

SYL “STEAM-based” Teachers’ Package



Co-funded by
the European Union

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

Project title: Shoes (Choose) Your Life - A New Educational Approach to STEAM Jobs

Acronym. SYL

Call type: SCH COOPERATION PARTNERSHIP – KA220

Project number: 2021-1-PT01-KA220-SCH-000027935

Document title: SYL “STEAM-based” Teacher’s Package

Author: SYL consortium

Contributors: SYL consortium

R2: SYL “STEAM-based” Teachers’ Package

Date: 29 February 2024

Contents

Introduction	4
Target group	7
Project main aims.....	9
The new learning strategies	11
Common methodology to support the integration of the STEAM-based educational package.....	18
Virtual Reality App.....	26
International Learning/ Teaching/Training activity for teachers - LTTA.....	30
Conclusions	52
Annex 1 – Presentations used in the LTTA.....	53
Annex 2 – VR App Manual (copy).....	79

Introduction

Generation Z, growing up with pervasive technology, has a strong entrepreneurial spirit, with many aspiring to start their own businesses. This generation comprises students between the 7th and 9th grades, typically aged 12-15. Generation Z (born roughly between 1997 and 2012) is the first generation to have widespread access to the Internet at an early age, high potential of dealing with new technologies and therefore more exigent and motivated to go for the mentioned careers.



The European footwear industry, with a focus on quality, flexibility, and technology, seeks to attract young talent to rejuvenate its workforce, as many in the older generation are nearing retirement. This industry, like others in Europe, is embracing Industry 4.0 (i4.0) and offering STEAM-based opportunities for young people.

The "SHOES (CHOOSE) YOUR LIFE - SYL" project targets Generation Z, aiming to inspire them to consider industry-based careers in the digital and intelligent sector. The project focuses on involving teachers and students in early education, transforming teachers into ambassadors of i4.0 in schools, and promoting new approaches to teaching.

The second project results – R2 – with the same name of this documents – SYL “STEAM-based” Teachers’ Package consists in a Methodology verted into a guide dedicated to teachers to apply the STEAM-based educational package in all its components, to

support them to use all its developed resources and to adapt themselves to the new educational methods namely virtual reality immersive contents apps, and combine them to elevate the potential of all the resources. It was completed with an interchange event between the teachers to fine tune the results, within a LTTA which took place in Portugal.

This R2 is determinant to the preparation of teachers. Therefore, this R2 was extremely important for the fulfilment of the project objectives as it determined the success of the teaching delivery strategies and methods, the piloting integrated in the project (within the R3), and it influences the sustainability of the project results. This R2 is dedicated to the teachers from the schools involved in the project and/or other from the schools involved, other possible facilitators involved in the project during its implementation and afterwards.

This Result R2 comprehends the following elements:

- 1- **Common methodology** to support the application of the STEAM-based educational package. The methodology will support the application and use of the R1 resources and all possible ways of combining them in order to obtain the most of their advantages toward the final target group. The methodology is verted into a guidance on how to use all the project resources and take the most advantages of them.
- 2- An **international teaching/learning activity** to consolidate and mainstream the practices with teachers and validate the guide - C1 - To co-work with teachers from the project staff to fine tune the drafted guide and validate it within the correspondent schools.

The goal of R2 is to define, to perform and to evaluate all necessary activities to prepare teachers to become facilitators of the educational package developed within the project and the other project resources, toward the end users, the students. This R2 is determinant to the preparation of intermediate users to support the piloting in each country, and any other action involving the SYP teaching material in the future and influences, the sustainability of the project results.



SYL “STEAM-based” Teachers’ Package

The ambition of the R2 is to promote the preparation of a new generation of teachers in innovative models of training including more interactive tools such as virtual reality.

Target group

The success of any educational initiative relies on the engagement and collaboration of various key stakeholders. In the context of this project, the target groups play pivotal roles in shaping the future of education and the integration of Industry 4.0 principles. The main target audiences to reach are:"



Generation Z Students: This group comprises students aged between 12 and 15, though the program's impact may extend to older age groups. As digital natives, they are uniquely positioned to embrace the transformative potential of Industry 4.0 technologies, making them a central focus of our efforts.

Teachers: Educators serve as the essential mediators and facilitators of the learning process. In this context, they not only impart knowledge but also act as ambassadors of Industry 4.0 within school environments. By empowering teachers, we ensure the sustainable integration of these technologies into the educational landscape. Teachers from schools, other educational organizations extract the following benefits from the project as:

- They are aware of the strategies, tools and methodologies of the SYL STEAM-based education package focused on digital, innovative and attractive, offering practical and digital immersive experiences related to i4.0, innovative employability and entrepreneurial skills to generation z, to implement toward their students;
- They develop skills on i4.0, innovative employability and entrepreneurial skills to generation Z;
- They assign new methodologies of teaching using digital strategies based on Virtual Reality (VR) in their own environment.

Schools, educational institutes, and other players in educational sector:

- They their teaching practices to ones more adapted and flexible to the new generation of youngsters, boosting the change of the paradigm in teaching/education on practical skills through immersive experiences. They can be part of the network and take advantages of the free STEAM-based educational package to attract youngsters to motivating careers, avoiding the drop out;
- They have inside competences for the delivering of teaching methodologies more digital and practical;
- They integrate a network for the STEAM-based digital education, contributing to new projects, be informed and updated regarding innovation in digital teaching/education;
- They can benefit from the methodology and guide for teachers on the best usage of the digital technologies in teaching specially targeted to generation Z youngsters.

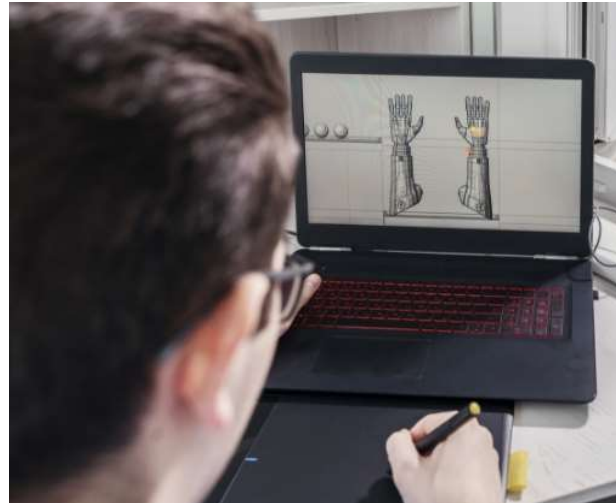
Industry: The business sector, represented here, has a crucial role in rejuvenating human capital. Collaborating with education, industry stakeholders can provide real-world context and expertise, enriching the learning experiences of students and helping them develop relevant skills for the future.

This diverse range of stakeholders, united in their commitment to enhancing education and preparing students for the challenges of Industry 4.0, forms the core of our project's vision. Together, they work towards a shared goal of a more innovative and adaptive education system for the benefit of the upcoming generation and the workforce of tomorrow.

Project main aims

The expected contributions of the project, in line with its objectives, are as follows:

- To reduce the school dropout by orienting the generation Z students to potential opportunities in STEAM-based jobs, in sectors embracing i4.0.
- To develop innovative skills for employability and entrepreneurship in this generation Z according to their potential and ambitions.
- To develop the motivation for the embracing of STEAM-based jobs in parallel with the rejuvenation of the traditional industries, stimulating the youngsters through immersive experiences in the i4.0, and activate the attraction for the industry in Europe.
- To provide international interchange between teachers and students, acceleration a joint growth with Europe in backstage.
- To update teachers in the new digital education methodologies that can attract even more students to STEAM based qualifications, and afterwards to jobs in i4.0 industry.
- To disseminate different ways of teaching, based on hands-on activities combined with digital tool/practices such as virtual reality, promoting unforgettable immersive learning experiences for life.



- To accelerate the transference of tacit knowledge and skills in European industries from older workers to talented youngsters, perpetuating their heritage now supported by disruptive innovation.

The new learning strategies

The quick development of digital technologies continues to create new opportunities for education, specializing in dynamic means of content delivery supported on blended online learning approaches.

The traditional training teaching content very based on textbook knowledge, orally presented by the teacher, trainer toward attentive students, trainees, gave place to multimedia contents, static two-dimensional textbooks gave place to three-dimensional four-dimensional multimedia textbooks, which make the course material more vivid and enhance students' interest in learning and self-learning. In this way, the knowledge of books and static presentations are enriched and expanded, and students can learn more, faster, and better during the prescribed learning time.

Thanks to new technologies, students can change from passively accepting knowledge to actively learning knowledge, becoming more learning independents, creativity, innovative, self-learning, self-management, collaborative learners.

The new learners

There seems to be several characteristics that not only make newer generations of trainees and students different, but also make it necessary for educational institutions to re-evaluate their models if they want to continue being appealing to young and talented students:

- Students today are more heterogeneous. Disruptive innovations change the skills and competences required to stay competitive in the job market. Most students expect to switch careers several times before retirement and more and more people pass through several levels of formal education during their lifetime. The multiplicity of trainee and student profiles means a multitude of learning situations, which require institutions to respond to students’ need for learning options that are more flexible and freer of limitations of place, duration, pace, or institution.

- A different attitude towards education - 21st century students do not want to be regarded as generic students, but rather as individuals with their own personalities. They expect education institutions to offer programmes that are more fitted to their personal aspirations. Coupled with a more consumerist attitude towards education, they have clear ideas of what they want to learn, how they want to learn it and do not hesitate to voice their dissatisfaction if they feel they are not getting enough from their study course. Because the education market has become global and because student mobility has increased significantly in recent years, students have a wider range of education institutions to choose from and have become more selective.
- A different learning context – One of the biggest disrupters in the world of education is of course technology. But technology does not only provide more possibilities to design study curricula: it also changes the context in which trainees and students learn. Because knowledge has become so readily available online, information on its own has lost value. Learning facts has become less relevant while being able to evaluate and apply information has become essential. This means that rather than being fed information, today’s students are keen to discuss this information, look at it critically and try to find new ways to make use of it and apply it. Technology is also part of today’s students’ reality: they know how to use it – sometimes better than their teachers, trainers – and it has become part of the way they demonstrate knowledge and express themselves. Technology also disrupts the traditional image of the desk in the classroom by allowing students to learn anywhere, anytime.

Virtual and Augmented Reality

Extended reality (XR) - covers technologies that generate learning environments where the real and virtual world merge, such as:

- Augmented reality where it is possible to access information and digital objects in the real world through common tools that are easily accessible by the target audience, such as a smartphone;
- Virtual reality that offers immersive experiences in a completely digital world thanks to specific equipment such as headsets.

and

- Mixed reality that combines the first two offering the possibility of having access to real objects in a digital world.

Very promising in terms of receptivity on the part of the various target audiences, given the effectiveness and efficiency that it imprints on the learning process, making the training of the various audiences attractive, flexible, productive, advantageous in terms of cost/benefit, it is perhaps on young people that it could have a more surprising impact, promoting a more attentive and curious look at the footwear cluster and its multifaceted professions, contributing to the medium-long term strategic objective of the attraction of young people for the sector.

Bold innovations in technology, such as Virtual Reality (VR) and Augmented Reality (AR) gain increasing importance due to the exploitations of virtual learning infrastructures that promote flexible, open, and collaborative learning beyond time, personality, and place constraints within virtual classrooms of educational institutions all over the world.

VR is basically a virtual simulated environment, similar to or completely different from the real world, with a computer that users can explore and interact with in an immersive way. In contrast to VR, AR adds virtual elements to existing reality without completely replacing it.

More recently, VR and AR has developed as an exclusive technology that can transform learning experiences across various disciplines and make it more attractive for the new generations of students. Research shows that VR and AR technologies are more

effective in attaining the educational goals and facilitates the knowledge construction by providing a unique and learner-centred experience that allows students to interact, at their own pace, with the virtual and real objects. For this reason, many industries are exploring AR and VR solutions for faster and more effective learning. At the same time, AR and VR technologies are becoming more and more available to the general consumer to enhance and interact with the world.

