



# INTEGRATED ITINERARY GUIDE

**Jobs4tech: VET & jobs for a technological and virtual future**



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# INDEX

The Project: Jobs4Tech .....	3
Virtual Reality / Augmented Reality .....	4
Competence development .....	6
Vocational training and education.....	7
Spain.....	8
Germany.....	8
Estonia.....	9
Lithuania.....	9
Integrated Itinerary.....	9
Experts, employees and teachers point of view .....	10
Current stage regarding VR in VET .....	10
Current stage regarding entrepreneurial skills in VET .....	10
Implementation of the common itinerary .....	10
Objectives.....	11
Contents .....	11
Methodology.....	12
Soft and hard skills integration: .....	12
Contents.....	16
MODULE 1.....	16
MODULE 2.....	17
MODULE 3.....	18
MODULE 4.....	20
MODULE 5.....	21
References.....	23





## THE PROJECT: JOBS4TECH

*What is J4T? Where it comes from? What are the objectives of the project? Who is involved? Which is its objective?*

In June 2016 the European Commission launches the New Competencies Agenda for Europe, which sets in motion a series of measures to ensure that the "Coalition people of the European Union have the training, skills and adequate support with the ultimate goal of promoting the process of finding quality jobs and improving people's opportunities. Specifically, one of the initiatives proposed for digital skills and jobs", a measure that aims to promote people's digital talent. The fact is that the new technologies sector has become an emerging sector for employment and entrepreneurship and has become a fundamental sector of economic and social activity in recent years.

At a European level, the promotion of digital talents for the development of the Digital Single Market, for European competitiveness and for our digital society to remain inclusive is considered crucial. According to the Commission, up to 500,000 professionals of Information and Communication Technologies (ICT) may be missing by the year 2020.

Education, particularly vocational training and education are a mean of adjusting technological competences with respect to the needs of the labour market in the new technologies sector. Specifically, the sub-sector of virtual and augmented reality has emerged as one of the most relevant visualization technologies according to the development of the sector in the coming years.

Jobs4Tech has carried out an analysis of vocational education and training offer in the sector, that points at an update as an imminent need, since this sector suffers from being one of the sectors which professional qualifications are less assimilated in the reality of the labour market. It has been contrasted with the partners of the project that the current training offer for ICT does not include content of new trends in the sector, such as virtual and augmented reality.

The demand of the companies in the sector, with respect to their future workers, is that they have social skills and competencies such as leadership, motivation, perseverance, flexibility, communication, etc. Focusing on the development of skills and abilities aimed at a specific sector, in this case the virtual reality subsector, ensures its better assimilation, greater effectiveness of training and a more complete response to what companies demand in profiles of these characteristics. Vocational Training includes subjects oriented to career guidance and orientation, but they lack a transversal skills development approach, and these are not addressed directly in the itineraries.





The integration of transversal skills required for the sector, as well as technical competencies related to the latest trends, will comprehensively cover the labour market demands of new technologies and will ensure the best inclusion of VET students in the technological labour market of the future.

This need detected at European level has been contrasted with the project partners. Along with their contributions in the preparation phase of this project, it has been designed, considered by the partners as strategic.

Therefore, the **general objective** of Jobs4Tech is to align Vocational Education and Training (VET) with the needs of the labour market in the new technologies sector, and specifically in virtual and augmented reality, to improve the employability of its students.

The **specific objectives** are:

- To adapt and integrate the competencies for employment and entrepreneurship to the technical competences within the VET in the technological subsector of virtual and augmented reality.
- Support the professional development of VET teachers and other professionals in the sector through the development of the competency approach and the updating of its technical contents in terms of virtual reality.
- Improve and evaluate the key competences of VET students in the new technologies sector.
- Encourage transnational cooperation between organizations representing VET at European level, entrepreneurship and the public sector, to promote and disseminate inclusive and innovative pedagogical approaches in the field of new technologies.

## VIRTUAL REALITY / AUGMENTED REALITY

*What is Virtual Reality? What are its origins? What is its impact today? What is the importance of this technology in the present? How is the future of the RV anticipated? In which sectors will it impact or is it impacting more strongly? What is its impact on employability in the short/medium term? VR/AR in education*

Virtual Reality is the universe of objects, environments or elements created virtually in 3 dimensions by computer and that need an auxiliary technological device either of emission or of perception to be perceived and interacted by people: virtual reality glasses, computers, mobile devices, tablets, projectors.





Virtual Reality implies the possibility of interaction by the user; at least the three-dimensional movement capacity of the observer with respect to the observed and vice versa, as it would happen in an environment or with a real object in which a person can move around a room or pick up an object and move it, rotate it and see it from any angle and distance.

