OBEC

INSPIRING REVOLUTIONARY EDUCATIONAL CREDENTIALS

Chapter III

Gaming, Coding & Technology

One Block for Educational Credentials (OBEC)
2020-1-SE01-KA204-077803

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

OBEC

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ABOUT THE PROJECT

OBEC (2020-1-SE01-KA204-077803) is a KA2 Strategic Partnership co-funded by the Erasmus+ of the European Union. Led by SwIdeas in Sweden, the project gathers partners in Croatia (Regional Develpment Agency of Sisak-Moslavina County - SIMORA), Italy (LAI-MOMO Società Cooperativa Sociale & Università degli studi di Urbino Carlo Bo), Belgium (EURADA - Association Europeenne Des Agences Developpement).

OBEC is an innovative project that aims to explore the potentials of Blockchain technology to promote competency development and recognition of skills and qualifications by creating an innovative system to issue and validate learning credentials on a trial basis. Through this effort, the project's goal is to encourage the professional and academic integration of migrants, exchange students, and individuals with informal and non-formal learning backgrounds.

By contributing to the educational and economic integration of these targeted groups, OBEC envisions to benefit individuals with migrant background, students, teachers, education institutions, and employers. Focusing on the key issue of lack of uniformity and transparency in systems of validation of credentials, it is expected that this effort will result in positive effects in the working context, promoting employability, empowerment, and accessibility to the labour market.

1. INTRODUCTION

During the OBEC project, the partner organizations conducted different upskilling training courses on their facilities in order to test the use of Blockchain Technology for certification purposes on educational contexts. The participants of the training courses were accredited with a certification verified on Blockchain Technology, which makes it trustable, transparent, permanent and directly owned by the learner, who has a personal key to access it whenever (s)he needs. The competences acquired during the training courses are also reflected on the learners' certifications. This process was done through the ECTA platform.

The training courses were developed in 13 modules:

1. Gaming Development - Unity Program
2. Gaming Development - Blender Program
3. How to start a business
4. Create your business Idea and plan
5. How to use Blockchain Technology to verify your credentials
6. Leather good laboratory
7. Tailoring laboratory
8. Soft skills for responsible entrepreneurial mindset
9. Working in a Circular Economy context - upskilling your business and your CV
10. Critical Thinking
11. Logical fallacies, how to recognize them and how to avoid them
12. Coding in classroom
13. Ethical and moral problems of artificial intelligence

1. INTRODUCTION

To allow easy access to the modules content, the 13 modules have been gathered in four different chapters, according to the following topics:

- Chapter 1: Circular Economy & Entrepreneurship
- Chapter 2: Tailoring
- Chapter 3: Gaming, Coding & Technology
- Chapter 4: Logic & Critical Thinking

In this document, you will find the training and guiding materials of the modules included in **Chapter 3: Gaming, Coding & Technology.**
This corresponds to Modules 1, 2, 5, 12, and 13.

For each module, the structure, methodology and other useful information are provided, including the following sections:

1. What? – The topic and description of the course
2. Why? – The motivation and purpose of the course
3. Who? – The target groups
4. How? – The methodology
5. When? – The timing of each component of the course
6. Milestones of the course

Besides, the reader can find all the training materials, including course presentations, facilitator notes and other supporting materials in the **QR codes**. For this chapter, the presentations are available in English.

In this way, OBEC aims to foster the transferability of the presented training courses into other contexts.

1.1. BACKGROUND

The main goal of elaborating and implementing an upskilling set of training courses was to prompt the employability of the participants through the development of different skills, while providing them with a certification built on Blockchain (BC) technology that is trustable and transparent. For that purpose, the already mentioned modules were created. Each partner organization implemented the modules they had the most expertise in.

As Blockchain technology is getting acknowledged for its potentials to bring revolutionary and positive impacts in diverse sectors and to create trusted networks of information with minimum maintenance cost it thus provides an innovative infrastructure that is ideal to secure, share, and verify learning achievements (Smolenski, 2016) in a transparent and secured manner while guaranteeing the individual's privacy and ownership. The goal of the modules embedded by this Training Guide is to introduce the potential of BC for the development of a trusted and transparent system of educational certificates in Europe and explore and apply an existing technology to the educational field.

Furthermore, the use of the ECTA Platform to provide the certifications allowed the inclusion of the acquired competences for each module. Hence, every learner participating in a certain module got a certification with the acquired competences, that are particular to each module.

