit interest in the 4-week placement and present the potential opportunities to be gained. This included briefings to referral bodies e.g. VET bodies, HEI bodies, engineering organizations, engineering incubators, business development agencies so that we could link directly to potentially interested female candidates.

In the EMERGE Project, we opened a call to invite both candidates and host organizations to join this experience at the beginning of July via telephone, virtual meetings, and email. We then sent out the official Host Application and Candidate Application to respective interested parties. They were particularly interested in getting direct contact and experience with female student engineers who are hard to come by especially in the engineering industry.

EGE received student applications from fourteen different Turkish cities and universities. After the assessment, it revealed the applications also came from fourteen different engineering fields (such as computer engineering, civil, food, bioengineering. etc). EGE opened a second call for the applicant to measure the true interest in the EMERGE Placement Program. After 4 weeks and much application review and evaluation, we selected 59 interns for the program. We believe that the fact that the program was mainly implemented in a virtual format, it was more accessible, flexible, and didn't demand too much student resources (travel time for those not in close proximity, transport costs, work attire, etc).

EGE had 2 opening and 1 closure meetings with their interns and also mentored them on a weekly basis in order to follow-up. EGE also provided extra training to interns from Eurodesk.

The placement student engineering candidates were chosen first, a mixture of Candidate Applications from the Engineering Degree pool was selected to ensure they could apply their graduated engineering knowledge and learnings in the placements. It was also a beneficial way of getting the early learners confident in their chosen career path early in their studying life and start developing an engineering entrepreneurial mindset. The next step was matching the selected candidates with the host enterprises. This was conducted according to the student's field of study and field of interest; engineering, research, administration and management, marketing and sales, and social media and advertising.

For the selected candidates to participate in the EMERGE placements optimally and generate the benefits, we facilitated the hosts in providing guidance, support, and the relevant conditions required to ensure a meaningful experience for both host and candidate in engineering skills development and entrepreneurship. Challenge-Based Experience for both candidates and hosts was established. Hosts presented the candidates with challenges or problems they were experiencing as an engineering organization and asked them to come up with opportunities and solutions. Candidates had the option to work on their own or as a group to solve the presented challenges and problems. Candidates had to follow four steps to understand and solve the challenge.

1. Understand and conceptualize the problem
2. Find the best possible solution(s)
3. Test and validate the solution(s) and pick one
4. Try and make their solution happen in reality

To ensure the program worked as efficiently and effectively as possible we selected carefully chosen communication and virtual tools suitable to EMERGE, partners, candidates, and hosts. After discussion, the chosen communication tools chosen were:

- WhatsApp (phone calls, quick messages, and queries),
- Google Drive and Dropbox (storage of files, submitting reports and information)
- Discord (instant messaging and group voice calls, for meetings, presentations and group discussions, video calls, text messaging, and files in private chats).

For email communication hosts used their company email and candidates used their student email.

Hosts provided their inductions guiding the process planning, providing project templates and guides, regulations, and other protocols participants needed to be aware of. Throughout the process they had meetings with participants, guiding them through the development of their solutions, introducing them to the wider team and company culture.

For the physical internship applications, a risk analysis was conducted with the necessary actions taken to minimize the problems that an intern may face, particularly COVID-related. We assessed if they had any physical or health restrictions if they needed technical support or assistance, provided them with COVID Workplace Guidelines to follow, and ensured they were well aware of the commitment required to complete the placement.

In cooperation with IZIKAD which is one of the key players in women entrepreneurship and a member of EMERGE Business Partners, contributions to their activities were put forward as a part of their entrepreneurship support programs all reported in the final report detail.