Key aspects linked to VR/AR system are: Immersion, Interaction, and Visual Realism. Immersion is created by surrounding the user with virtual technologies and devices, e.g. virtual glasses, gloves, haptics (movement feedback sensors), HMDs (head mounted displays), surround/ambisonics sound, and any other elements creating sensorial stimuli that enables the user to interact with a virtual environment.

Virtual Reality simulates the physical presence of the user in a virtual environment, which is categorized as sensory-motoric, cognitive, and emotional. However, VR also creates an immersive 3D spatial experience when the user perceives that he or she belongs in the virtual world. To be credible, this perception requires real-time interaction, so that the user gets instant feedback from his or her movements, position, and sensations. This feedback permits the user reacting and sending commands to a computer by using trackers, gloves, keyboards, or any other input device simulating real-world user's reactions. Output devices (visual, aural, or haptic) should create a realistic illusion, so that hardware and software should be able to render detailed and realistic virtual scenarios, and have to handle geometry, texture, and physical models to be credible and accepted.

Among other things, Virtual Reality allows us to introduce another type of interaction never seen between the customers and the company, a much more visual and ground-breaking communication; therefore, it can contribute a lot to the development of a business idea.

Humanity is at the beginning of a Fourth Industrial Revolution which is building on both VR & AR applications and solutions. The changes to the way we teach, and the curriculum needed to support innovative time is required to support the graduating generations into a workforce rapidly changing and evolving using digital applications not yet taught in our schools' systems. Day to day operations and day to day systems will be using VR and AR systems to be engaged in the operations.

VR & AR for Education is mandated for the following reasons:

- To engage our current students and future generations in this Digital Age
- To provide education of the tools, the technology, the applications of VR & AR to be used in future jobs
- To provide best practices for the classrooms
- To provide engagement tools for Students, Parents & resources for Teachers & Mentors
- To be the leader and resource of VR & AR applications that relate to extending knowledge to support the application, build or creation of the technology to use in our everyday lives







VR refers to a completely simulated reality, which is built with computer systems by using digital formats in immersive environments. Building and visualizing this alternative reality requires a specific hardware and software.

AR superimposes synthetic digital elements like 3D objects, multimedia contents or text information onto real-world images; increasing its possibilities of interaction with the user. (ie. Pokemon Go).

## COMPETENCE DEVELOPMENT

*What are the competences for employment and entrepreneurship? What is the importance of competencies in professional development? What are the key competencies we work with? How have we arrived at these key competencies in the ICT sector? How do we work for their development?*

The European Commission has proposed 'A New Skills Agenda for Europe: Working together to strengthen human capital, employability and competitiveness' to address the skills challenges that Europe is currently facing. The aim is that everyone should have the key set of competences needed for personal development, social inclusion, active citizenship and employment. These competences include literacy, numeracy, science and foreign languages, as well as more transversal skills such as digital competence, entrepreneurship competence, critical thinking, problem solving or learning to learn.

The Entrepreneurship Competence Framework, also known as EntreComp, offers a tool to improve the entrepreneurial capacity of European citizens and organisations. The framework aims to build consensus around a common understanding of entrepreneurship competence by defining 3 competence areas, a list of 15 competences, learning outcomes and proficiency levels, which current and future initiatives can refer to."

The origin of EntreComp goes back to 2006 when the 'Recommendation on key competences for lifelong learning' identified a 'sense of initiative and entrepreneurship' as one of the 8 key competences for all citizens (European Parliament and the Council, 2006).

Sense of initiative and entrepreneurship can be broadly defined as the capacity to turn ideas into action, ideas that generate value for someone other than oneself. Sense of initiative and entrepreneurship is a transversal key competence, which every citizen needs for personal fulfilment and development, active citizenship, social inclusion and employment in the knowledge society (JRC.EntreComp)".





Competencies for the labour market, which increase the employability of the student, have an eminently technical variable (companies require workers with specific and innovative knowledge), but also in transversal skills, very important at the labor level, although less specified.

The general objective of Jobs4Tech is to align Vocational Education and Training (VET) with the needs of the labour market in the new technologies sector, specifically in virtual reality, and the necessary soft skills to improve the employability of its students.

To achieve the results of the project each partner had to carry out a needs analysis in order to detect relevant skills for the labour market in the ICT sector. The results are the basis for the training activities of the project.

Each partner carried out an analysis of the professional families and the subjects where the technical training contents on virtual reality should be integrated, as well as the training in skills for employment and entrepreneurship delivered in the VET centres in the new technologies sector. Additionally, we asked the opinion of experts and companies of all the partner countries regarding competences considered as most needed in this sector, being able to prioritize and/or add others. Teachers, employers and experts were asked to participate in the survey; their feedbacks were analysed, and outcomes are reported for each partner country. The interviews were divided in two parts. The first part focuses on Virtual Reality (VR) skills; the second part on entrepreneurial and social skills.