1.1. BACKGROUND

For designing the competences, the ESCO system was utilized as a reference. ESCO (European Skills, Competences, Qualifications and Occupations) is the European multilingual classification of Skills, Competences and Occupations, a project of the European Commission.

As described by the European Commission "ESCO works as a dictionary, describing, identifying and classifying professional occupations and skills relevant for the EU labour market and education and training. Those concepts and the relationships between them can be understood by electronic systems, which allows different online platforms to use ESCO for services like matching jobseekers to jobs on the basis of their skills, suggesting trainings to people who want to reskill or upskill etc.

ESCO provides descriptions of 3008 occupations and 13.890 skills linked to these occupations, translated into 27 languages (all official EU languages plus Icelandic, Norwegian and Arabic).

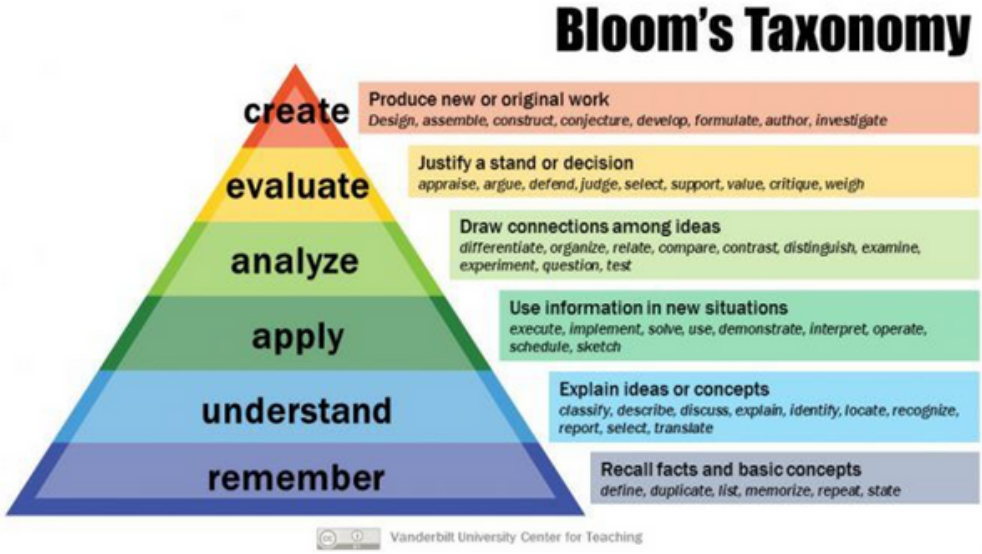
The aim of ESCO is to support job mobility across Europe and therefore a more integrated and efficient labour market, by offering a "common language" on occupations and skills that can be used by different stakeholders on employment and education and training topics".

Therefore, the partner organizations of OBEC used the ESCO competences to define the major competence areas (named "Parent competencies" on the ECTA Platform) that were developed on each module. Then, secondary competences were linked to the major competence areas. An example of that can be:

- Major competence area (Parent competence): Entrepreneurship
- Secondary competences: describe a business idea, develop a business plan, eco-entrepreneurship, etc.

1.1. BACKGROUND

Additionally, the Bloom's Taxonomy was also utilized to design the competences and assign them to a certain proficiency level.
The Bloom's Taxonomy is a hierarchical classification of the different levels of thinking, from remembering to creating, that facilitates the definition of the competence degree that a learner may achieve in relation to a certain task or topic.



Source: https://www.bloomstaxonomy.net/

Thus, OBEC used the Bloom's Taxonomy to define the thinking levels achieved for each competence of each module. Level 1 referred to remembering, while Level 6 referred to creating. Following the previous given example:

- Major competence area (Parent competence): Entrepreneurship
- Secondary competences: describe a business idea (Level 2 - understanding), develop a business plan (Level 6 - creating), eco-entrepreneurship (Level 2 - understanding), etc.

1.1. BACKGROUND

Last but not least, it is worth mentioning that these training courses and the testing of the certification through BC technology are tasks embedded on OBEC's second intellectual output, which builds on the preliminary findings of OBEC's first intellectual output, Naming the Barriers, which was dealing with the current European context concerning educational credentials and recognition of competences/abilities, the use of Blockchain technologies, and the potential issues that are present when those technologies are employed. The final point was to obtain a general assessment of the European legal and institutional stance on Blockchain technologies and formal certification of competences.