The case: Ireland

STUDENTS

In March 2020, just prior to our Irish national lockdown, our Irish EMERGE Partnership participate in Sligo Engineering Fair at IT Sligo and gained really good interest from female students and graduates in engineering. We continued to work with these students and nurture the relationship and had arranged to conduct the placements in April - June when they had the academic timetable opportunity. However by end March they had left college (due to COVID) and were no longer 'able to' or 'not in a position to', 'hadn't the ability to conduct a virtual placement'. Our consultation with students was clear, they would 'prefer to do a direct on-site placement' and 'didn't' see the benefit in doing a placement online,' so would 'like to wait until things get back to normal' said they 'could not now conduct a placement' but would be happy to do the placement once they returned to college. The fact that they would now have to do the placements in October (during their new term with many now in the labour market) instead of the planned April - June was 'conflicting to their studies' and they 'wouldn't have time' or 'ability' to do such a long placement. Although they were sorry, they could not engage in such a great opportunity they would like to consider the same type of placement in 2021.

INDUSTRY HOSTS

Our EMERGE Placement partners, stakeholders, hosts, and those involved in the placements program expressed their 'inability to continue with the placements program due to COVID and its early, unpredictable, and uncertain future impacts'. We consulted in depth with all those involved in EMERGE Placements who said they were 'not comfortable to continue and promise to engage in something that would require significant resources and staff' when 'staff were already strained and under-resourced working from home and remotely'.

Many businesses expressed that their priority was ' to change and business survival in adapting and putting all their resources into "essential only" activities adapting to COVID', they would 'have to retain virtual meetings for business exchanges only and focus on keeping their businesses sustainable'. Momentum had arranged to work with IT Sligo female engineering students and place them in the EMERGE placements program. We had secured a number of host organisations throughout the months (March to July) but when the time came to placement commencement they were

- 'resources were constrained due to layoffs and operating on minimal staff',
- 'too busy focusing on solutions to COVID impacts and recovery'
- 'hadn't the resources as previously promised to conduct a placements program'
- 'not open for business'
- 'unable to avail of this excellent experience due to work demands connected to management through Covid'
- 'they had other more important priorities such as changing processes and business operations to a virtual world, change their business model leaving little availability to conduct any placements'.

Further, in March, our Irish EMERGE Partnership was in the process of working with WITS to organise an event to attract and speak directly to female engineers outside of the college environment. WITS Women in Technology and Science actively promote women in engineering, technology, and science in Ireland, WITS has informed and educated, completed projects, held events, and published two books celebrating the lives and achievements of STEM women. We had planned to host a virtual event with WITS and conduct the majority of the organising, collateral development and communications but WITS found that they 'needed to now focus on supporting the industry with COVID response and recovery related online seminars rather than putting added pressure industry to host placements and recruit those doing the placements'. They didn't want to 'put their stakeholders in a

compromised and uncertain position if it was possible' and 'were not putting further pressure on them than what was necessary'. So the event and virtual engagements didn't go ahead.

Instead of being able to implement the EMERGE Placements, Momentum, supported by our EMERGE Irish partners, put considerable communications, time and resources into trying to make the placements a reality, but ultimately, they were not feasible.

Implementation summary

The implementation of the placement program has been found very interesting by all parties participating and many lessons have been learnt. The challenge-based learning experience may be one of the most intriguing elements, once business-related challenges have been assigned to engineering interns.

Sample Challenges Based Experience Learnings & Results included those described in the table below.

CHALLENGE	LEARNINGS	SOLUTION
1. **Construction** To come up with a structure for mount pressure reducers	Learned the basic commands and how the program works, learned about the structure. The host informed us about the materials used and their dimensions and we learned some terms Learned how to present in a corporate environment	Used a SAP2000 program for analysis. Created a general shape of the building. We made our installations on the building and formed the foundations of the building. We also included pressure reducers in the system. We discussed the structure by analyzing it together
2. **Research, Entrepreneurship, and Marketing Strategies** Highlight products during the COVID pandemic and marketing strategies	One of the issues I focused on was how the COVID-19 outbreak could affect workplaces. I worked on "Pandemic preparedness and response plan" and "Safe working practices" in order to prepare workplaces for the pandemic. Reviewed the measures-taken and their qualifications to provide a safe working environment for workplaces and employees. In my 3rd week, I started producing business ideas for my project.	Prepared marketing strategies on how to market the choice product and an effective presentation and entered the reporting process. Developed different strategies in the digital field and for the website to promote and inform the developed products
3. **Bioengineer R&D & Social Media** What bioengineering	Learned how to research and find answers to the solution in the most cost-effective and	The student came up with a compound and it was discussed that recycling this compound