The results of the results of interviews and VET offer analysis helped the identification and development of contents of integrated itinerary of virtual reality.

## VOCATIONAL TRAINING AND EDUCATION

*What is VET? VET at European level? What are the objectives of VET? What is the relationship between VET and the companies? What is the relationship between VET and employment/entrepreneurship? What is the employability data for VET graduates?*

Vocational education serves the purpose of fostering the knowledge, skills and attitudes, occupational know-how and the social readiness required for working, participating in social life and participating in the lifelong learning process. Vocational training is organized by vocational educational institutions and professional higher education institutions.

Vocational Education and Training (VET) partners with industry and government should provide people with workplace skills and technical knowledge to help them advance their career, now and in the future.





The European Centre for the Development of Vocational Training – Cedefop is helping to develop the right policies to provide the right skills.

Cedefop is one of the EU's decentralised agencies. Founded in 1975 and based in Greece since 1995, Cedefop supports development of European vocational education and training (VET) policies and contributes to their implementation. The agency is helping the European Commission, EU Member States and the social partners to develop the right European VET policies.

Europe's strategy for 2020 is a route for smart, sustainable and inclusive economic growth through knowledge and innovation, which sets an employment rate target of 75%.

The success of this strategy depends on the skills of Europe's workforce. Enterprises need people with the skills required to compete and provide high-quality goods and services.

People need the right qualifications to find jobs. People with low levels of education or no qualification are nearly three times more likely to be unemployed than those with high qualifications. In the EU, around 75 million people, nearly a third of the working population, have low levels of or no qualification. Too many young people, around 15%, leave school without any qualifications.

## Spain

VET diplomas in the Spanish education system are divided in three levels:

- Basic Vocational Training
- Intermediate Vocational Training
- Advanced Vocational Training

With regard IT Sector, diplomas are more oriented towards the use of new technologies and those whose syllabus may have room for virtual reality subjects, which are:

- Image and sound
- Computer science
- Construction and Civil Works
- Electricity and Electronics

## Germany

In the VET dual system there are around 326 professions which can be assigned to either the professional field of craft or the professional field of industry & commerce.

Out of these professions there are four accounted ICT-professions:

- IT Specialist
- IT System Electronics Technician







- IT System Support Specialist
- Information Technology Officer

## Estonia

Vocational training offers the opportunity to study according to initial and continuing curricula. VET curricula in Estonia are based on professional standards, positioned between EQF levels two to five.

There are four professional standards for ICT:

- IT support specialist, EQF level 3
- IT-systems specialist, EQF level 4
- Junior software developer, EQF level 4
- ICT Security Specialist, EQF level 5

Curricula's based on level 4 standards provide level 4 qualification in two or three years. Three years of studies volume is 180 credits, including at least 60 credits of general education.

## Lithuania

Vocational schools provide both training leading to a qualification, and basic or secondary education. VET programmes are delivered as:

- programmes at lower secondary education (ISCED 2 level) for learners having no lower secondary education;
- programmes at upper secondary education (ISCED 3C level) for learners having completed lower secondary education and not seeking to complete upper secondary general education;
- programmes at upper secondary education (ISCED 3A level) for learners seeking to complete upper secondary general education;
- programmes at post-secondary education (ISCED 4 level) for learners having completed upper secondary general education.

Vocational education in Lithuania offers five specialization directions in ICT area.

- Computer basic usage training programme
- Computer-aided-design operator programme
- Computer technician of business enterprise
- Computer graphics design operator training programme
- Java developer training programme
- Computer equipment specialist training programme

# INTEGRATED ITINERARY

*How do we insert the VR and the competence development in VET? Is VR already introduced in VET? What is the need to introduce it? Is competences development currently integrated in VET? What is the importance of the competence development?*





## Experts, employees and teachers point of view

### Current stage regarding VR in VET

The national points of views are from “VR plays a less important role in companies” to “VR in industry is key for training and risk scenarios simulations”. But nevertheless, in all partner countries VR is acknowledged as a technology which could gain importance within the next years. The teacher’s partners interviewed have either “no experiences with VR” or “low/basic level knowledge”. The problems to overcome are mostly how to integrate VR in the teaching process as well as a teaching subject, and the lack of the necessary equipment (Hardware, software to create content for VR).