The use of VR and AR applications has been explored within a diversity of fields and disciplines, many of which are related to education.

At the present time VR and AR are used also for work-based training in manufacturing sectors. The personnel can be trained, informed and protected at all times without wasting additional resources using the right AR applications and devices. The potential of VR and AR systems in training and education have been confirmed in several studies and examples. The results of implementing these systems highlight as advantages: higher level of comprehension, enthusiasm and engagement from student side, higher confidence and satisfaction, improved ability to understand concepts, practice techniques, and minimize risk related to training.

Augmented Reality (AR)

Augmented reality bridges the gap between the virtual and the real world. Augmented reality environments allow users to see the real world with virtual computer-generated objects superimposed or merged with real surroundings. Digital content is therefore overlaid and mixed into our perceptions of the real world. It combines the real and the virtual, it is interactive in real time and it is registered in 3D. Research shows that Augmented Reality in education has the potential to engage and motivate students to explore class materials from different angles, to help teach subjects where students could not easily gain first-hand experience, to enhance collaboration between students and instructors as well as among students, to foster student creativity and imagination, to help students take control of their learning at their own pace and to create authentic learning environment suitable to various learning styles.

The future of augmented reality market looks very bright. This technology is moving fast, and there are many innovative and exciting developments taking place. We do not stay out of this. In this course we start to implement some contents in this advanced learning technologies such as Augmented Reality (AR).

Augmented reality allows us to increase our ability to access knowledge. It is a technology that allows access to an invisible digital layer of information that is associated with objects and everything around us. Ultimately, in the future, we will all have smart glasses with which we will be able to access all the information available online about an object, space or person.

Augmented reality allows us to visualize and interact with the content in its context, that is, if one is in front of a machine, one will be able to see information about the machine, namely how it works, what are the steps to start the machine's operation.

When an employee who does not know the assembly line, can use mixed reality glasses to quickly learn their tasks and the sequence of operation.

With augmented reality, the manuals can have a digital layer of content, that is, on the sheets of paper there can be videos demonstrating the materials, 3D simulations or simply links to “more information” available online.

It can be said that augmented reality is the link between the real world and the digital world, which allows human beings to increase their ability to access information without this implying stopping what they are doing to touch a screen, not simply the information appears before the user's eyes.

Several examples of AR applications are presented at the following links:

The Cambridge Satchel:

<https://www.cambridgesatchel.com/blogs/journal/csc-brings-the-doctors-bag-to-life-with-augmented-reality> , <https://www.youtube.com/watch?v=86Ac7cCV8KA>

STM:

<https://www.techguide.com.au/news/stm-launches-augmented-reality-app-explore-bags-like-never/>

Louis Vuitton:

<https://www.youtube.com/watch?v=MSuA27hw-QU&feature=youtu.be> ; https://www.instagram.com/tv/BxjdMBwFyDR/?utm_source=ig_embed

Gucci:

<https://www.designboom.com/technology/gucci-wannaby-app-virtually-try-shoes-on-using-augmented-reality-06-26-2019/>

Sayduck:

<https://www.youtube.com/watch?v=xkmyaUPfp5Y&feature=youtu.be>

Service and maintenance:

<https://memoori.com/virtual-augmented-reality-smart-buildings/>

<https://www.youtube.com/watch?v=nHfY56IHZjU>

Virtual Reality (VR)

Virtual Reality is a powerful technology that creates immersive, interactive digital environments, offering numerous applications across various fields. Its ability to simulate real-world experiences and provide unique interactive opportunities makes it a valuable tool for entertainment, education, training, and beyond. It uses computer technology to generate realistic images, sounds, and other sensations that simulate a user's physical presence in a virtual or imaginary environment.

Virtual Reality is indeed becoming a pivotal component of modern educational methods, offering immersive, engaging, and personalized learning experiences. By overcoming traditional barriers and providing innovative ways to visualize and interact with

content, VR holds the potential to revolutionize education for youngsters, preparing them for the complexities of the 21st century. However, careful consideration of challenges such as cost, content development, and teacher training is essential for its successful implementation.

Several examples of VR applications are presented at the following links:

VR Surgery Simulation: VR applications are used for surgical training and simulations, providing a risk-free environment for medical professionals to practice.

<https://ossovr.com/>

Labster: VR simulations for science students to conduct experiments in a virtual lab.

<https://www.labster.com/>

Google Expeditions: A VR app that allows teachers to take their students on virtual field trips around the world.

[Google for Education - Online Resources for Teachers & Students](#)

VRSafety: Focuses on VR safety training to improve workplace safety and reduce accidents.

<https://www.vrsafety.com/>

National Geographic VR: Offers immersive VR experiences of various travel destinations and natural wonders.

<https://www.nationalgeographic.com/vr/>

Google Earth VR: Allows users to explore the world from an entirely new perspective in VR.

[Google Earth VR no Steam \(steampowered.com\)](#)

Common methodology to support the integration of the STEAM-based educational package

In the STEAM-based Educational Package, a STEAM-based educational approach was drafted and furthermore developed, this mean that a specific philosophy, strategy to facilitate learning and teaching to comply with the Generation Z demands and facilitate their integration in industry was drafted. This took into consideration the commonalities between the 3 countries involved – Portugal, Italy and Romania – what relates to education, the specificities of the Generation Z - their unique characteristics, preferences, and the environment they are growing up in – and the new demands for employability and labour market from the industry side. A new approach to education has been drafted centred in the students.

Therefore, the new **Student-Centred Approach**:

- Emphasizes the student’s active role in the learning process.
- Encourages collaboration, critical thinking, and problem-solving.
- Examples include project-based learning and inquiry-based learning.
- Adopt Experiential Learning, through constructive methods, where the students learning through experience and reflection, engage in hands-on activities and real-world problem-solving.

In the Results 2 – R2 – the objective is to design and envelope a **common methodology to support the application of the STEAM-based educational package**. The methodology supports the application and use of the R1 resources and all possible ways of combining them in order to obtain the most of their advantages toward the final target group. This document includes **a guide on that methodology** to support the application of the STEAM-based educational package, to guide the teachers on how to use all the project resources and take the most advantages of them.

The teachers’ roles in the new Generation Z educational approach - A new generation of teachers in innovative models of training

The educational approach tailored to Generation Z, requires a significant shift in the roles and responsibilities of teachers who need to be multifaceted and dynamic, focusing on developing a broad range of skills that prepare students for the complexities of the modern world. A new generation of teachers trained through innovative models of training can significantly impact education by incorporating modern methodologies, technologies, and a learner-centred approach.

The new educational approach for Generation Z emphasizes not just traditional academic knowledge but also a range of skills necessary for the 21st century. This involves being not just educators but also mentors, innovators, and role models, guiding students through an ever-changing educational landscape.

The evolving educational landscape, particularly with the emergence of Generation Z (born roughly between 1997 and 2012), requires a significant shift in the roles and responsibilities of teachers. The new skills need framework for Generation Z emphasizes not just traditional academic knowledge but also a range of skills necessary for the 21st century. The role of teachers in the new skills needs framework for Generation Z is multifaceted and dynamic, focusing on developing a broad range of skills that prepare students for the complexities of the modern world. This involves being not just educators but also mentors, innovators, and role models, guiding students through an ever-changing educational landscape.

Here are the teachers’ new key roles:

- **Facilitators of Learning:** to create active and engaging learning environments that encourage critical thinking and problem-solving. They need to understand the individual needs and learning styles of students to tailor instruction accordingly.

- **Technology Integrators:** teachers must incorporate digital tools and resources in their teaching, helping students develop digital literacy skills, should be proficient in educational technologies and platforms, using them to enhance learning experiences and foster collaboration.
- **Mentors and Coaches:** they need to provide emotional and academic support, helping students navigate both their personal and educational journeys, and facilitate soft skills development, fostering essential soft skills such as communication, teamwork, and adaptability.
- **Curriculum Designers:** they need to be skilled on designing and implementing curricula that integrate STEM, critical thinking, and creativity, encouraging an interdisciplinary approach to learning, connecting different subject areas to real-world applications.
- **Cultural and Global Awareness Promoters:** they should be skilled on promoting an inclusive classroom environment that respects and celebrates diversity, preparing students to be globally competent, understanding and appreciating different cultures and perspectives.
- **Assessment and Feedback Providers:** they should be able to use a variety of assessment methods to measure student learning and progress and to provide timely and constructive feedback that helps students improve and succeed.
- **Life-Long Learning Models:** teachers nowadays need to know how to engage in ongoing professional development to stay current with educational trends and innovations, continuously reflecting on their teaching practices and seeking ways to improve.
- **Collaborators with the Community:** to engage with parents to support student learning, building partnerships with local businesses and organizations to provide students with real-world learning opportunities.

- **Ethical and Moral Guides:** to be the ethical decision-making and integrity model, instilling a sense of social responsibility and community involvement in students.
- **Advocates for Student Well-being,** recognizing and addressing mental health issues, promoting a healthy school-life balance, ensuring a safe and supportive learning environment for all students.

The unfolding role of VR in education

Virtual Reality (VR) is rapidly emerging as a transformative educational tool, often referred to as “**the new black**” in modern teaching methods, particularly for young learners. Here are several ways in which VR is revolutionizing education:

- **Immersive Learning Experiences:** VR provides highly engaging and interactive environments, capturing students' attention and increasing their motivation to learn.
- **Experiential Learning:** it allows students to experience and interact with content in a way that traditional methods cannot, enhancing understanding and retention of information.
- **Enhanced Visualization and Understanding:** VR can simplify complex concepts by allowing students to visualize and manipulate 3D models, making abstract ideas more concrete. Students can take virtual field trips to historical sites, scientific laboratories, or even outer space, providing a deeper understanding of subjects.
- **Personalized Learning Paths:** VR can be tailored to individual learning styles and paces, providing personalized learning experiences that cater to each

student's needs. Interactive VR environments can offer instant feedback, helping students learn from their mistakes in real-time.

- **Collaboration and Social Interaction:** VR enables students to collaborate in virtual environments, working together on projects and solving problems collectively, regardless of their physical location. It can also help develop social skills by simulating real-world interactions and scenarios.
- **Safe Learning Environment:** VR allows students to practice skills in a safe and controlled environment, particularly useful for fields like medicine, engineering, and emergency response. It can provide access to experiences and environments that may be otherwise inaccessible due to physical, financial, or geographical limitations.
- **Innovative Assessments:** VR can be used to assess students' skills and knowledge through performance-based tasks, providing a more comprehensive evaluation than traditional tests. The data collected from VR interactions can be used to gain insights into student learning patterns and progress, helping educators tailor instruction accordingly.
- **Increased Accessibility:** VR can make education more accessible for students with disabilities, offering customized learning experiences that cater to their specific needs. It breaks down geographical barriers, enabling students from different parts of the world to learn together in a shared virtual space.
- **Teacher Training and Professional Development:** VR can be used to train teachers, allowing them to practice classroom management and instructional strategies in a simulated environment. It provides opportunities for ongoing professional development, helping teachers stay updated with the latest educational practices and technologies.

VR also offers **challenges and considerations** at many levels:

- The high cost of VR equipment and the need for technical infrastructure can be barriers to widespread adoption.
- Developing high-quality educational content for VR requires significant time, expertise, and resources.
- Teachers need adequate training and support to effectively integrate VR into their teaching practices.

How to draft modular curricula to cope with the new educational approach where the Virtual Reality is the central tool of contents delivering?