problem could be solved. It was decided the candidate conduct research and literature review under the name of transforming phenolic compounds in olive black water. Examine the effect of hydroxytyrosol on human health	efficient way.	reduces the phenolic load of olive black water substantially, and it was decided to work with this compound.
4. **Marketing** Had to conduct a price and product analysis of the baby products in the market	Learned how to do practical domestic and international market research on e-commerce sites. How other competitors operate and compared. Research methods and strategies that increase recognition in social media.	Produced a market map, sales campaign, and developed price policies, and developed a digital marketing and advertising campaign.
5. **Research, Sales, and Marketing** Researching factors in OSGB's Preference Reason	Learned how to deliver good communication and a presentation in English. Improved in the field of research and entrepreneurship.	Delivered a Sales and Marketing Strategy.
6. **Research** **Healthy milking techniques and their importance**	The importance of milk and dairy products in healthy nutrition and the importance of healthy milk from the breast to the table and the relation of these products with health were investigated. Optimization studies that were conducted in production.	Assisted TE-TA in developing high-performance products by saving energy consumption.
7. **Textiles** Preparing a portfolio, create guerrilla campaign ideas, organize a mail campaign	Learned how a company can expand their networks and keep in contact with their customers	Improved their website and marketing campaigns.
8**. Food** Write an applied article on making soymilk chocolate	Learned the needs for a bureaucratic laboratory and investigate the suitability for laboratory use Observed competitiveness and	Developed an article for Food Journal as a research article. Was able to create it specifically for Mendeley Food Magazine in the vegan chocolate category

	customer focus as the factors that determine business strategies How engineering brand equity can be strengthened and build a company reputation. How to participate more in joint projects with other institutions. Identifying new distribution points for the company service	
9. **Engineering Processes** Assist with the zero-waste philosophy, the case of establishing an olive oil factory, and the issues it has to overcome	Learned Olive Oil production processes, the philosophy and factor set up, drying process, production process, and how to produce soap from olive oil with minimum chemicals	Researched machines for factory and found the best prices for the relevant machines on the internet
10. **Food** How to set up a joint business in Vegan Chocolate with Soy Milk	How to develop software and how to generate and develop an idea using it	Development of an article for 'Food Journal' Mendaley used the article for reference on how to adapt and investigate its potential
11. **Chemical Engineering** Two issues were presented: 'Isocyanate-free polyurethane emulsions' and 'production of water-based halogen-free flame-retardant polymer emulsions. I chose the topic 'Isocyanate-free polyurethane emulsions'	Learned about the company strategies, processes, and business model.	
12. **Biomedical Engineering** Develop a demo on how to provide finance to resources and products. To develop an	How to brainstorm and develop an idea. How to work with the company software and carry the study out collaboratively	Provided the final design version and was able to inform the company how to further develop their markets by going addressing other similar problems in the same market

exemplary design format with a final version to be presented at the end		
13. **Research, entrepreneurship, marketing strategies** Highlight products during the COVID pandemic and marketing strategies	Learned National legislation, Complying with international agreements, obligations of Turkish standards and terms of contracts made with its customers, ensuring continuous improvement and improvement in customer management, quality management, and employee management cooperation, ethical service to be a pioneering and reliable company in the sector	Developed how the company can develop a periodic health screening unit and how to save costs
14. **Food Engineering** Target market research and customer analysis in order to create and improve sales channels, for online market and retail market chains	Target Market Analysis and Business Intelligence online training -	Market and efficiency research were developed on B2B, B2C, and C2C models. Developed product promotion/advertisement with social media content, improvement of product contents and accordingly e-commerce and/or e-commerce of the existing website via social media A report was prepared on the transformation into a trade sub-based website
15. **Bioengineering** To create a name or brand for the image acquisition / holographic system for the incubator under development	How to prepare and develop a logo and more than one logo. How to develop a brand. Learned different approaches on how to deliver company products to more buyers. How to improve the website and its vibrancy	Prepared a brochure for the Digital Holographic microscope task. The research was conducted with DHM. A presentation was also made for the introduction of the holographic microscope