Another hurdle for using VR in classroom is financial as it implies an elevated equipment cost. Also, teachers agree that using VR requires more extensive/ time consuming preparation and they do not have enough experience in using VR for teaching. For them is very important to know/learn how to produce something (prototype). VR in industry is key for training and risk scenarios simulations and offers the potential to significantly improve practical and job-related learning in vocational training. Components and internal processes can be made visible like the case example “maintenance of a machine”. Simulations offer the possibility of multiple repetition with direct visual and auditory feedback, allowing learning from mistakes without concern for real consequences.

### Current stage regarding entrepreneurial skills in VET

The other main aspect of the project is not only improving the technical level of proficiency in the use of ICT/VR but also to direct towards pedagogy and subject matter. Beyond subject related knowledge the training should complement the specific on-the-job skills with broader, transversal and transferable skills, since work is getting more complex and in flux and requires flexibility, initiative, creativity, the ability to take on many different tasks - and to learn from own doing and experience. Employers emphasize skills as being important in turning technical skills into economically productive ones and demonstrating entrepreneurial characteristics and work habits. The transversal and transferable skills are defined in contrast to specific skills, as not being tied to any particular company, sector or work process but as being applicable to a wide range of educational and professional situations.

### Implementation of the common itinerary

The team needed for VR is multidisciplinary since most tasks require the combined use of (interdisciplinary) knowledge in different forms “building/connecting bridges”. These activities engage students to work on tasks and experience processes of knowledge construction and use, while developing new literacy at the same time. Based on participatory and project-based methods the itinerary will help apprentices/students to understand why they are doing something rather than





doing something because they have been told so. They will gain insights and ideas for new ways of doing things; questions provoke new insights, connections, possibilities, and helps to discover new directions by making connections across seemingly unrelated questions, problems, or ideas.

The methodology will be learning by doing, group training, theory-practice session, individual and team working on a project including and dealing with different views. The project-based learning involves both vertical learning (cumulating of subject matter knowledge) and horizontal learning (generic skills). The essence of project-based learning is that a question or prototype (in our case) serves to organize and drive activities; and these activities culminate in a final product that addresses the driving question. The objectives include developing problem-solving abilities, creativity, flexibility and a capacity for independent work. The most distinctive feature of our project-based learning is working on and elaboration of a prototype.

Based of suggestions and recommendations an introduction of basic aspects of VR could be useful before starting with the training, as:

- What VR is?
- How to introduce this tool in the different business?
- What could be the benefits of it?
- Different usages

## Objectives

General objective of the integrated itinerary is to align Vocational Education in ICT sector with the needs of the labour market in new technologies sector, in virtual and augmented reality and to improve the employability of these students.

Specific objectives are:

- to create a content for learning related to virtual and augmented reality
- to adapt of competencies To fit skills for employment and entrepreneurship to in the ICT sector
- to support the professional development of VET teachers through the development of the competency approach and the technical knowledge and skills in VR/AR
- to provide knowledge and skills in new technologies integrated with employability and entrepreneurship skills for ICT students

## Contents

The integrated itinerary we propose for VET centres contains five modules that can be combined according to needs and level of students. There are four possible learning results depending on the level of the students in terms of programming and other technical skills:

1. Students will make the VR project by themselves
2. Students will make the VR project with considerable help
3. Students are not able to make the VR project but can reach a lower lever project





4. The teacher will do the VR environment with the students' inputs

All modules have both technical and competence objectives.

## METHODOLOGY

*Why an integrated itinerary in VET? How do we do this?*

The main reasons for an integrated itinerary are:

- Virtual and Augmented reality contents do not need to be arranged in a new degree but can easily fit in already existing ones. Integrating them in ICT trainings such as IT Support or Computer sciences requires of a planned intervention, with defined contents and learning outcomes.
- Employment and entrepreneurial skills related to the VR/AR field need to be present if our main goal is to foster employability. However, they can not be taught as something disjointed, unconnected or not related to the technical content: it is vital that they are seen and learnt as crucial skills for them to become full professionals in the field.

Therefore, the idea of an integrated itinerary emerges as the best way to provide students with knowledge and skills for the Virtual and Augmented reality sector that also works as an asset and added value to their general ICT training and provides a practice scenario for their teamwork, creativity and motivation.

The whole itinerary is based on Project Based Learning (PBL). It prepares students for academic, personal, and career success, since students gain knowledge and skills by working for a given timeframe to investigate and respond to an authentic, engaging, and complex question, problem, or challenge.

During the itinerary, students will be given the chance to think of a real problem that could be answered by this new technology. All contents, both hard and soft, will be absorbed and assimilated with a practical perspective since they will be implemented in their project idea from the beginning.

### Soft and hard skills integration:

Making students aware of the importance of building up soft skills is a fundamental step. It is a must to help students see how they both work to make better professionals, and this exercise has to be done from the beginning of the itinerary if we want soft skills to be understood, perceived as important and developed accordingly.