Drafting a modular curriculum that integrates Virtual Reality (VR) as the central tool for content delivery requires careful planning and a structured approach. By following this structured approach, educators can create a dynamic, engaging, and effective curriculum that leverages the full potential of VR technology to enhance learning outcomes for Generation Z. Here's a step-by-step guide to creating such a curriculum:

1. Define Educational Goals and Objectives:

Identify Learning Outcomes: Clearly define what students should know and be able to do after completing each module. Align these outcomes with national or regional educational standards.

Skill Development: Focus on both academic content and essential skills such as critical thinking, problem-solving, and collaboration.

2. Analyse and Select Appropriate VR Content:

Content Relevance: Choose VR content that aligns with your learning outcomes and enhances the educational experience.

Quality and Accessibility: Ensure the VR content is high quality, age-appropriate, and accessible to all students.

3. Structure the Curriculum into Modules

Modular Design: Break down the curriculum into distinct, self-contained modules that can be taught independently or in sequence.

Thematic Units: Organize modules around themes or topics that integrate multiple subject areas, leveraging VR's capability to provide interdisciplinary learning experiences.

4. Develop Instructional Strategies

Blended Learning: Combine VR activities with traditional teaching methods, such as lectures, discussions, and hands-on activities.

Active Learning: Design VR activities that require active participation, critical thinking, and problem-solving.

5. Create Assessment Methods

Formative Assessments: Use quizzes, reflection journals, and interactive tasks within VR to monitor student progress.

Summative Assessments: Develop performance-based assessments that allow students to demonstrate their understanding through projects, presentations, or simulations within the VR environment.

6. Plan for Teacher Training and Support

Professional Development: Provide comprehensive training for teachers on using VR technology, integrating it into their teaching, and troubleshooting common issues.

Continuous Support: Offer ongoing support through workshops, online resources, and a dedicated helpdesk.

7. Ensure Technical Infrastructure and Access

Equipment and Software: Secure the necessary VR hardware and software, ensuring compatibility and reliability.

Access and Equity: Address potential barriers to access by providing sufficient devices and ensuring that all students have equal opportunities to benefit from VR experiences.

8. Develop Supplementary Materials

Guides and Manuals: Create detailed guides and manuals for both teachers and students on how to use VR effectively.

Complementary Resources: Develop or curate additional resources such as worksheets, reading materials, and online activities that complement the VR content.

9. Pilot and Evaluate the Curriculum

Pilot Testing: Implement the curriculum on a small scale to gather feedback and make necessary adjustments.

Evaluation Metrics: Establish clear criteria for evaluating the effectiveness of the curriculum, including student engagement, learning outcomes, and teacher feedback.

10. Implement and Iterate

Full-Scale Implementation: Roll out the curriculum across the school or district, ensuring all stakeholders are informed and prepared.

Continuous Improvement: Regularly review and update the curriculum based on feedback, advancements in VR technology, and emerging educational research.

Aiming at preparing the “new generation teachers” to deal with the generation Z new skills framework and demands, an international teaching/learning activity was designed and developed to consolidate and mainstream the practices with teachers and validate the guide.

Virtual Reality App

The Virtual Reality App (VR App) includes challenges where the students can interact with machines and cooperate.

It aims to provide a immersive smart environment, to be used simultaneously with the pack of contents or eventually alone, focused on the feature of i4.0 as well as other subject that compose what the students need to be skilled about and most important to call their attention to the new industry and its new opportunities.

The challenges are connected with the topics developed in the educational KIT namely: **chemistry, science lab, mechanics, 3d printing, sustainability, ICT computing, marketing and history and heritage.**

An integral video is presented in the project website It can be download to the specific [Video demonstration of the SYL steam-based educational package result | Gallery \(shoesyourlife.eu\)](#)

How to access the App?

It’s necessary to have “virtual reality Oculus Headset” which can be of many types.

It’s mandatory to download the Oculus app from the App Store (iOS) or Google Play Store (Android):

- Log in to Your Account
- Open the app and log in with your Oculus account or create a new one if you don't have an account yet.
- Connect Your Oculus Headset
- Ensure your Oculus headset is turned on and nearby.
- In the app, go to "Devices" and select your headset to pair it with the app if it's not already paired.

Browse the Store:

- Tap on the Store icon at the bottom of the screen to browse available VR apps and games.
- Find ShoesYourLife App - Search for the app to install. You can use the search bar or browse through categories.
- Once you find the app, tap on it to view its details.
- Tap "Get." as it is free.

Install the App:

- After selecting the app, tap "Install" or "Download." The app will be added to your library and begin downloading to your headset.

Using the Oculus Headset:

- Turn on Your Oculus Headset
- Make sure your headset is powered on and you are logged in.

Open the Oculus Store:

- From the home screen, select the Store icon to open the Oculus Store.

Tips

- **Wi-Fi Connection:** Ensure your Oculus headset is connected to a stable Wi-Fi network for downloading apps.
- **Storage Space:** Check that you have enough storage space available on your headset for new apps.
- **Updates:** Keep your Oculus software and apps updated for the best performance and new features.
- By following these steps, you can easily install and manage VR apps on your Oculus headset.

In annex the complete manual to access, download and install the VR App.



Enjoy your virtual reality experiences!



LT TA - International Learning/Teaching/Training activity for teachers

International Learning/ Teaching/Training activity for teachers - LTTA

The preparation of a new generation of teachers in innovative models of training including more interactive tools such as virtual reality was concretized through a international train the teachers’ activity/course.

A 3 working days training/learning activity targeted to teachers and partners’ organization staff was designed, developed and tested as following.

This event aims at the preparation of teachers from the 3 schools involved to cope with the new challenge of using and exploiting the innovative teaching resources to be developed within the project to their students, correspondent to the project target-group.

The teachers (from the schools) together with staff from the other project partners (not schools) met in an training event of 3 working days in CTCP facilities in S. João da Madeira, Portugal, to be filled in the project results and products, filled in the i4.0, innovative employability and entrepreneurial skills contents, and prepared to the use of the new delivering methodology on teaching, oriented to generation z students such as the hands-on kits and the virtual reality apps. This activity aimed at improving the future use of the educational resources. The training activities were based on the methodology and correspondent guide for teachers, developed in R2. During the training event, the participants had the opportunity to comment on the methodology, the guide, providing suggestions for improvement.

This learning/training activity creates a stronger opportunity to:

- pilot the results of R2 and R1 from the perspective of teachers;

- balance knowledge on i4.0, employment and entrepreneurial skills for generation Z;
- validate outputs and provide feed-back for improvements;
- wide exchange of practices, enhancing the cooperation between all the participants involved. This activity allowed to achieve a wide exchange of practices between the teachers, to create and strengthen laces which contributes for the sustainability of the partnership during piloting phase and after the project ends;
- better appropriation of the project results from the part of the teachers, making them more at ease with new teaching solution and in a wider perspective with all the education set of resources developed within the project;
- to involve more staff in the validating of the outputs;
- to add a social and professional inclusion character to the project as it makes possible the involvement of teacher besides the project team.

The characterization of the activities is the following:

- Duration: 24 hours (8 hours per day) – (equivalent to 3 ECTs)
- Venue: CTCP, S. João da Madeira, Portugal
- Trainers: CTCP, ByAR and TY (non-school partners)

Programme basis:

- Balance of knowledge on i4.0, employment and entrepreneurial skills for generation z – 4h
- Visit to a footwear company i4.0 – 4 hours
- Introduction to the SYL educational packages - 4 Hours
- Real World Projects: immersive experience using hands-on kits and virtual reality in CTCP Shoe Fab Lab - 4 H
- Tips and Tricks related to the usage of all material- 4 H
- Exchange of experiences - 3 H
- Evaluation of the course - 1 H
- The LTTA can be treated as a course and defined under presuppositions of LO, ECVET and upon recommendations of the ECTs.

The activities involved in the preparation and realization of the LTTA were the following:

- to prepare the programme, bridge credits to educational system, assign quality indicators and prepare a memorandum of understanding between the partners.
- to assign trainers and teachers for the activity from all partners.
- to prepare conditions for the development of the activity in CTCP
- to assist the organization of the accommodation of the participants, as well assist internal mobilities to optimize their performance during the activity. Partners will arrive 1 day before the start of the activity and will leave one day after, in order to be totally dedicated to the learning and exchange process.
- to implement and assess the training according assigned indicators.
- to issued certificates.

In the next session, the program of the event designed specifically for the project is presented as an example of a program that copes with the requirements of the teachers within the project scope.

LTTA PROGRAMME

24-26 Jan 2023

São João da Madeira, Portugal

Venue: AEOJ, Av. Adelino Amaro da Costa 342, 3700-043 São João da Madeira / CTCP, Rua de Fundões – Devesa Velha, 3700-121 S. João da Madeira

Day 1 – 24 th Jan - AEOJ	
9:00h	Welcome, introduction and documentation AEOJ
9:15	Icebreaking activity AEOJ/CTCP
10:15	Project framework Brief presentation of the project, objectives, activities, and results AEOJ/CTCP
10:45	Break
11:00	Visit to AEOJ school & visit to individual development area
13:10	Lunch
14:00	Workshop on new educational approaches - AR/VR - ByAR Extended Reality is taking an increasingly importance in education. It brings components from the digital world to the perception of yourself in the real world, integrating immersive sensations that are perceived as real. This workshop will immerse teachers in some curious environments and help them to familiarize themselves with the technology that will soon be part of their school.
15:00	Visit to Footwear/Leather Goods Company in S. J. Madeira - Luis Onofre https://luisonofre.com
16:30	Industrial tourism – visit to Shoe Museum at S. João da Madeira

	<p>The project “Industrial Tourism” promoted by Municipality of S. João da Madeira is a recognized good practice of the virtuous cooperation between local authorities, entrepreneurial and scientific/technology partners and companies. The Shoe Museum at S. João da Madeira is the starting point for an unforgettable journey into the past, present, and future of our industrial history.</p> <p>https://www.museu-do-calcado.pt/en</p>
17:30h	End of day 1

Day 2 – 25th Jan - CTCP	
9:00	<p>Practical activity at CTCP ShoeFabLab – <i>Where crafts meet digital</i> - CTCP</p> <p>An experimentation activity in a semi-industrial environment in which the participants produce themselves, under the guidance of a coach, personalized small leather goods using traditional techniques allied to digital technology.</p>
10:30	Break
11:00	Practical activity in CTCP ShoeFabLab - continue
12:00	Visit to CTCP premises
13:00	Lunch
14:00	<p>Workshop on new challenges for Gen Z – Think Young</p> <p>Generation Z has some of the youngest people in the world now. Born and grown up at the peak of technological advancements, they are fully awake, diverse, and shaped for adventures, and seem to have an easy life.</p> <p>This workshop will fill participants in the big challenges, in fact, Gen Zers need to face.</p>

15:00	Strategies for Improving “Students’ Package” R1 – Demonstration / Test Building up activity to involve participants in the test, analysis, and improvement of the <i>ShoesYourLife</i> VR App.
15:30	Visit to Collaborative Robotics Laboratory at CEI by Zipor
17:00	End of day 2

Day 3 – 26th Jan - CTCP	
9:00	Workshop on Creativity & Innovation – CTCP Creativity is the mirror of how inspiringly one can think about new solutions for any given problem and it should walk alongside innovation which, by its hand, relates to the application of those new ideas to create value. In this workshop, these two concepts will be addressed. It will be an inspiring moment, starting by the consciousness of that everyone can be creative and innovative driven educated, with the presentation of some practical cases of success of companies that use creativity and innovation in their strategies, and the bridge to the education world. How can education benefit from the same approach?
11:00	Break
11.30	Workshop on sustainability and circular economy: how education can help to reach Sustainable Development Goals – CTCP Circular Economy basis on the reduction, reuse, recovery and recycling of materials and energy replaces the end-of-life concept of the linear economy. Redesign of processes, products and new business models are central in today industry. But it goes beyond the industry and we all can contribute, incorporating circular economy principles into our daily lives. And education? Where to start facing this challenge from? How can teachers involve students in Sustainable Development Goals forward-looking actions?
13:00	Lunch