Although the implementation of the program has been finally successful, in all countries several, specific challenges had to be faced. Those included:

In Poland:

- Despite of many Covid-19 restrictions both students and hosts preferred participation in off-line program;
- Providing additional motivation to students to engage in business problems of the enterprises, like competition and awards is beneficial for all;
- The structured business report format provided for interns help them understand business context;

- Using existing structures of internship organizations (schools, universities) and enriching them with 4-weeks business component promotes engagement of regional parties;
- Vital role of company mentors in development of interns business knowledge is of great importance, thus encouraging their motivation should be considered.

In Turkey

- Need of a fast match-matching process, because of chemistry conflict between the two sides after student and firm matches.
- Students' preferences about off-line practicing on companies laboratories and offices in spite of Covid-19 pandemic situation preventive warnings.
- Orientation problems of each host with students for understanding and engaging them in business and expectations from companies.
- Specifying Key Performance Indicators(KPI's) for both students and business companies

In Ireland

- Time and resources were not feasible in Covid-19 pandemic period.
- Stakeholders negative motivations to join placement actions

This means that the methodology can be regarded as a useful guideline, but should be implemented with a flexible approach.

LEARNING EXPERIENCE AND IMPACT

Impact of the actions taken

Several positive implications of internship programme implementation can be identified.

The EMERGE Placement Program has radically improved the path for female engineers, HEI, and VET education and placement experience. By trailing the program EMERGE partners have not only enabled female engineers and companies to benefit from an acceleration of their entrepreneurial skills and mindset but also organizations implementing the program directly have gained the experience on how to promote the wider participation and integration of this style of training experience within the wider educational sector.

First one relates directly to the learning process. The analysis of the entrepreneurial reports provided by programme participants clearly reveals that the learning process they went through was very successful. People participating in the internships gained knowledge about the technology-based businesses, and especially understanding of their needs, resources managements, opportunities screening and innovation process.

The opportunity to participate in a realistic placement setting for a decent amount of time has helped some land jobs either within the organization or provided them with the experience to work in another enterprise. Many of the students have learned new skills, developed and improved others. The mutual relationship and cross-learning opportunities through collaboration have benefited both hosts and students.

Many of the students found huge experiential benefit by working with female engineers and entrepreneurs, experts in the field, and found the learning environment completely different from the public sector educational environment. They learned how to practically apply and adapt themselves so they could progress. Learning project management, facilitating discussions through research results, solving problems and solutions by themselves, and engaging in collaborative brainstorming can add spark to their passion to become professionals in the engineering and entrepreneurship field.

Many of the students walked away feeling they would like to go back to the host company to do more, provided a list of recommendations from their observations that they would like to assist in improving. Students were able to apply new and innovative on-trend digital skills particularly in the field of marketing, website development, software development, and customer engagement.

In a way, the internships and the competition motivated the participants to look at entrepreneurs more broadly, which means that they not only learned about the internal operation of a given enterprise, but also how it is perceived in the environment. It gave them the opportunity to focus on the specifics of the enterprise at every level, which the participants had not delved into before. The entrepreneurial report template that was provided to trainees gave them an opportunity to reflect on their business remarks and lessons learnt, like business models, business opportunities or innovation opportunities.

Students realized the placements were an integral part of their Degree course, 2nd and 3rd-year students would now like to commit to summer placements between now and when they graduate. Having completed the experience during their early years will give them a better chance of achieving an in-demand placement or job once completed. Now that the students have gone through the process, they reported they are no longer afraid to contact an engineering

company directly and ask for a job or experience. They are happy to recommend their host company to others and think it was a very enjoyable experience. They now understand what is involved in an engineering career and some would like to learn more in the business and enterprise fields.

Some students reported having built valuable relationships and networks that will help them progress their career. They are aware of external events they would like to attend and even represent their hosts at the event exhibitions.