The “hard” is what you know and can do, the “soft” is how you do it



THE PROFESSIONAL HANDSHAKE

Based on the Entrecomp and taking into account teachers', experts' and employers' perception, eight soft skills were outlined as the most important for the Virtual and Augmented reality sector:

1. Creativity
2. Working with others
3. Vision / Association
4. Mobilizing others / Leadership
5. Oral and written expression
6. Planning and management / adaptation to change
7. Mobilization resources / reaction
8. Motivation and perseverance, tenacity, resilience

Along the 5 modules, the technical content unfolds in a coherent way starting with an approximation to the topic, analyzing students' previous knowledge and interest to then further move from basic concepts to more complex ones along the itinerary.

As for the soft skills, they are suggested to be introduced and worked in the classroom as a response to a project cycle and considering which one is more relevant in each moment.

PROJECT PHASE	SOFT SKILLS INTEGRATION
MODULE 1 Conception and initiation of the project	<ul style="list-style-type: none"> <li>• Vision</li> <li>• Teamwork</li> </ul> <p>From the beginning, students must work on their vision as the ability to see how their work (their project in this case) can solve bigger problems and let</p>



	<p>this aim drive their efforts along the journey. If it is understood and well-built from the beginning, this skill will work as a trigger of their motivation and persistence when difficulties arise.</p> <p>The ability to work on a multidisciplinary team is a great asset to the VR sector. This skill is transversal and will be developed along the itinerary, but awareness on the importance of building teams based on individual talents should be managed from the first day. Fostering cooperation, helping each member to contribute with their talents and learn from the others' is something we considered crucial at this point.</p>
<p><b>MODULE 2</b></p> <p>Definition of the project</p>	<ul style="list-style-type: none"> <li>• Detect Opportunities</li> <li>• Creativity</li> </ul> <p>Virtual Reality is an emerging sector and thus, opportunities in this field are wide and ready to be explored. When starting to develop a project idea, it is very important to go further, be opened to find new uses and connections of the idea on different fields, make new contacts that can be useful for your project and overall, be ready to learn and flexible to adapt these new opportunities to your plan.</p> <p>Creativity is one of the skills that experts and companies value the most in their teams. Helping students to think out of the box and in terms they have not done before is both challenging and very motivating when they get to it. Students must be encouraged to question themselves constantly "Is there another way to think about this?", "Can this be done in a different way?". In schools, it is important to dismiss the idea of creativity = building something from scratch, but to change, improve or find new uses to already existing things.</p>
<p><b>MODULE 3</b></p> <p>Planning and executing</p>	<ul style="list-style-type: none"> <li>• Planning and management</li> <li>• Take the initiative</li> </ul> <p>Planning and management is one of the most relevant skills in the sector. Through tools like SMART planning, SWOT analysis and action plans, students start to define their actions, take meaningful steps and revise their progress. It helps them focus their efforts in the most needed times, monitor and coordinate their work with the rest of the team.</p> <p>Taking action when your project is stuck, making decisions, finding solutions and anticipating problems is a skill that students must acquire and master in their process of becoming professionals of any given sector. Along the execution of the project, many challenges will need of this skill to be solved and training it will be a long term benefit.</p>





	<div> <div>PLANNING AND MANAGING</div> <div> </div> </div>
<b>MODULE 4</b>  Performance and control	<ul style="list-style-type: none"> <li>• Motivation and perseverance</li> </ul> <p>As the project unfolds, keeping motivation up can be challenging. For this we integrate the “Motivation roller coaster” or “Motivation phases” so they learn how when we work in a given task, we will face pessimism and despair. Understanding this as something common and connecting again with the Vision we worked on the first module can help generate new strategies for persisting and not giving up.</p>
<b>MODULE 5</b> Project closure	<ul style="list-style-type: none"> <li>• Communication</li> <li>• Mobilize the others</li> </ul> <p>These skills go together as communication is the main tool to mobilize other and generate leadership. Learning storytelling strategies to promote your project or your professional profile, getting acquainted with assertiveness and conflict resolution as well as developing negotiation skills to get other people interested in what you do, is a key of this integrated itinerary.</p>

Students will develop the skills and understand their importance they have when they see how they impact in the development of the technical project in Virtual and Augmented reality and teachers should be able to connect both hard and soft skills to deliver a training that joins them and make them one.