14:00	<p>Workshop on i4.0 - CTCP</p> <p>I4.0 revolution aims at interconnecting all systems and processes supported on cyber-physical systems, the internet of things and the internet of services.</p> <p>It changed how people work, transforming repetitive tasks into collaborative work alongside robots, products being designed using modelling, virtualization and simulation supported by 3D printing advanced prototyping and/or augmented/virtual reality, among many other things.</p> <p>This workshop is a journey through a complete transformation of the industry and the set of technologies that supports it with a view to new job creation based on STEAM qualifications.</p>
15:00	<p>Strategies for Improving Manual for teachers/trainers (R2)</p> <p>Building up activity to involve participants in the analysis and improvement of the Manual with orientations to teachers to adopt <i>ShoesYourLife</i> approaches and results.</p>
16:00	<p>Final evaluation of the LTTA – Finding and lessons learnt</p> <p>All partners</p>
17:00	<p>End of the Training</p>

Pictures of the activity:





Certificate:



Shoes (Choose) Your Life - A New Educational Approach to STEAM Jobs


Project number / Grant Agreement 2021-1-PT01-KA220-SCH-000027935

CERTIFICATE OF ATTENDANCE

Training/Learning Activities for Teachers


We certify that **Mafalda Barros** from **ByAR – Embracegadget, Lda** attended the 3 days Training/Learning Activities for Teachers of the project **Shoes(Choose) Your Life - A New Educational Approach to STEAM Jobs**, project number **2021-1-PT01-KA220-SCH-000027935**, funded with the support of European Commission, in the frame of the ERASMUS+ PROGRAMME SCH COOPERATION PARTNERSHIP – KA220, organized by **Centro Tecnológico do Calçado de Portugal** and **Agrupamento de Escolas Oliveira Júnior** placed in their correspondent premises in Rua de Fundões – Devesa Velha 3700-121 S. João da Madeira, and Avenida Adelino Amaro da Costa, 3700 – 023 S. João da Madeira, Portugal, between 24.01.2023 and 26.01.2023.

S. João da Madeira, 26th January 2023



(Managing Director-CTCP)





Project co-funded by ERASMUS+ Programme of the European Union



**Co-funded by
the European Union**

How did teachers find the event?

A **feed-back survey** was launched just after the event ends with the following characteristics and the results are the following.

<https://forms.gle/4A4ZkQVTnfXqvELe8>

SHOES YOUR LIFE - Learning/Training Activity for Teachers - feed-back questionnaire

B *I* U ↻ ✕

Thank you for attending the learning/training activity for teachers in CTCP & AEOJ.
Your feed-back is very important for us. Please provide feedback on this activity by completing this survey.
Thank you very much for your time.

The topics of the training were relevant in the frame of the Shoes Your Life project

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The topics of the training were clear and easy to follow

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The length of training was adequate

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The organisation of the training was effective

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The training contributed to my professional improvement

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The training contributed to my personal improvement

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The technical resources used (platforms, visual aids, fablabs, presentations) were adequate

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

⋮

The topics were presented in a clear and understandable manner

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

⋮

The trainers encouraged participation, interaction and answered questions clearly

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The visits and interaction with stakeholders were proficuous

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The training meet my expectations

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The overall evaluation of the training is:

- Very good
- Good
- Satisfactory
- Poor
- Very poor

What did you like the most about the training?

Texto de resposta longa

Which topics did you like the most?

Texto de resposta longa

Which topics would you cancel or substitute?

Texto de resposta longa

What suggestions or comments do you have for the improvement of the training?

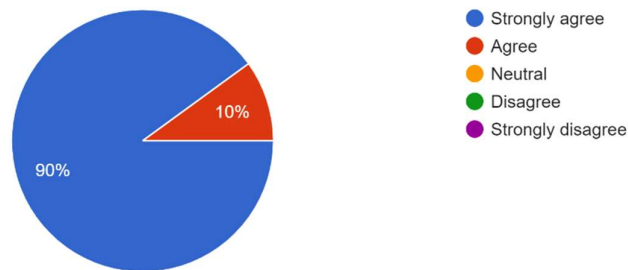
Texto de resposta longa

What can be replicate in other similar training activities targeted to teachers and/or students?

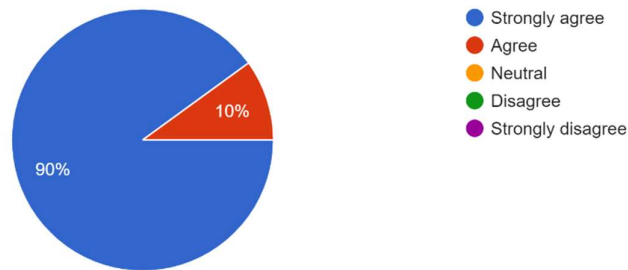
Texto de resposta longa

The feed-back survey results are the following:

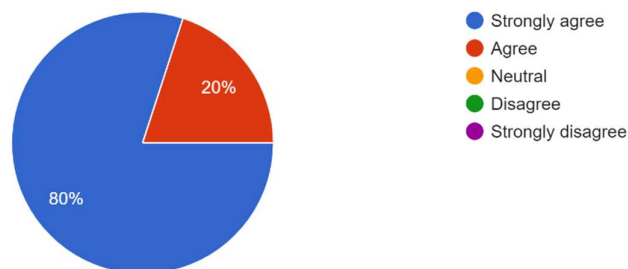
The topics of the training were relevant in the frame of the Shoes Your Life project
10 respostas



The topics of the training were clear and easy to follow
10 respostas

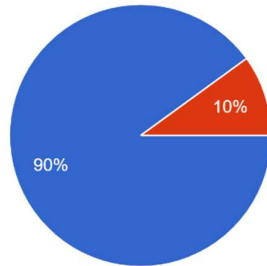


The length of training was adequate
10 respostas



The organisation of the training was effective

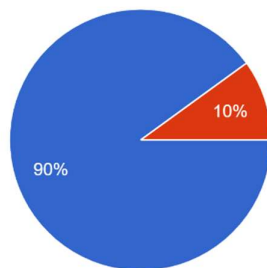
10 respostas



- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The training contributed to my professional improvement

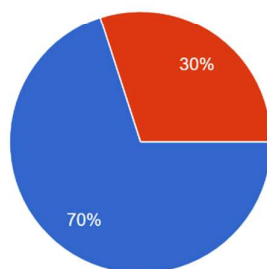
10 respostas



- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

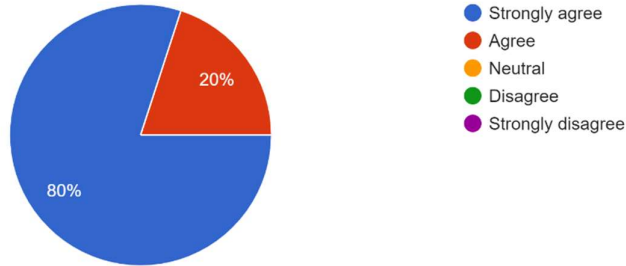
The training contributed to my personal improvement

10 respostas

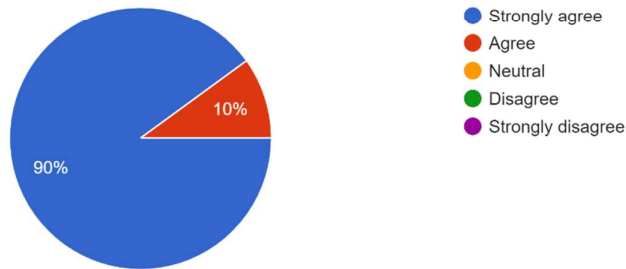


- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

The technical resources used (platforms, visual aids, fablabs, presentations) were adequate
10 respostas



The topics were presented in a clear and understandable manner
10 respostas

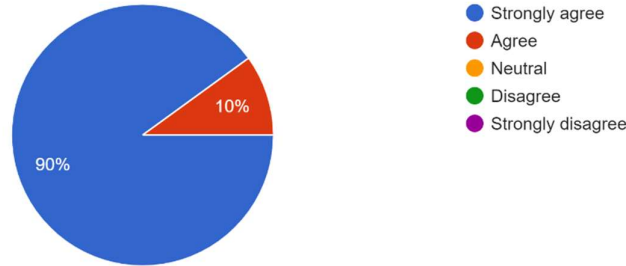


The trainers encouraged participation, interaction and answered questions clearly
10 respostas



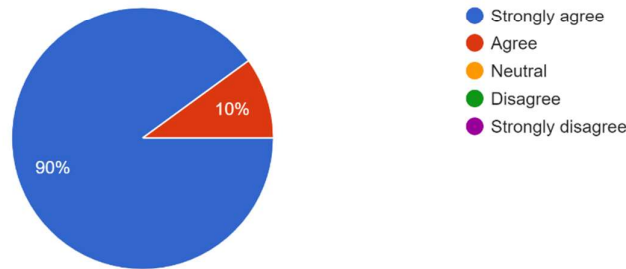
The visits and interaction with stakeholders were proficuous

10 respostas



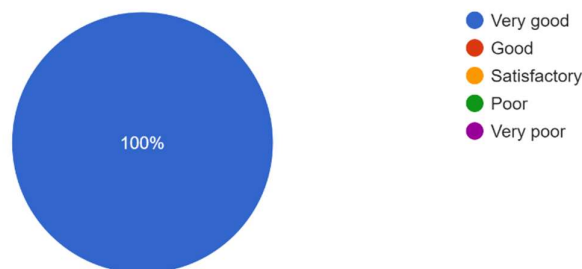
The training meet my expectations

10 respostas



The overall evaluation of the training is:

10 respostas



What did you like the most about the training?

9 respostas

visits, workshops

The overall friendship.

Knowing other points of view.

The good organisation of the activities and the variety of topics we immersed ourselves in

Workshops

The different workshops

The organization, the content of the workshops, the topic

The topic , the content of the workshops, The workshop about circular economy

Creativity workshop

Which topics did you like the most?

9 respostas

AR, VR

Creativity workshop

Criativity and innovation

Virtual Reality and also the connection with the traditional sector of the region.

Digital, creativity and inovation, interation with all the participants

Creativity and innovation

I liked the workshops the most, especially the one about creativity and innovation
It is extremely useful for my teaching activity

The workshop about circular economy and leather skills

Which topics would you cancel or substitute?

9 respostas

none

None.

Nothing, all the activities were really interesting

None

All were useful and interesting

None

Noone

What suggestions or comments do you have for the improvement of the training?

6 respostas

Very good!

We must do this more often

Maybe including some activities or simulations with students

None

Any

Was very well.

What can be replicate in other similar training activities targeted to teachers and/or students?

8 respostas

Nice question

real-world approaches and experiences

workshops

Creativity Workshop

All.

They were workshops suitable for the educational process, at least for high school, all contents can be replicated for both teachers and students

Everything

The content of the course can be easily integrated into the classroom and can be used both as training material for teachers and students.

VR workshops, creativity workshops, visits

Conclusions

The SYL “STEAM-based” Teachers’ Package consists in a methodology verted into a guide dedicated to teachers to apply the STEAM-based educational package in all its components, to support them to use all its developed resources and to adapt themselves to the new educational methods namely virtual reality immersive contents apps, and combine them to elevate the potential of all the resources.

The new **Student-Centred Approach** emphasizes the student’s active role in the learning process, encourages collaboration, critical thinking, and problem-solving, includes project-based learning and inquiry-based learning and adopt experiential learning, through constructive methods.