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2. Modules

2.1. MODULE 1 – Game development - Program Unity

What?

In the introductory process of the module, participants will get acquainted with the organization and functioning of the educational institution, they will get acquainted with the lecturers, the space in which the classes are held and the equipment they will use.

Games are most often made and developed by teams that can consist of a smaller group of people rather than a few of them or even an individual himself. Everyone on the team has some role to play in the development of the game. Designers create goals, rules, appearance and role of the game, are responsible for all aspects of the development of the game (from its beginning and the very end), create visual elements of the game (characters, landscapes, objects, vehicles, clothing, etc.). In addition to the above, they create the very concept of the game, that is, its story. All codes and scripts required in the game are in charge of the developers. Different platforms have different programming requirements, and within the game itself, requirements such as physics, artificial intelligence, 3D interface development, control system, etc. must be met. Level (level) designers in the game are the people in charge of the game architecture. They use the game and change its appearance and complexity of the game, define the objects and characters involved in the game, their behavior when playing, challenges such as obstacles, places to hide, skill tests and other elements to interact. Also quite important is the audio designer who creates music, sound effects, voice character, noise, vehicles, etc.

Unity game engine is a game development program for PC, mobile devices and computer graphics that has been developed by Unity Technologies. The Unity program attracts many programmers because it offers quality scripting languages. In terms of input and output formats, Unity supports most programs among them and Blender for 3D modeling, image editing, video editing, etc. The graphics engine offers great capabilities because it works on multiple platforms such as Direct3D and OpenGL. Through different units, the participants of this education will receive all the necessary knowledge and skills so that they can independently create their own video game in the mentioned program. Education "Game development – Program Unity" " is carried out by the Development Agency of Sisak-Moslavina County SI-MO-RA.

Why?

Simply put, Unity is a tool used by many developers to create and ultimately train their creations. Unity software is very powerful, and at the same time very easy to use. It is also free to use except for business entities. Unity is not only software for building a game, it is a professional tool used by some of the biggest names in the entire industry. Since there is no logical reason why the developer himself would want to create every small detail when he can save literally months or even years of work using a platform that is already pre-prepared. For game developers, we can most certainly say that Unity is a big windfall because it allows them and allows them to compete with some of the biggest names in the industry. There is a strong possibility that some developers are fans of mobile application programming. In this case, Unity comes to the fore compared to other tools. Although the software is formerly known as "Unity 3D", it has become just as good as a 2D development tool. Not only that, but the way it handles graphics features makes it very easy to adapt to

slightly weaker hardware. SIMORA is implementing an Initiative “Sisak Moslavina County - Center of gaming industry” from 2016. and has educated more than 150 people during 6-month courses, has introduced new curriculum Gaming technician developer in region’s high schools and possess a business incubator/DIH PISMO focused on gaming industry.

Who?

- Beginners in game development
- Unemployed people
- Pupils/Students

When?

Getting acquainted with an educational institution, as the first theme, is going to last 7 days and participant will learn how does educational institution work and which are its methods. The second theme is the introduction to the programming. There, they will learn almost everything about the basics of programming, such as programming languages in Unity, pseudo-language, a study of programming logics with the lasting of 22 days. The third thing is level creation that leads a person into study and adjustment of players psychology for a game experience that lasts 12 days. Next, the Creation of the game design document. In 5 days, participants will be able to know the creation of the game concept, story writing and development and creation of the game design document for the game with mentors help. The fifth theme is marketing, 11-day presentation and learning process is all about setting a marketing plan, identifying target groups, how to promote games for free, how to promote games by paying and selling them and calculating your profit. Next 28 days are turning towards the basics of graphics in a game (Setting up a scene, optimizing a graphic, adjusting material and texture, graphic creation for a 2D and 3D game, lighting in games). Seventh thing is various platforms and, in that theme, we will learn game creation and optimization for Windows PCs and Androids with the duration of 6 days. The penultimate theme is advanced Unity. Advanced Unity is lecture about physics in games, turning real-world physics in-game physics, use of light and shadows and enhanced reflection Creation of particle effects (VFX) with a lasting of 24 days. The last theme is the creation of games of various types with a duration of 80 days.

How?