# CONTENTS

## MODULE 1

MODULE 1	<p>Introduction to VR/AR/MR Technology, trends and market opportunities.</p> <p>In this module, we will cover the basics of VR/AR. We will start by sharing a definition of VR/AR, and exploring VR hardware, and then students will try different demonstrations of a range of VR Head</p>
<i>Skills</i>	<p>Introduction to work by competencies/skills: What are the key competencies, skills to develop, train the teachers, methodology...</p> <p>Skills to train:</p> <ul style="list-style-type: none"> <li>• Vision</li> <li>• Teamwork</li> </ul>
<i>Technical objectives</i>	<ul style="list-style-type: none"> <li>• Understand the fundamental concept and components of VR/AR. History of VR, primary features and present development on VR/AR.</li> <li>• Understand in detail the VR/AR associated technology, identifying application environments and market &amp; job opportunities.</li> </ul>
<i>Competence objectives</i>	<ul style="list-style-type: none"> <li>• Introduce the competencies to train and to get to know their level of acceptance and development among the participants.</li> <li>• Determine which roles the participants could play and how to create teams based on them.</li> </ul>
STRUCTURE	CONTENT AND DEVELOPMENT
<i>Competence Dynamic</i>	<p>Teamwork.</p> <p>Dynamic to facilitate the positioning of roles and the constitution of work teams.</p>
<i>Dynamics Development &amp; Live Session</i>	<p>Classroom schedule:</p> <ul style="list-style-type: none"> <li>• Class introduction: <ul style="list-style-type: none"> <li>○ Video_M1_00_2019 (Intro to VR/AR)</li> <li>○ Video_M1_01_2019 (The Future World 2025)</li> <li>○ Video_M1_02_2019 (New Technologies)</li> </ul> </li> <li>• Lecture: Module_01_2019 (Presentation) <ul style="list-style-type: none"> <li>○ Introduction to VR/AR/XR</li> <li>○ Market opportunity</li> <li>○ VR/AR landscape</li> <li>○ VR technology</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ VR history</li> <li>○ Understanding sensors</li> <li>○ VR/AR/XR definition</li> <li>○ VR ecosystems</li> <li>○ VR devices</li> <li>○ Future jobs opportunities</li> <li>• In-Class assignment / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 1 / Module Activity: Define a real application environment and design a VR ecosystem for the classroom</li> </ul> </li> <li>• Self-Study <ul style="list-style-type: none"> <li>○ Videos / Tutorials</li> </ul> </li> <li>• VR final project / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 2 / Final Project: Building teams, configure roles and tasks for the Final VR Project. Identify potential projects to develop, identify necessary infrastructures, project plan.</li> </ul> </li> </ul>
MATERIALS AND RESOURCES	
Documents, presentations, videos, personal laptop, blackboard, HMD.	

## MODULE 2

MODULE 2	<p>VR/AR educational ecosystem, immersive environments, project methodology.</p> <p>In this module, students will learn more about the different applications of VR- from industry, simulators, to sports, therapy, and games. Students will also learn more about the VR Technical Framework, and will have the opportunity to share their thoughts on VR applications with peers.</p>
<i>Skills</i>	<p>Competencies to train:</p> <ul style="list-style-type: none"> <li>• Detect Opportunities</li> <li>• Creativity</li> </ul>
<i>Technical objectives</i>	<ul style="list-style-type: none"> <li>• Understand the VR ecosystem, identify the different components, tools, resources, immersive environments, libraries and assets</li> <li>• Understand and design project and content creation, methodologies</li> </ul>





Competence objectives	<ul style="list-style-type: none"> <li>• Develop creative projects</li> <li>• Be aware the transversality of the VR</li> <li>• Detect market niches in which to include the VR</li> <li>• Learn how to use the VR to provide solutions to the needs and problems detected</li> </ul>
STRUCTURE	CONTENT AND DEVELOPMENT
Competence Dynamic	Dynamics to work side thinking and creativity to detect VR implementation opportunities
Dynamics Development & Live Session	<p>Classroom schedule:</p> <ul style="list-style-type: none"> <li>• Class introduction: <ul style="list-style-type: none"> <li>○ Video_M2_00_2019 (Real Player ONE VR/AR)</li> <li>○ Video_M2_01_2019 (The first video-game)</li> <li>○ Video_M2_02_2019 (First Virtual Trainer)</li> </ul> </li> <li>• Lecture: Module_02_2019 (Presentation) <ul style="list-style-type: none"> <li>○ VR Educational Ecosystem</li> <li>○ Digital transformation in VR education</li> <li>○ VR/AR contents in education</li> <li>○ Immersive environments</li> <li>○ VR environment for beginners</li> <li>○ VR edu methodology</li> <li>○ VR edu barriers</li> <li>○ VR projects</li> </ul> </li> <li>• In-Class assignment / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 1 / Module Activity: Identify, select and validate a guide of libraries of contents and digital resources to incorporate in the classroom and the project</li> </ul> </li> <li>• Self-Study <ul style="list-style-type: none"> <li>○ Videos / Tutorials</li> </ul> </li> <li>• VR final project / hands-on practice</li> </ul> <p>Assignment 2 / Final Project: Functional design and final specifications of the VR Project. Presentation to the Staff.</p>
MATERIALS AND RESOURCES	
Documents, presentations, videos, personal laptop, blackboard, HMD (Samsung Gear, Oculus Rift, HTC Vive). Office, Unity, Unreal, Maya, Adobe	