Virtual Reality (VR) is rapidly emerging as a transformative educational tool, often referred to as “**the new black**” in modern teaching methods, particularly for young learners. Therefore, a new generation of teachers trained through innovative models of training can significantly impact education by incorporating modern methodologies, technologies, and a learner-centred approach. This package was completed with an interchange event between the teachers to fine tune the results, within a Learning/Teaching/Training Activity which took place in Portugal. A 3 working days training/learning activity targeted to teachers and partners’ organization staff was designed, developed and tested. The overall evaluation of the 3-days training event was very good, met all participants expectations, with interaction with stakeholders was fruitful and can be easily replicated in other contexts.

Annex 1 – Presentations used in the LTTA

ICEBREAKING

5 CARDS

Activity Date: 24/01/2023
Activity Time: 09:15 GMT

STEP 1
(BEFORE THE GAME)

DOWNLOAD THE APP

Please download the app, for free, through the App Store, Play Store or App Gallery. Just search **'Wildgoose - Mobile Adventures'** and look for the **green icon**. Or via this QR Code or link: <https://join.wildgooseglobal.com/download>

STEP 2
(DURING THE BRIEFING)

DOWNLOAD THE GAME

At the beginning of the activity, after the briefing – you will have access to your Game Code to enter the game. There are two formats:

1. You can enter the **Game Code**, which we will provide at the time – a series of numbers, e.g. 580789000000 – and then tap on **"Download Game"**.
2. You can tap on **"Scan QR Code"** and Scan the QR Code provided.

OR*

2. You can tap on **"Scan QR Code"** and Scan the QR Code provided.

If you have any questions about the App, we will answer them on the day of the activity as well.

IMPORTANT:

Please have in mind, during the activity you will need:

- (1) A cell phone with Mobile Data;
- (2) Allow the app – ADVENTURES – to access your Camera and Microphone.

PROJECT OVERVIEW

<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>PROJECT FOCUS</h3> <ul style="list-style-type: none"> Digital Innovative practices in training/education Concept learning allied to Virtual Reality/Augmented reality Exchange practices Attract newcomers to the industry Vision of the industry that allies technology to creativity and influences youngsters to choose STEAM-based job in a I4.0 framework Teachers as ambassadors of the I4.0 in schools 	<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>TARGET-GROUPS</h3> <ol style="list-style-type: none"> Generation Z students – students in schools between 12-15 but also possible older groups Teachers, as key mediators/facilitators of the learning process. Teachers as ambassadors of the I4.0 in schools Industry – rejuvenate human capital
<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>RESULTS</h3> <ol style="list-style-type: none"> <p>SYL “STEAM-based” Educational Package toward students constituted by:</p> <ul style="list-style-type: none"> educational kits (8 modules) immersive app in virtual reality that will offer immersive experiences 	<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>RESULTS</h3> <ol style="list-style-type: none"> <p>SYL Teacher’s Package toward teachers comprehends:</p> <ul style="list-style-type: none"> Guide to apply the “STEAM-based” educational package ITTA interchange between the teachers
<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>RESULTS</h3> <ol style="list-style-type: none"> <p>SYL Piloting and transference of “STEAM-based” package:</p> <ul style="list-style-type: none"> Consolidation of the project interchange between the students 3 international learning activity toward students in Portugal, Italy and Romania (C2, C3 and C4) 	<p>NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>RESULTS</h3> <ul style="list-style-type: none"> Project website https://shoesyourlife.eu/ Social media and promotional / advertising material along the project. Workshops/multiplier events - Jump out events – blended session with hands-on activities of demonstration and discussion and try out the project results Wider conference in Brussels with European organizations.
<p>Obrigada</p> <p>The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.</p>	

GENERATION Z

	<p>About ThinkYoung</p> <ul style="list-style-type: none"> → Founded in 2009 → Non-profit NGO and think tank conducting research on young people → Develops impact programmes and campaigns targeting schools and improving the lives of youth
<p>GET TO KNOW GEN Z</p> <ul style="list-style-type: none"> → Born 1997-2012 → Advocate for sustainability, equality and mental health → 40% have work experience as volunteers/in charities → Ethically-conscious consumers → Citizens of the world → High unemployment → 1st digitally-native generation 	<p>CHALLENGES FACING GEN Z IN THE DIGITAL AGE</p> <ul style="list-style-type: none"> → Unequal access to technology <ul style="list-style-type: none"> • Digital literacy skills and education • Hardware (devices, internet connection) → Freedom of speech <ul style="list-style-type: none"> • Fear being criticised for being too honest • Risk of being silenced • Proliferation of hate speech → Overwhelming volume of information and media <ul style="list-style-type: none"> • Unmoderated content may be unsuitable for some • Impact on mental health • Disinformation/ misinformation
<p>CHALLENGES FACING GEN Z IN THE DIGITAL AGE</p> <ul style="list-style-type: none"> → Addiction to technology <ul style="list-style-type: none"> • Not everything needs to be digitised • Learn how to disconnect and separate between personal life and studies → Loss of privacy controls <ul style="list-style-type: none"> • Many are unaware of how/by whom their data is used • Data exploited by advertisers → Generational differences in digital literacy speak “natural” social hierarchies <ul style="list-style-type: none"> • Parents/ adults learning from children = inverted familiar relationships 	<p>CHALLENGES FACING GEN Z IN THE DIGITAL AGE</p> <ul style="list-style-type: none"> → All involvement in significant decision-making eg. recruitment <ul style="list-style-type: none"> • “Baked-in bias” of algorithms • Some groups disproportionately impacted (esp. minorities) → Uncertain future of work <ul style="list-style-type: none"> • Many jobs “will be digital” • Need to clarify the skills needed → Environmental impact <ul style="list-style-type: none"> • Huge electricity demand of “The Cloud” • Planned obsolescence and overconsumption • More digital doesn’t necessarily mean more green!
<p>CHALLENGES IN THE CLASSROOM</p> <ul style="list-style-type: none"> → Attention span → Unequal access to technology beyond the classroom → Impact of COVID-19 → Distraction of mental health problems → Over-digitised education can become too impersonal → Increased risk of plagiarism → Danger of reliance on auto-correct 	<p>OPPORTUNITIES FOR GEN Z IN THE DIGITAL AGE</p> <ul style="list-style-type: none"> → Education <ul style="list-style-type: none"> • immersive environment → Communication <ul style="list-style-type: none"> • overcome temporal and geographical barriers → Access <ul style="list-style-type: none"> • immediate download options → Civic engagement and activism <ul style="list-style-type: none"> • more opportunities to develop global movements

<p>NEW EDUCATIONAL APPROACH TO STEAM LEARNING</p> <h2>OPPORTUNITIES FOR GEN Z IN THE DIGITAL AGE</h2> <ul style="list-style-type: none"> → Hybrid work/education <ul style="list-style-type: none"> • more flexible so can be adapted to suit lifestyle → Closer connections between technology developers and their users <ul style="list-style-type: none"> • better feedback systems → Platform economy largely based on digital technology <ul style="list-style-type: none"> • income opportunities • gain work experience • develop independence 	<p>NEW EDUCATIONAL APPROACH TO STEAM LEARNING</p> <h2>OPPORTUNITIES IN THE CLASSROOM</h2> <ul style="list-style-type: none"> → Digital intuition speeds up learning → Appeal of video-based teaching to supplement traditional resources → Digital tools allow differentiation between students → Continued learning journey outside of school → Flipped classroom model
<h2>Obrigado/a</h2> <p>Co-funded by European Programme of Erasmus+ Online</p> <p><small>The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.</small></p>	

SUSTAINABILITY & CIRCULAR ECONOMY

<p>SUSTAINABILITY AND CIRCULAR ECONOMY: HOW EDUCATION CAN HELP TO REACH SUSTAINABLE DEVELOPMENT GOALS</p>	<p>Sustainability and circular economy: how education can help to reach Sustainable Development Goals</p> <ul style="list-style-type: none"> — Sustainable Development – Current Environmental Impacts — Sustainability Tools — Circular Economy — Exercise
<p>Sustainable Development</p> <p>Is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.</p> <p>1987, Brundtland Commission Report</p>	<p>+ 35 YEARS LATER</p>
<p>Climate Change</p>	<p>Ocean Pollution and Lost of Biodiversity</p>
<p>Waste</p> <p>Atacama Desert, Chile</p> <p>Republic of Ghana, Africa</p>	<p>Waste</p> <p>Portugal</p> <p>1,4 kg of waste per day per person</p>

<p>Problem!!</p> <p>Our planet's ability to regenerate its resources <u>cannot</u> keep up with the human demand.</p>	<p>Problem</p> <p>Earth Overshoot Day 1971 - 2022</p> <p>Earth Overshoot Day marks the date when humanity's demand for ecological resources and services in a given year exceeds what Earth can regenerate in that year.</p> <p>In 2022, it was on 28 July.</p>
<p>Problem</p> <p>Country Overshoot Days 2022 When would Earth Overshoot Day land if the world's population lived like...?</p>	<p>Solutions</p>
<p>2030 Agenda – United Nations</p> <p>SUSTAINABLE DEVELOPMENT GOALS</p>	<p>Climate Change Conference – United Nations</p> <p>COP26</p> <p>COP27 SHARH EL-SHEKH EGYPT 2022</p> <p>Assessment of the implementation of the Paris Agreement, which aims to keep global warming below 2°C compared to pre-industrial levels and make efforts to limit it to 1.5°C.</p>
<p>Climate Change Conference – United Nations</p> <p>CLIMATE CRISIS</p> <p>What are the goals at COP26? The UK is hosting the 26th Conference of the Parties, with four goals to be discussed during the annual climate change summit in Glasgow.</p>	<p>Solutions</p> <ul style="list-style-type: none"> - Reduce greenhouse gas emissions (more efficient travel with renewable energy) - Avoid wasting water and natural resources - Avoid food waste - Reduce waste - Protecting Oceans and Biodiversity - Choose more sustainable options

<p>Ecological Footprint</p> <p>The impact of human activities measured in terms of the area of biologically productive land and water required to produce the goods consumed and to assimilate the wastes generated.</p> <p>http://www.footprintcalculator.org/</p>	<p>Personal choices to reduce your contribution to climate change</p>
<p>Food Waste</p> <p>If food waste were a country, it would be the world's third largest producer of greenhouse gases... About 30% of the world's food is wasted.</p>	<p>And how can we, as consumers, chose more sustainable options?</p>
<p>Transparency ✓ Greenwashing ✗</p> <p>avoid</p>	<p>Sustainability Tools</p> <p>Transparency</p>
<p>Sustainability Tools</p> <p>ISO Environmental Management System - EMS</p> <p>An Environment Management System is a set of processes and practices that enable an organization to evaluate and define objectives to reduce its environmental impacts and increase its operating efficiency.</p>	<p>Sustainability Tools</p> <p>Chemicals</p> <p>Ø ZDHC Zero Discharge of Hazardous Chemicals</p>

NEW EDUCATIONAL APPROACH TO STEAM GOALS

Sustainability Tools

- Chemicals
- Materials
- Social Responsibility

NEW EDUCATIONAL APPROACH TO STEAM GOALS

April 24th 2013
Collapse of the Rana Plaza, Bangladesh

FASHION REVOLUTION

We must invest in growth to invest in supply chain prosperity.
Orsola de Castro, Fashion Revolution Co-founder

NEW EDUCATIONAL APPROACH TO STEAM GOALS

MANIFESTO FOR A FASHION REVOLUTION

We love fashion. But we don't want our clothes to exploit people or destroy our planet.

We demand radical, revolutionary change.

This is our dream...

> 500 brands

NEW EDUCATIONAL APPROACH TO STEAM GOALS

Who made my clothes?