Students said their pre-existing knowledge in their placement fields were low level, lacked practical investigation and implementation. The placement helped candidates achieve significant learnings and knowledge they otherwise wouldn't have achieved at college. Students learned how to test and validate an idea from a practical and realistic level, this proved a welcomed approach to learning. A lot of the students remain passionate about their ideas and would like to pursue them in the future. Students said they now realize their capabilities and their potential and found the experience good overall. They are now able to focus on what they want to do, to either pursue in the field experienced or try another.

Moreover, the possibility of using the training materials of the EMERGE project was an excellent supplement to the practical internship. Participants at any time had the opportunity to download selected materials in the area that interests them. The internships and training materials made the participants think and taught them many new things about entrepreneurship. Here are some opinions of the interns themselves.

"Participation in the internship taught me a different perspective on work in the IT sector. Innovations are a key element that, despite their cost-effectiveness, provide opportunities for development. The time spent in the company taught me, above all, the process of creating R+D projects, their business importance of which is constantly growing. The advantage provided by the new innovative technology of the entrepreneur enables a significant acceleration of the development of one's own interest."

"In addition to the internship itself, training materials available on the EMERGE portal have also taught me that innovation and the spirit of entrepreneurial activities is able to create positive value on the market, which has a chance to achieve significant success. To do this, you need determination to acquire and exchange knowledge. Without it, it's hard to create an innovative product or service."

"It is important in business to look for the optimization of each stage of production, saving materials and resources. In addition, you have to remember that the competition is awake and therefore you have to constantly look for better and better algorithms, and introduce newer solutions if they are profitable. The company needs an ERP system."

"EMERGE helped me look at the company in which I did my internship from a business perspective. I learned practical and theoretical lessons that will be useful in my future work in IT. It is very cool that the EMERGE project debunks myths and supports women to try their hand at IT."

"The portal showed the benefits that can be derived from the ERASMUS program and international cooperation. It motivates women to act in a very good way by increasing their self-confidence in various technological industries. It supports the selection of future academic and professional paths."

"I learned a lot of useful information in the field of marketing in the IT industry. I also learned the basics of social media marketing and found out how they are serviced by companies. I have developed some

habits that are welcome in my professional life - these are, among others, responsibility for the work done, searching for new solutions to various problems, or, thanks to meetings with the team, openness to the ideas of colleagues and the ease of presenting my point of view. The internship encouraged me to continue deepening my interests related to marketing and technologies in the Internet industry."

"Implementation of the EMERGE placement programme has also changed the perception of the internships by company owners. They realised that development of entrepreneurial skills may be similarly important as technical, work-practice skills. Similarly, placement coordinators at schools and universities could have changed their perception on how internship programmes for engineering students can be thought. As the companies and internship mentors of the best students were also awarded, the need to explore development of entrepreneurial skills among students has evolved."

The main new skills and competences learnt by students can be summarized as follows:

- New skills learned e.g. in software and digital developments, entrepreneurship particularly in female entrepreneurship
- How to work as part of a corporate team and develop a team spirit, learn from their peers and experts in the field
- How to project manage their 'own' project, take responsibility, and overcome issues presented
- Ability to develop their skills in working more effectively and efficiently to solve a problem and come up with a solution
- How to develop a marketing and product campaign, schedule it, build an e-bulletin, pricing structures, and strategies. How to assist shoppers to shop online securely.
- How to deliver a good corporate presentation in English. Improve their skills in research on focused fields
- How to make connections with companies through solution-driven conversations
- How to improve their research and reporting skills to further strengthen their competencies. That research and marketing strategies go hand in hand
- The difference between the private sector and the public sector
- How to take full responsibility for the issues related to the job you are working on, how to use the internet better to your advantage, how to produce something with self-confidence and less guidance than you would in college

As good practices in relation to business-engineering internship programmes have been established, it has become clear that those practices can be implemented in other organisations. The existence of Regional Partnerships supporting development of women driven technological enterprises facilitates the process substantially. Although placement events and programmes in many schools have been suspended, the interest in participation in further editions is observed. Thus, a good recommendation for further development of the programme in the region is to continue distribution of EMERGE placement guide and organisation of competition with awards granted to students, mentors and companies in the upcoming years, to encourage organisations to implement it in their future practices of practical learning paths.