## MODULE 3





MODULE 3	VR Authoring tools, Digital resources and Video 360°. In the third module, we will look at content development, immersive environments, digital assets and 3d design, 360 ° Video creation.
Skills	Competencies to train: <ul style="list-style-type: none"> <li>• Planning and management</li> <li>• Take the initiative</li> </ul>
Technical objectives	<ul style="list-style-type: none"> <li>• Identify VR authoring tools and learn the content creation phases of a VR project</li> <li>• Learn how create and integrate assets and 3d models into VR environments</li> <li>• Understand 360 ° Video, Technology, Storytelling in Video</li> </ul>
Competence objectives	<ul style="list-style-type: none"> <li>• To help reflecting on the importance of detecting and taking advantage of the opportunities of the environment.</li> <li>• Work on the need for good project management and planning.</li> <li>• Reflect on the importance of participants and their roles in the team.</li> </ul>
STRUCTURE	CONTENT AND DEVELOPMENT
Competence Dynamic	Dynamic to facilitate the realisation of a good management and planning of the recording of the video, as well as work needs and the roles of each participant for achieving the objectives of the team.
Dynamics Development & Live Session	Classroom schedule: <ul style="list-style-type: none"> <li>• Class introduction: <ul style="list-style-type: none"> <li>○ Video_M3_00_2019 (HP Video Standalone)</li> <li>○ Video_M3_01_2019 (Unity Class assets)</li> <li>○ Video_M3_02_2019 (VR Essential pack)</li> </ul> </li> <li>• Lecture: Module_03_2019 (Presentation) <ul style="list-style-type: none"> <li>○ Authoring tools</li> <li>○ Design, development and deployment</li> <li>○ Creation of 2d/3d assets and modelling</li> <li>○ Digital Resources</li> <li>○ Video 360 ° and integration</li> <li>○ From 2d video to 360 ° video, and volumetric video</li> <li>○ Cameras and accessories. Editing programs</li> <li>○ Immersive Sound</li> </ul> </li> <li>• In-Class assignment / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 1 / Module Activity: Design, scripting and recording of a 360° Video. Pre-production, post-production and editing</li> </ul> </li> <li>• Self-Study <ul style="list-style-type: none"> <li>○ Videos / Tutorials</li> </ul> </li> <li>• VR final project / hands-on practice</li> </ul>



	<ul style="list-style-type: none"> <li>○ Assignment 2 / Final Project: Development of the final project in working groups. Integrate a 360° in a VR Scene</li> </ul>
<b>MATERIALS AND RESOURCES</b>	
Documents, presentations, videos, personal laptop, blackboard, cardboards for exhibitions. Office, Unity, Unreal, Maya, Adobe, Action Director 360°. VR Equipment (Oculus Rift, HTC Vive, Samsung Gear and Cardboard, 360° cameras Samsung and Vuze)	

## MODULE 4

<b>MODULE 4</b>	Virtual Worlds, Haptic Feedback, 5 Senses Learning, Coding. In module four, we will introduce virtual worlds, scenarios and virtual communities, avatars and their use, immersive 3d simulators. We will look at more advanced concepts of VR, like Haptic Feedback and 5 Senses Techniques.
<i>Skills</i>	Skills to train: <ul style="list-style-type: none"> <li>• Motivation and perseverance</li> </ul>
<i>Technical objectives</i>	<ul style="list-style-type: none"> <li>• Understand Environment Modelling in VR, and geometric modelling, Behaviour Simulation, Physically Based Simulation</li> <li>• Learn Interactive Techniques in Virtual Reality, Body Track, Hand Gesture, 3D Manus, 3D Object creation</li> </ul>
<i>Competence objectives</i>	<ul style="list-style-type: none"> <li>• Detect the motivation/demotivation cycles of a project.</li> <li>• Provide keys to maintain motivation, tolerate frustration in project development, and work teams.</li> </ul>
<b>STRUCTURE</b>	<b>CONTENT AND DEVELOPMENT</b>
<i>Competence Dynamic</i>	Having reference to the RV project and attending to other personal projects that each participant has had to undertake in their lives, we will work on the life cycle of a project focused on the motivation/discouragement process that it can generate.
<i>Dynamics Development &amp; Live Session</i>	Classroom schedule: <ul style="list-style-type: none"> <li>• Class introduction: <ul style="list-style-type: none"> <li>○ Video_M4_00_2019 (Immersive Simulator)</li> <li>○ Video_M4_01_2019 (VW Lost in Space)</li> <li>○ Video_M4_02_2019 (VW Inter. Space Station)</li> </ul> </li> <li>• Lecture: Module_04_2019 (Presentation)</li> </ul>