I made your clothes

I made your Antonio bag

NEW EDUCATIONAL APPROACH TO STEAM GOALS

G7 FRANCE BIARRITZ 2019 FASHION PACT

> 200 brands

NEW EDUCATIONAL APPROACH TO STEAM GOALS

H&M CONSCIOUS COLLECTION
More sustainable fashion

be transparent

NEW EDUCATIONAL APPROACH TO STEAM GOALS

FASHION TRANSPARENCY INDEX

NEW EDUCATIONAL APPROACH TO STEAM GOALS

KEY RESULTS

24% of respondents have implemented a sustainability strategy

27% of respondents have implemented a sustainability strategy

27% of respondents have implemented a sustainability strategy

28% of respondents have implemented a sustainability strategy

31% of respondents have implemented a sustainability strategy

34% of respondents have implemented a sustainability strategy

AVERAGE SCORES IN EACH SECTION

Section	Score
Environmental	51%
Social	34%
Economic	21%
Animal Welfare	39%
Other	30%



TOP 10 BRANDS IN EACH SECTION

Brand	Environmental	Social	Economic	Animal Welfare	Other
Adidas	51%	34%	21%	39%	30%
Asics	51%	34%	21%	39%	30%
Converse	51%	34%	21%	39%	30%
Dr. Martens	51%	34%	21%	39%	30%
Gap	51%	34%	21%	39%	30%
Levi's	51%	34%	21%	39%	30%
NIKE	51%	34%	21%	39%	30%
Puma	51%	34%	21%	39%	30%
Reebok	51%	34%	21%	39%	30%
Vans	51%	34%	21%	39%	30%

	<p>Sustainability Tool - Circular Economy</p> <p>Linear Economy</p>
	<p>Sustainability Tool - Circular Economy</p> <ul style="list-style-type: none"> - Eliminate waste and pollution - Circulate products and materials – at their highest value - Regenerate nature
<p>Sustainability Tool - Circular Economy</p>	<p>Sustainability Tool - Circular Economy</p>
<p>Circular Economy – 5 Business Models</p>	<p>Circular Economy – 5 Business Models</p> <p>1. Circular Supplies</p> <p>The circular supply business model is particularly relevant for companies dealing with scarce resources that can be replaced with fully renewable, recyclable or biodegradable resources.</p> <p>Goals:</p> <ul style="list-style-type: none"> - Reduce dependency on materials - Not dealing with price volatility - Ensuring the regularity of supplies - Maximize resource profitability

<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>1. Circular Supplies</h3> <p>Orange Fiber/Salvatori Ferragmo – Italy</p> <ul style="list-style-type: none"> Salvatori Ferragmo works with silk – luxury business Using what remains after squeezing oranges for juice – which amounts to more than 700,000 tons of byproduct in Italy - they can replicate silk fibre <p>ORANGE FIBER</p>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>1. Circular Supplies</h3> <p>Ecovative – United States of America</p>
<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>Circular Economy – 5 Business Models</h3> <h4>2. Resource Recovery</h4> <p>The resource recovery business model leverages technological innovations and resources to recover and reuse resource outputs and maximize potential economic value.</p> <p>Examples include closed-loop recycling, industrial symbiosis, and Cradle-to-Cradle projects where waste materials are reprocessed into new resources.</p> <p>It eliminates not only waste, but also the concept of waste.</p> <p>Convert waste into new products.</p>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>2. Resource Recovery</h3> <p>EcoX – Portugal</p> <p>Industrial Symbiosis – food oil is used to do ecological detergents.</p>
<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>2. Resource Recovery</h3>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>Circular Economy – 5 Business Models</h3> <h4>3. Product use extension</h4> <p>The product life extension model helps companies extend the life cycle of their products and assets to ensure they remain economically useful.</p> <p>Material that would otherwise go to waste is maintained or improved through remanufacturing, repairing, upgrading. By extending the shelf life of the product as long as possible, companies can keep material out of the landfill and discover sources of revenue.</p>
<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>3. Product Use Extension</h3>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-EDU.</p> <h3>3. Product Use Extension</h3>

<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>3. Product Use Extension</h3>	<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>3. Product Use Extension</h3>
<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>3. Product Use Extension</h3>	<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>3. Product Use Extension</h3> <p>Pantagonia – american retailer of outdoor clothing - launched Worn Wear in 2013 to extend the life of apparel. The company has set up repair stations around the world. Also, the company provides to the customers free tools to repair their own clothes.</p> <p>Pantagonia's Worn Wear repair shop in Reno, Nevada repairs over 45,000 items a year.</p> <p>Patagonia offers cleaning and repair guides, sewing tutorials, and pricing transparency. With each repair, the company provides feedback to its designers to improve future products.</p>
<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>Circular Economy – 5 Business Models</h3> <h4>4. Sharing Platform</h4> <ul style="list-style-type: none"> - Different from traditional commerce, allows the access by other people through the use of goods and services rather than owning them. - More access to goods and services at a lower price - Motivated by worldwide economic recession, rising environmental awareness and growth of information and communication technologies - Reduces waste associated with lack of use - Increases actual product usage 	<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>4. Sharing Platform</h3> <p>Hello Tractor - Through a tractor sharing application, the company aims to connect tractor owners and smallholder farmers in need of tractors</p>
<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>4. Sharing Platform</h3> <p>Sharing Platforms are always Circular Economy?</p>	<p>NEW EDUCATIONAL APPROACH TO STEAM EDUC.</p> <h3>Circular Economy – 5 Business Models</h3> <h4>5. Product as a Service</h4> <p>In this model, customers pay for products through a rental or pay-as-you-go contract compared to the conventional purchasing approach.</p> <ul style="list-style-type: none"> - pay per use - leasing - rental - performance contract

<p>5. Product as a Service</p> <p><u>Rolls Royce</u> – manufacture of airplane turbines – started to sell flight hours</p> <p><u>Philips</u> – Lighting Service of the Schipol’s Airport, Netherlands</p>	<p>Circular Economy – 5 Business Models</p>  <ol style="list-style-type: none"> 1. Circular Supplies 2. Resource Recovery 3. Product use Extension 4. Sharing Platforms 5. Product as a Service
<p>Don't forget to ask</p> <ul style="list-style-type: none"> - Where does it come from? - What happens after use? - How is the product made? - There are toxic materials? - What could we change? - The product could be a service? - What value does this product bring to me/to the people and the world? 	<p>Examples?</p> <p>Ideas?</p> <p>Questions?</p>
<p>Thank you</p>  <p>Co-funded by European Union</p> <p><small>The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.</small></p>	

i4.0

WORKSHOP ON I4.0

26/11/2023 | Cristiano Figueiredo | cristiano.figueiredo@ctcp.pt

Contents

- What is industry 4.0?
- Enabling technologies
- Examples
- Opportunities

Industry 4.0?

additive manufacturing, virtualization, internet of things, autonomous robots, augmented reality, computer simulation, factory of the future, high-speed communications network, industry of the future

How do you imagine the factory of the future?

FACTORY OF THE FUTURE

We can imagine a **smart factory** supported on interconnected **cyber-physical** systems, where all the data from production, logistics, maintenance, sales, etc, can be accessed in real-time in the cloud, a warehouse, a stock completely traceable by wireless **RFID** modules. A factory where **autonomous robotic systems** managed remotely, setup by **simulating** the shop floor for increased efficiency and resource usage. A place of work where humans can interact with machines and cooperate for a more reliable production by improved **human-computer tools**. We can also imagine project design using **modelling, virtualization** and **simulation** allowing to visualize our product before manufacture supported by advanced prototyping with the help from additive manufacturing. **3d modelling** or even **augmented and virtual reality**, a project design that can be truly **cooperative** supported by the cloud, responsive to the client demands, to the customer needs for **customization** and that can be quickly applied to the **flexible manufacture**. All this is available for our **I4.0** plants and can, step by step, element by element, enter our manufacture routine.

FACTORY OF THE FUTURE

IoT Sensors for Supply Chain Management, Predictive Machine Analytics, Industrial Augmented Reality, Module Equipment, Computer Vision, Unmanned Trucks, Robotics, and Innovation for Enterprise Resource Planning and Supply Chain Management.

Origin

Industry 4.0, or *Industrie 4.0* in the original German geneses, was first presented as a concept in 2011 at the Hannover Fair. As an idea coined by the German government, it was intended to encapsulate the technology changes and the priorities for the manufacturing processes to maintain the global competitiveness of the German industry.

Nowadays, viewed as the fourth industrial revolution, it embodies the organization and production processes supporting the full digitalization of the manufacturing industries. Real time communication between devices is key, as well as between different factories, companies and clients.

The implementation of the concepts of I4.0 will result in "smart-factories".

Origin

Industry 4.0 aims for the interconnection of all systems and processes supported on a network of communicating machines and cloud-based services.

This approach is oriented to **digitalization** of the manufacturing processes, sustained on a network of communicating machines and cloud-based computation.

Information will be accessible in real time allowing quick decision making and the possibility of prediction models to be used as a tool for planning.

For workers, I4.0 brings the possibility of repetitive, harmful and less creative tasks to be performed by autonomous robotic systems replacing or working alongside humans, with these individuals relocated to more creative and less physical demanding jobs.

This will require a change in skills for all employees and their leaders, with the possibility of new job creation based on higher qualifications.

Goals

Industry 4.0 as a process of change of the manufacturing industry can be defined by a set of planning goals:

- Standardization of systems and creation of reference architecture
- Establish a comprehensive and reliable industrial broadband infrastructure
- Efficient management
- Setting a safe and secure environment
- Organizing and designing the work Personal training
- Creating and organizational frameworks
- Increasing efficiency in resource utilization

Main pillars of i4.0

Cyber-physical systems (CPS) connecting the physical and virtual worlds, such as the physical shop floor and the computational virtual space, allowing real time management of autonomous production processes.

Internet of things (IoT) inter-connecting machines with embedded electronics, sensors, actuators and network connectivity allowing these devices to collect and exchange data.

Internet of services (IoS) letting companies offer their services online, such as, but not limited to, virtual showrooms and design based on augmented reality.

What developments are connected to i4.0?

Industry 4.0 can be seen as result of the giant leap in digital technology observed in the last 2 decades, resulting in a paradigm shift across the most diversified fields of economics and society.

It is a combination of several novel technological advances (IT):

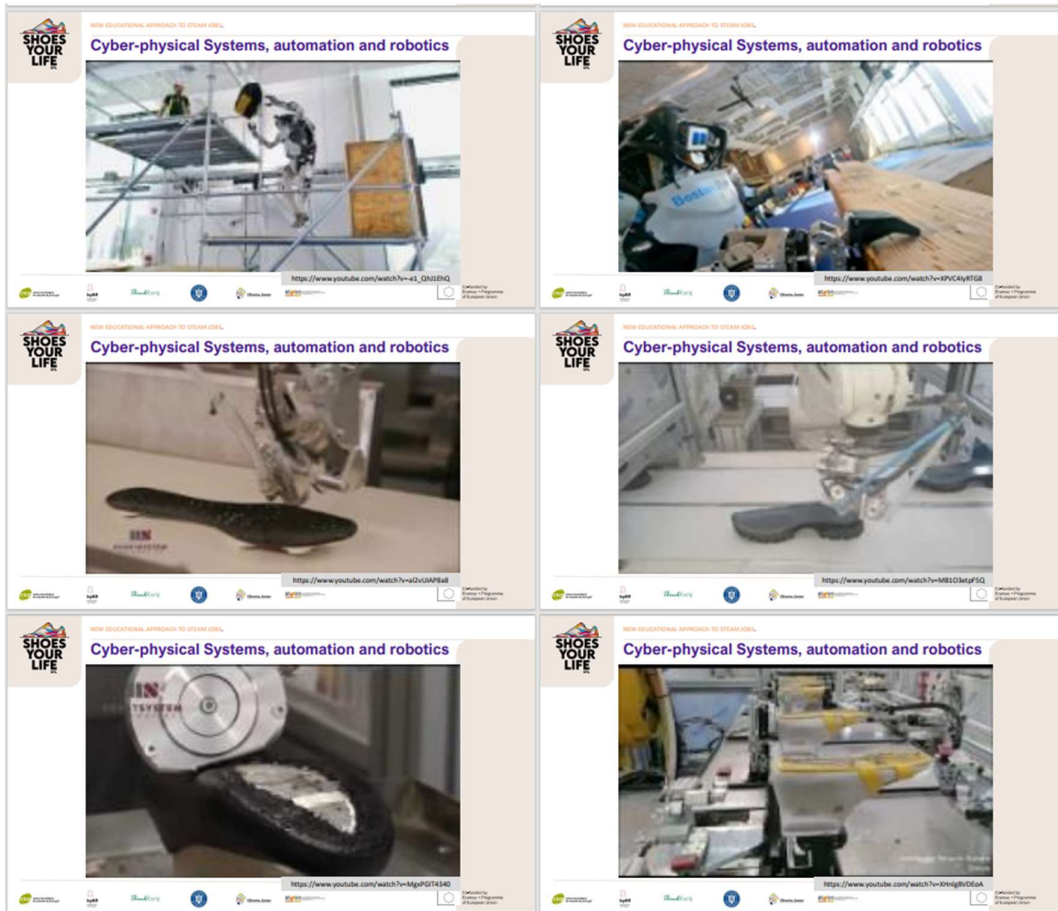
- Information and communication technology;
- Cyber-physical systems;
- Network communication;
- Big data and cloud computing;
- Modelling, virtualization and simulation;
- Improved tools for human-computer interaction and cooperation;


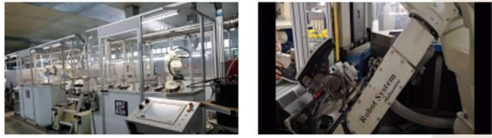




Building blocks of Industry 4.0

Controlled intelligence that analyzes the value of digitalized data.