THEMES	DESCRIPTION
Getting acquainted with educational institution	Introduction to educational institution operating procedure. Description of the educational process (space, working hours, organizational culture) Duration: 1 day
Introduction to video game graphics	Graphics basics Study of reference images and real space Basics of shapes, light and color Various programs for graphic creation based on art style and display technology. Free alternatives to commercial programs

	Duration: 2 days
Graphical elements	2D sprite creation process. Creating sprite atlas sheet. Creation of texture bitmaps. Picture compression and data formats. Importance of "power-of-two" dimensions. Palette swatches collections. Graphic file data types. Duration: 4 days
Graphics design basics	Design methods according to the game type. Design basics based on display technology. Reference materials. Graphical user interface design. Importance of user experience. Duration: 4 days
Animation basics	Sprite sheet animation. Sequences: time line, dope sheet and graph editors. Organizing animation sequences based on target platform and game engine. Animation file export. Duration: 7 days
Exercises	Background sprite elements. Static environment sprite elements. Animated sprites. Duration: 14 days
3D modelling	Basic modelling concepts Editing concepts. Structural sub elements: vertex, edge, face. Primitive (basic) meshes. Polygonal extrusion tools. Geometry insertion tools. Edge loops and cutting tools. Polygon merge and join concepts. Mesh editing tools. Hierarchy and parenting structure. Geometry mirroring. Modelling based on reference image. Scale, dimensions and measurements.

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	3D file format export. Duration: 45 days
Object shading	Shading methods Light type and sources. Textures, UV data and mapping techniques. Shading network and pipeline. Shadow types. Procedural textures. Shading types based on display technology. Duration: 5 days
Animation	3D model preparation. Frame rate timeline settings. Timeline animation and keyframes. Object motions according to physical properties. Keyframe settings and adjusting. Linear motion interpolation. Animation graph editors. Nonlinear editors. Duration: 20 days
Environment modelling	Object modeling using polygonal extrusion technique. Duration: 25 days

Milestones/Badges

MILESTONE/BADGE: Advanced user in Unity

Content

Facilitator Notes

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M1 - Facilitator Notes English

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2.2. MODULE 2 – Game development - Blender program

What?

In today's highly developed technologically, it is difficult to imagine a world without multimedia. We are constantly surrounded by all kinds of multimedia such as text, sound, video and animations. Although we are often unaware computer graphics have been implemented in almost all branches of visual media and industry. Computer graphics has enabled the creation of new industries, among them the fastest growing branch of the entertainment industry, video games. Blender was developed by Ton Roosendaal, or his company "Not a Number Technologies" (NaN). Blender includes a free professional open-source tool for 3D computer graphics and is used to create animated films, visual effects, models for 3D printers and interactive content. In the last few years, Blender has seen more and more users and accelerated development that allows you to follow trends in the industry.

In the introductory process of the module, participants will get acquainted with the organization and functioning of the educational institution, they will get acquainted with the lecturers, the space in which the classes are held and the equipment they will use.

With this education, participants will acquire knowledge about video game graphics. The 1990s were marked by the biggest changes in the innovations of the video game industry. Thus, simple graphics developed to 3D graphics that provided a better video game experience, but also encouraged the development of different genres of video games. All graphics consist of one or more elements of graphic design. Design elements are its components, such as color, type and images. Each design is made of basic elements stacked per certain principles. Good knowledge of the properties of these elements, as well as the design principles by which compositions are built from them, is of great importance for any designer. Creating animations for video games is very different from creating animations for movies. The main difference is that the film simply needs to be reviewed, and the purpose of the video game is to interact. The word animation means revival. In computer graphics, the animation is a series of methods by which objects are triggered or distorted. Animation of solid bodies involves moving some objects in the scene, without deformation. With the advent of increasingly advanced computer technology, it is possible to accelerate the development of computer animating, as well as facilitate the 3D animating process itself. New generations of computers have greatly improved the creation of computer animation with better and stronger hardware and an increasingly complex software part. With knowledge from 2D animations and new knowledge about 3D animation, the creation of skeletons of 3D models and the use of new 3D animating techniques such as FK and IK, and generally the "keyframe" animating itself, as well as the development of motion capture technology, there is a great improvement in animating. Nowadays, there is a multitude of different programs that are used to make skeletons and to create 3D animations and one of them is Blender.

Education "Gaming development – Program Blender" is carried out by the Development Agency of Sisak-Moslavina County SI-MO-RA ltd.

Why?