	<ul style="list-style-type: none"> <li>○ Virtual worlds</li> <li>○ Haptic feedback</li> <li>○ 5 Senses learning</li> <li>● In-Class assignment / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 1 / Module Activity: Design a complete activity/project to develop with their students at home. Including instructional design, style guide, templates, resources and devices to be used.</li> </ul> </li> <li>● Self-Study <ul style="list-style-type: none"> <li>○ Videos / Tutorials</li> </ul> </li> <li>● VR final project / hands-on practice <ul style="list-style-type: none"> <li>○ Assignment 2 / Final Project: Development of the final project in working groups. Creating a VR environment with Unreal/ Unity.</li> </ul> </li> </ul>
<b>MATERIALS AND RESOURCES</b>	
Documents, presentations, videos, personal laptop, blackboard, cardboards for exhibitions. Office, Unity, Unreal, Maya, Adobe, Action Director 360 °. VR Equipment (Oculus Rift, HTC Vive, Samsung Gear and Cardboard, cameras 360 ° Samsung and Vuze)	

## MODULE 5

<b>MODULE 5</b>	Case Studies, Best Practices, Entrepreneurship in VR. In module five, we will review some case studies by sectors and best practices from top companies worldwide. Finally, we will present some guidance in entrepreneurship in VR
<i>Skills</i>	Skills to train: <ul style="list-style-type: none"> <li>● Mobilize the others</li> </ul>
<i>Technical objectives</i>	<ul style="list-style-type: none"> <li>● Learn how to identify the needs of a project/client/problem/sector and apply the best and appropriate solution to the real context.</li> <li>● Identify value/money, cost/benefit ratio</li> </ul>
<i>Competence objectives</i>	<ul style="list-style-type: none"> <li>● Work on the final project based on storytelling.</li> <li>● Facilitate communication and persuasion techniques.</li> </ul>
<b>STRUCTURE</b>	<b>CONTENT AND DEVELOPMENT</b>



Competence Dynamic	Students will work from the storytelling the communicative competencies of the participants for the presentation of their projects.
Dynamics Development & Live Session	<p>Classroom schedule:</p> <ul style="list-style-type: none"> <li>• Class introduction: <ul style="list-style-type: none"> <li>◦ Video_M5_00_2019 (VR eSports)</li> <li>◦ Video_M5_01_2019 (VR in Space)</li> <li>◦ Video_M5_02_2019 (VR in Games)</li> </ul> </li> <li>• Lecture: Module_05_2019 (Presentation) <ul style="list-style-type: none"> <li>◦ Case Studies in VR</li> <li>◦ Best Practices</li> <li>◦ Entrepreneurship in VR</li> </ul> </li> <li>• In-Class assignment / hands-on practice <ul style="list-style-type: none"> <li>◦ Assignment 1 / Module Activity: Identify a Case Study, adjusted to an environment/sector of application. Identifying profit/value and ROI.</li> </ul> </li> <li>• Self-Study <ul style="list-style-type: none"> <li>◦ Videos / Tutorials</li> </ul> </li> <li>• VR final project / hands-on practice <ul style="list-style-type: none"> <li>◦ Assignment 2 / Final Project: Development of the final project in working groups. Test, Q&amp;A, integration and validation. Final presentation</li> </ul> </li> </ul>
MATERIALS AND RESOURCES	
Documents, presentations, videos, personal laptop, blackboard, cardboards for exhibitions. Office, Unity, Unreal, Maya, Adobe, Action Director 360 °. VR Equipment (Oculus Rift, HTC Vive, Samsung Gear and Cardboard, cameras 360 ° Samsung and Vuze)	



## REFERENCES

- Erasmus+ Jobs4Tech. O1 Report
- Erasmus+ Jobs4Tech. Project Application
- JRC. “EntreComp: The entrepreneurship competence framework”
- EntreComp <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/entrecomp-entrepreneurship-competence-framework>
- Cedefop <http://www.cedefop.europa.eu/en/about-cedefop>
- Carlos J.Ochoa. VR/AR Association White Paper: Virtual and Augmented Reality Best Practices for Education

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