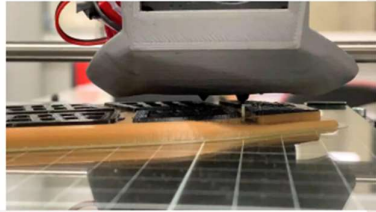




<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>What developments are connected to i4.0?</p> <ul style="list-style-type: none"> Information and communication technology: Digitalization and the widespread application of ICT allow the integration of all systems throughout the supply and value chains and enables data aggregation on all levels. Information is digitized and the corresponding systems inside and across companies are integrated at all stages of both product creation and use lifecycles; Cyber-physical systems: Cyber-physical systems improve the capability of controlling and monitoring physical processes, with the help of sensors, intelligent robots, drones, 3D printing devices. In cyber-physical systems the physical components are aggregated into a network of interacting elements. While the initial inputs and final outputs are customarily physical, information often transposes between physical and digital states during manufacturing process; 	<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>What developments are connected to i4.0?</p> <ul style="list-style-type: none"> Network communication: All these devices, both within the manufacturing plant and across suppliers and distributors, are connected through different wireless and Internet technologies. Reliable high-quality communication networks are a crucial requirement Industry 4.0 and therefore it is important to expand the Broadband Internet infrastructure where needed. This high level of networking of interconnected components allows for a decentralized and self-organized operating of the cyber-physical systems; Big data and cloud computing: With the use of big data and cloud computing, the information retrieved through these networks can be used to model, virtualize and simulate products and manufacturing processes;
<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>What developments are connected to i4.0?</p> <ul style="list-style-type: none"> Modelling, virtualization and simulation: Simulation is a core functionality of systems by means of seamless assistance along the entire life cycle, for example, by supporting operation and service with direct linkage to operation data; Improved tools for human-computer interaction and cooperation: To control these processes, human workforce is supplied with state-of-the-art ICT tools that make use of advancements in augmented reality and intelligent robotics. The cyber-physical systems of Industry 4.0 have the primary aim of assisting humans in their everyday jobs. The key features of such systems are non-intrusiveness, context-adaptiveness, personalized, location-based and mobility. 	<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>Technologies and processes related to the i4.0 application</p> <p>In addition to the main items described before, several key technologies are available for i4.0 implementation:</p> <ul style="list-style-type: none"> — Cloud computing for managing all the data collected allowing real-time information processing, analysis and sharing; — Machine to machine communication for autonomous production allowing the use of advanced robotics; — Advanced human-machine interface for collaboration between human and machines in a safe and productive environment; — Augmented reality, virtual manufacturing and simulation for product development, prototyping, for manufacturing simulation and for sales outlets; — Data mining for the analysis of the large amount of data collected for advanced decision making based on real-time data and predictive analysis; — Enterprise resource planning (ERP) and business intelligence based on interconnected and controlled production processes; — Additive manufacturing for prototyping, modular design and testing; — Smart factories where everything is connected supported on CPS, IoT and cloud computing.
<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>Technologies and processes related to the i4.0 application</p>	<p>NEW EDUCATIONAL APPROACH TO STEAM OERL</p> <p>What consequences for the industry?</p> <p>All this advances bring new opportunities to the industry in the form of:</p> <ul style="list-style-type: none"> — Business models – smart-factories based on the intelligent use of the data available and to the extreme efficiency of smart-devices supported cyber-physical systems. — Value creation networks – industrial symbiosis for cooperation between manufacturers. — Customization – greater ability to respond to client demands and product personalization. — Equipment – changes in equipment incorporating aspects of i4.0 with advanced human-machine cooperation interface. — Workforce – new skills changing from a physical job to a functions related to equipment supervision or more creative tasks. — Product and process – more efficient production with high quality standards.

<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>What is available for the footwear industry?</h3> <p>Most technologies available for footwear industry can be included in the following groups:</p> <ul style="list-style-type: none"> — Cyber-physical Systems, automation and robotics — Flexible Manufacturing and Customization — Footwear Sensorization — Virtual, augmented and mixed reality — 3D printing / prototyping — 2D/3D modelling and Co-design — IoT (internet of things) — Cloud computing 	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>Cyber-physical Systems, automation and robotics</h3> <p>Alshay, M. H., & Peres, S. (2016). Internet of Things Services Impact as a Driving Force on Future Technologies for Addressing Mining Data. <i>Yonsei University College</i>, 33(4)(1), 31-32.</p>
<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>Cyber-physical Systems, automation and robotics</h3> <p>https://www.youtube.com/watch?v=j8tDm3y3k4I</p>	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>Cyber-physical Systems, automation and robotics</h3> <p>https://www.youtube.com/watch?v=KxaoN4wKQ0</p>
<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>Cyber-physical Systems, automation and robotics</h3> <p>https://www.youtube.com/watch?v=7v1E0LsLz0G</p> <p>Full automation can be used for some particular type of shoes with great efficiency. For other type of footwear, some tasks can be automated freeing works for creative or specialized activities.</p>	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM BASED</p> <h3>Cyber-physical Systems, automation and robotics</h3> <p>https://www.youtube.com/watch?v=7v1E0LsLz0G</p>



 <p>NEW EDUCATIONAL APPROACH TO STEAM-COEL Cyber-physical Systems, automation and robotics</p> <p>https://www.youtube.com/watch?v=H606d73ps</p>	 <p>NEW EDUCATIONAL APPROACH TO STEAM-COEL Cyber-physical Systems, automation and robotics</p> <p>https://www.youtube.com/watch?v=U_gfP1axg8Bk</p>
 <p>NEW EDUCATIONAL APPROACH TO STEAM-COEL Cyber-physical Systems, automation and robotics</p> <p>https://www.youtube.com/watch?v=3v3ouaf8yodI</p>	 <p>NEW EDUCATIONAL APPROACH TO STEAM-COEL Cyber-physical Systems, automation and robotics</p> <p>https://www.youtube.com/watch?v=U_gfP1axg8Bk</p>
 <p>NEW EDUCATIONAL APPROACH TO STEAM-COEL Cyber-physical Systems, automation and robotics</p> <p>https://www.youtube.com/watch?v=4Cw_d-3V38k</p>	 <p>Collaborative robots can work alongside humans helping in tasks and with full safety.</p> <p>https://www.youtube.com/watch?v=08GV879k</p>

<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Flexible Manufacturing and Customization</h3> <p>Allows for greater ability to respond to client demands and product personalization.</p> <p>https://www.inecsp.eu/maps/virtualtoof/service/technologie-wanadai/5etofive-accessories.jpg</p> <p>https://www.mindtech.pt/imagens/substancias/viewer/mindCAD-streer.jpg</p>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Footwear Sensorization</h3> <p>Sensors in footwear can be helpful for health and fitness data analysis. Similarly, sensors can be used to guide visual-impaired individuals by helping in the avoidance of obstacles.</p> <p>Wu, J., Kuravakkudi, A., Schen, A., Sivarajah, A., Changpradit, G., Avel, E., Barry, G., Motta, L., Aze, L., Nelson, B. J., & Gligorovic, G. (2021). An intelligent in-shoe system for Real-Time Gait Monitoring and Analysis. <i>March</i>. https://doi.org/10.2196/ijmim.2021.2021.01.01</p> <p>Chou, S.-W., Shen, J.-H., Liu, H.-T., Tang, Y.-C., & Ho, W.-H. (2021). A Study on the Influence of Number/Distribution of Sensing Points of the Sensor Issues on the Center of Pressure Estimation for the Control of Prosthetic Applications. <i>Substancias</i>, 13(2), 28-34. https://doi.org/10.24068/substancias.1302.2834</p>
<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Virtual, augmented and mixed reality</h3> <ul style="list-style-type: none"> — Modelling, virtualization and simulation: Simulation is a core functionality of systems by means of seamless assistance along the entire life cycle, for example, by supporting operation and service with direct linkage to operation data; — Augmented reality, virtual manufacturing and simulation for product development, prototyping, for manufacturing simulation and teaching activities, and for sales outlets; <p>https://lusionofre.com/virtual-store/</p>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Virtual, augmented and mixed reality</h3>
<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Virtual, augmented and mixed reality</h3>	<p>SHOES YOUR LIFE NEW EDUCATIONAL APPROACH TO STEAM-ASEL</p> <h3>Virtual, augmented and mixed reality</h3> <p>GREAT IS VIRTUAL REALITY</p>