Hosts had the opportunity particularly during COVID to review processes factoring in COVID restrictions going forward, attended to long-overdue projects, met their shortfalls, and managed to improve their business processes particularly in the areas of research, product development, marketing, and business operations. Some have been able to save money based on the research conducted and increase reputation stature through the publication of research articles.

Hosts have said that they benefited as much as the students and would like to implement a placement program formerly as their yearly development and innovation strategy.

Hosts had fresh confidence in the EMERGE partners as an alternative screening process when selecting the right students. EMERGE students were valued more as they were focused on engineering and entrepreneurship experience rather than just engineering experience, adding another debt to their contribution.

The hosts were delighted and pleasantly surprised at the results of the Challenge-Based Experience. Due to restricted time and research resources they now have access to newfound, on-trend, and innovative information and solutions that will help their company progress.

Hosts said that they were for the first time able to meet their shortcomings and that the candidates were able to speed up its ability to search for solutions to projects and financial support, increase its social media visibility and reach more investors, how the company can grow and develop its separate departments. Here are some comments as provided by host organizations:

> *"Interns contributed to the product we developed as a part of our R&D work."*
>
> *"Our academic knowledge has been refreshed with new generation engineering students and graduates."*
>
> *"The interns' contribution in a new product development process provided an external perspective."*
> *"We decided to apply for the Public Fund project together for the intern's thesis study in industry cooperation."*
>
> *"The website was improved, revamped, modern, and now is more interesting."*
>
> *"Although it was online, it was very productive, we were satisfied with the work and made a job offer to our intern."*

In terms *of product development, a company expressed that it would like to formally include an ongoing placement program yearly.*

Reflections on the programme and propositions of its development

The situation related to the COVID-19 pandemic was certainly the most significant variable that had an impact on the EMERGE internship programme. This impact can be perceived twofold, positively and negatively, depending on the aspect under consideration.

Some obstacles included, for instance, inability to physically observe entrepreneurial style of work, employees relationships, direct customers relationships and atmosphere in the enterprise, that are important for business development, and from the point of view of educational institutions implementing internship programme – difficulties in gathering documentation confirming actions taken.

On the other hand, it was observed that online internships also have many advantages, to include easier access to coded resources, possibility to include in the programme companies that are located far beyond the region, facilitating the participation in internships for people living far from the place of internship. What is more, the online internships

organisation makes it easier to include people from outside the company in meetings, it does not generate additional costs, and it also gives insight into how new communication technologies can be integrated into business and used for business purposes. Both hosts and participants have recognized the benefit of virtual placements such as the interview process, managing restricted resources (e.g. for the host desk space, for the student transport costs and accessibility), keeping up to date, and flexible communication.

What is more, the options for potential candidate recruitment increased once proximity between participant and host was not a factor. Students where distance was always a challenge, now had access to opportunities they didn't have before and companies they always wanted to work for.

As good practices in relation to business-engineering internship programme have been established, it has become clear that those practices can be implemented in other organisations. The existence of Regional Partnerships supporting development of women driven technological enterprises facilitates the process substantially. Although placement programmes in many schools have been suspended, the interest in participation in further editions is observed. Thus, a good recommendation for further development of the programme in the region is to continue distribution of EMERGE placement guide and organisation of competition with awards granted to students, mentors and companies in the upcoming years, to encourage organisations to implement it in their future practices of practical learning paths.

Although several students didn't fully complete the program, the learning process they went through was very relevant, and they had a chance to reflect on business issues of technology-based enterprise. Main reasons for not completion of the program included: difficulties in access to companies due to Covid-19 restrictions, limited possibilities to work inside company due to remote-style work in many companies, temporary lack of interest in engaging trainees in business processes as a result of difficulties business owners had to face, insufficient motivation to complete the program due to limited consequences of non-completion. These should be taken into consideration while developing similar programs in the future.