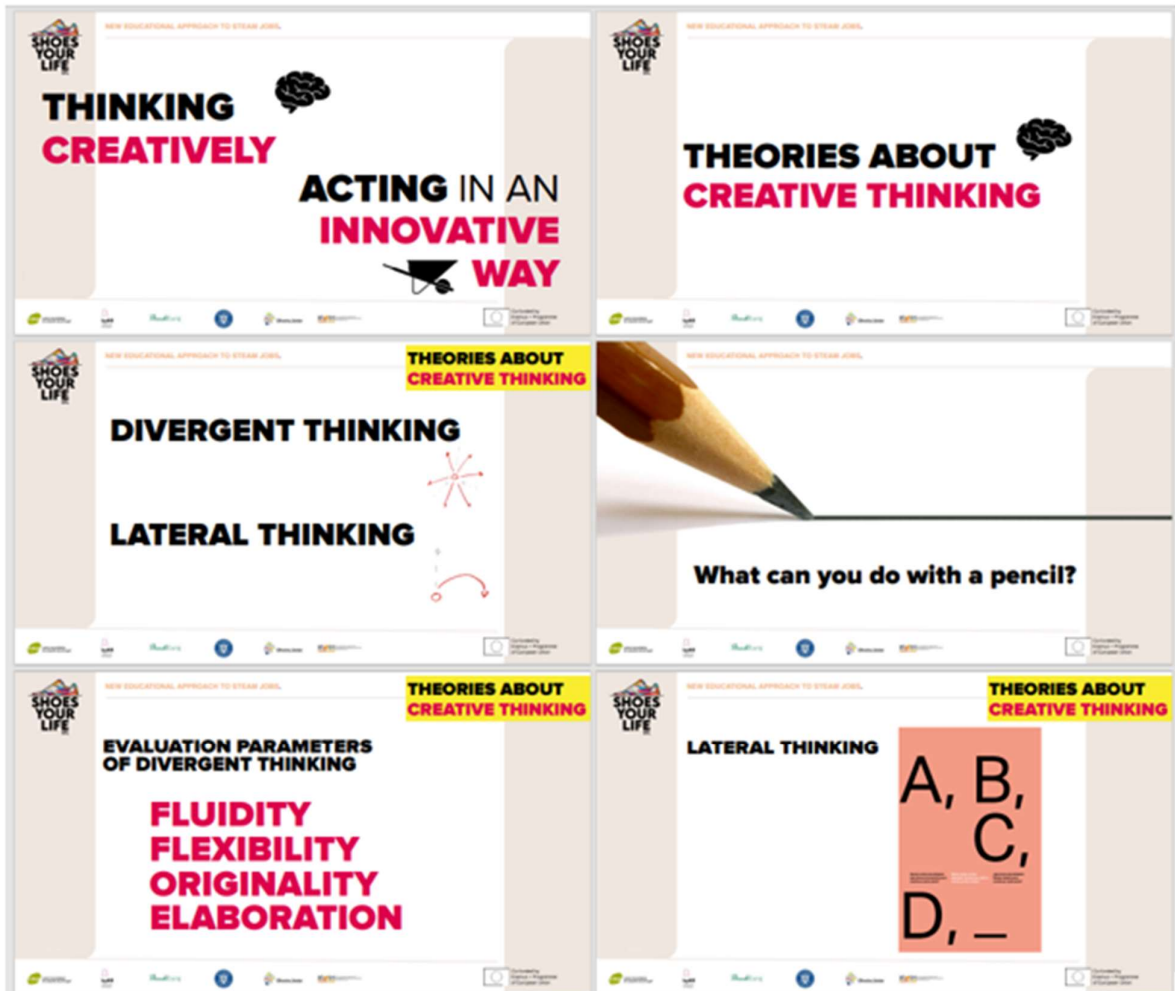
<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>3D printing / prototyping</h3> <ul style="list-style-type: none"> — Additive manufacturing for prototyping, modular design and testing. — Allows for rapid prototyping and interactive design — At the same time, can also be use to manufacture bespoke tools and even for maintenance of equipment. — Personalization with reduced costs.  <p>Source: CTCP</p>	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>3D printing / prototyping</h3>  <p>Source: CTCP</p>
<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>2D/3D modelling and Co-design</h3>  	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>2D/3D modelling and Co-design</h3> <ul style="list-style-type: none"> — Co-design allows for a collaboration along the process of designing a product between the manufacturer and the client. — Client can participate in the design along the various steps shaping the final product complying the manufacturer limitation. Manufacturer can design a product from the start with the collaboration of the client better fulfilling their expectations.  <p>https://youtu.be/mbr7w2NGpmw</p>
<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>IoT (internet of things)</h3> <p>Internet of things inter-connecting machines with embedded electronics, sensors, actuators and network connectivity allowing these devices to collect and exchange data. RFID tags can give an identity to each product or object attached with all data accessible by terminals connected to the cloud.</p> 	<p>SHOES YOUR LIFE</p> <p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <h3>Cloud computing</h3> <ul style="list-style-type: none"> • Big data and cloud computing: With the use of big data and cloud computing, the information retrieved through these networks can be used to model, virtualize and simulate products and manufacturing processes; • Managing all the data collected allowing real-time information processing, analysis and sharing;

<p>Technologies and processes related to the i4.0 application</p> <p>In addition to the main items described before, several key technologies are available for 4.0 implementation:</p> <ul style="list-style-type: none"> — Machine to machine communication for autonomous production allowing the use of advanced robotics; — Advanced human-machine interface for collaboration between human and machines in a safe and productive environment; — Data mining for the analysis of the large amount of data collected for advanced decision making based on real-time data and predictive analysis; — Enterprise resource planning (ERP) and business Intelligence based on interconnected and controlled production processes; — Smart factories where everything is connected supported on CPS, IoT and cloud computing. 	<p>How i4.0 technologies can benefit the footwear industry?</p> <ul style="list-style-type: none"> — Supply chain and warehouse management processes – real-time tracking of demand, order fulfillment, manufacturing flow, returns, etc. — Production lines – real-time control of performance, durability and safety of the products with a higher degree of automation and efficiency. — Predictive maintenance – real-time monitoring of industrial manufacturing devices allows companies to predict when maintenance is required. — New business models through real-time data that makes decision-making processes more efficient and effective. — Innovation in products – use of new materials and manufacturing processes with less waste and a more sustainable approach. — Innovation in sales and client engagement – use of modelling, augmented reality and virtualization both in production or as a mean to contact the client.
	<p>Opportunities</p>
<p>Industry 4.0?</p>	<p>Industry 4.0? Transformation in industry!</p>
<p>Thanks</p> <p>Cristiano Figueiredo cristiano.figueiredo@ictp.pt</p> <p><small>The European Commission's support for the production of this publication does not constitute an endorsement of the contents, which reflect the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.</small></p>	<p>References</p> <p>Source: www.feetin4.0.eu</p>

CREATIVITY & INNOVATION

The image displays six presentation slides arranged in a 3x2 grid, each with the 'SHOES YOUR LIFE SYL' logo in the top left corner and a footer with various logos. The slides are as follows:

- Slide 1 (Top Left):** Titled 'CREATIVITY' in large red letters. Below it, the text reads: 'CREATIVITY? CREATIVE THINKING? INNOVATION?'.
- Slide 2 (Top Right):** Titled 'CREATIVITY' in large red letters. Below it, the text reads: 'Who here in the room is creative? Creativity is an intrinsic capacity of human beings. The question is not whether we are creative, but how we can be even more so. We are creative when we create!!! When we create a lot, we are very creative.'
- Slide 3 (Middle Left):** Titled 'CREATIVE THINKING' in large red letters. To its right, the text reads: 'Cognitive capacity of a system (individual, group, company) to produce and transform knowledge and ideas to create social, technological, economic, educational and cultural value, for a certain context.'
- Slide 4 (Middle Right):** Titled 'CREATIVITY' in large red letters. To its right, the text reads: 'Capacity of a living system (individual, group, company, country) to create novelty and to evolve.'
- Slide 5 (Bottom Left):** Titled 'CREATIVITY SYSTEMIC CAPACITY' in large red letters. Below the title is a diagram showing three overlapping circles: 'DOMAIN' (red, top), 'FIELD' (green, left), and 'INDIVIDUAL' (yellow, right). Arrows indicate interactions: 'Selection of new ideas & Evaluation of innovation' between Domain and Field; 'Exchange of knowledge' between Domain and Individual; 'Stimulates novelty' between Field and Individual; and 'Product innovation' between Field and Individual. Below the diagram, it says '(Aldop Cabacinskihaly, 1998)'. The text 'CREATIVITY SYSTEMIC CAPACITY' is also present on the left side of the slide.
- Slide 6 (Bottom Right):** Titled 'INNOVATION' in large red letters. To its right, the text reads: 'The practical application of the new ideas with a view to achieving the objectives of a context (company, target audience, market, society) in an effective way.'



<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>THEORIES ABOUT CREATIVE THINKING</p>	<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>CREATIVE THINKING PROCEDURES</p> <p>CREATIVE THINKING Techniques</p> <p>ASSOCIATIVE THINKING - Brainstorming</p> <p>COMBINATORIAL THINKING - Forced Relationship</p> <p>THINKING IN COMPARISON - Analogies</p>
<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>ASSOCIATIVE THINKING</p> <p>milk</p> <pre> graph TD milk --> cow milk --> glass cow --> tit glass --> jug </pre>	<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>ASSOCIATIVE THINKING</p> <p>water</p> <pre> graph TD water --> washbasin water --> sea washbasin --> drain sea --> sink drain --> plug sink --> help </pre>
<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>ASSOCIATIVE THINKING - Brainstorming</p> <p>foot</p>	<p>NEW EDUCATIONAL APPROACH TO STEAM JOBS</p> <p>COMBINATORIAL THINKING - Forced Relationship</p>

NEW EDUCATIONAL APPROACH TO STEAM JOBS

COMBINATORIAL THINKING - Forced Relationship

THINKING IN COMPARISON - Analogies

THINKING IN COMPARISON - Analogies

THINKING IN COMPARISON - Analogies

THINKING IN COMPARISON - Analogies

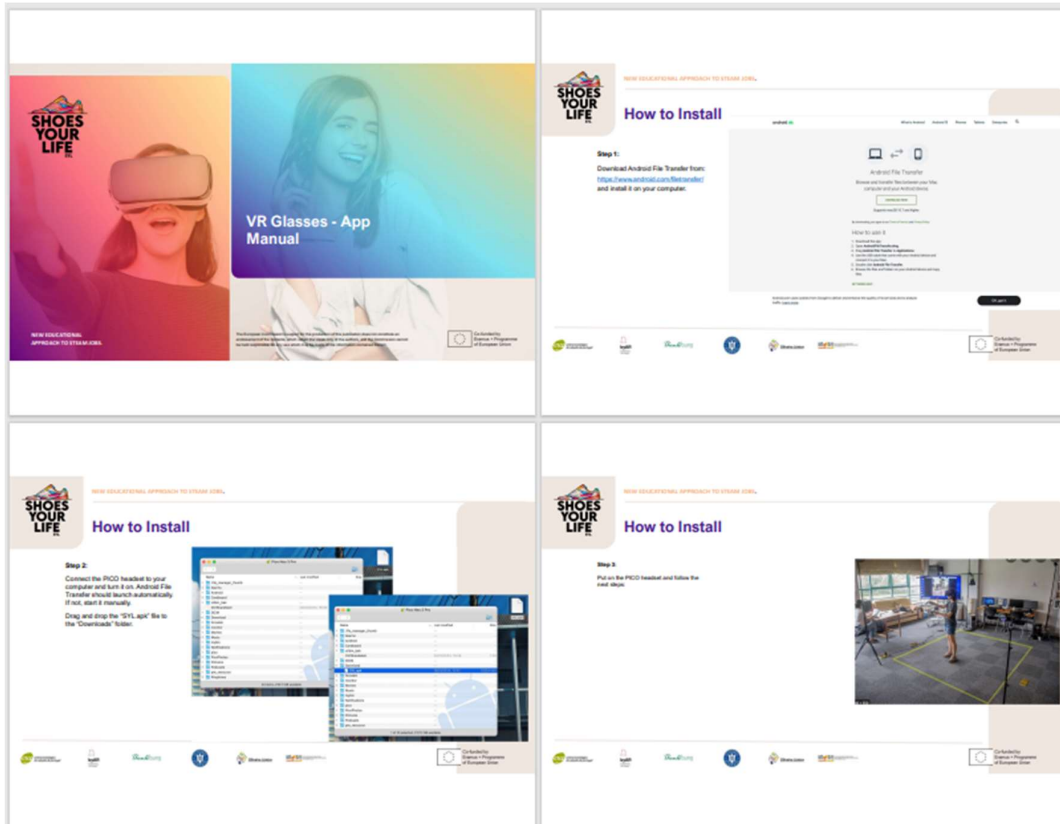
THINKING IN COMPARISON - Analogies





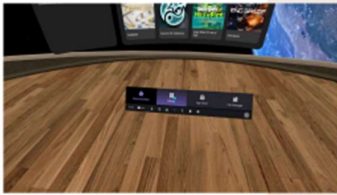




Obrigada

Co-funded by the European Union

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

Annex 2 – VR App Manual (copy)



	
	
<p>How to Run</p> <p>Put on the PCOD headset and go to the Library.</p> 	 <p>How to Run the App</p> 
<p>How to Run</p> <p>Look and select the Shoes Your Life application.</p> 	 <p>Setting VR Glasses</p> 