The most popular free software package for 3D modeling is Blender. It is a free open-source digital tool that is predominantly used to create animated films, visual effects, 3D modeling, create 3D models for printing on 3D printers, and in the computer game

industry. Also, big importance is the stay of creative and enterprising people in the labor market in Croatia, especially in Sisak-Moslavina County. It is also important to note that certain products can also be sold on the global market. In short, Blender is a versatile software in which you can do almost anything. It is available as an installation software package for Windows (version XP, Vista and above), Mac OSX (OSX 10.6 and above) and Gnu/Linux operating systems. The tool requires users to engage professionally to master it and get to know all the functionalities and ways of using it. Getting acquainted with the abbreviations on the keyboard is one of the most effective ways to use this tool. Features of the tool are actual rendering, fast modeling, real materials, fast assembly, animation tools, model design, fast UV unpacking, simulations, game making, camera positioning and object tracking, extension library, video editing, high support for data types and customizable interface. The tool is specialized and primarily intended for those users who want to engage in 3D modeling, computer graphics, or making objects for 3D printing. SIMORA is implementing an Initiative "Sisak Moslavina County - Center of gaming industry" from 2016. and has educated more than 150 people during 6-month courses, has introduced new curriculum Gaming technician developer in region's high schools and possess a business incubator/DIH PISMO focused on gaming industry.

Who?

- Beginners in gaming development
- Unemployed people
- Pupils/Students

When?

The idea is that the start is getting acquainted with the educational institution first, that intro theme would last about 1 day, and in that one-day participants will be introduced to the educational institution. Video game graphic is next up with a lasting of 2 days. Basic of shapes, light and color and basic graphic are only some of the things they will learn. After that, graphical elements with 4 days of learning and processing will be filled with new information about the creation of texture bitmaps and creating sprite atlas sheet, palette swatches collections and picture compression and data formats. Following that, also related with graphic, is graphic design basics that lasts 4 days. Next is animation basics that are 7 days long. After those 18 days, it's time for exercises, and exercises are in duration of 14 days. In exercises, we go through everything we have learned so far. 3D modeling is a really important part of this course and it's full of new information people will learn. Some of them are: geometry insertion tools, edge loops and cutting tools, polygon merge and join concepts, 3D file format export. The duration of 3D modeling is 45 days. Object shading lasts 5 days - participants will learn how to add textures, they will get to know all of the shadow types and shading types based on display technology. Just like 3D, theme animation in this course is also very important and it lasts 20 days. This course ends with environment modeling. In the last 25 days, it's all about object modeling using the polygonal extrusion technique.

How?

THEMES	DESCRIPTION

Getting acquainted with educational institution	Introduction to educational institution operating procedure. Description of the educational process (space, working hours, organizational culture) Duration: 1 day
Introduction to video game graphics	Graphics basics Study of reference images and real space Basics of shapes, light and color Various programs for graphic creation based on art style and display technology. Free alternatives to commercial programs Duration: 2 days
Graphical elements	2D sprite creation process. Creating sprite atlas sheet. Creation of texture bitmaps. Picture compression and data formats. Importance of "power-of-two" dimensions. Palette swatches collections. Graphic file data types. Duration: 4 days
Graphics design basics	Design methods according to the game type. Design basics based on display technology. Reference materials. Graphical user interface design. Importance of user experience. Duration: 4 days
Animation basics	Sprite sheet animation. Sequences: time line, dope sheet and graph editors. Organizing animation sequences based on target platform and game engine. Animation file export. Duration: 7 days
Exercises	Background sprite elements. Static environment sprite elements. Animated sprites. Duration: 14 days
3D modeling	Basic modeling concepts Editing concepts. Structural sub elements: vertex, edge, face.

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	Primitive (basic) meshes. Polygonal extrusion tools. Geometry insertion tools. Edge loops and cutting tools. Polygon merge and join concepts. Mesh editing tools. Hierarchy and parenting structure. Geometry mirroring. Modelling based on reference image. Scale, dimensions and measurements. 3D file format export. Duration: 45 days
Object shading	Shading methods Light type and sources. Textures, UV data and mapping techniques. Shading network and pipeline. Shadow types. Procedural textures. Shading types based on display technology. Duration: 5 days
Animation	3D model preparation. Frame rate timeline settings. Timeline animation and keyframes. Object motions according to physical properties. Keyframe settings and adjusting. Linear motion interpolation. Animation graph editors. Nonlinear editors. Duration: 20 days
Environment modeling	Object modeling using polygonal extrusion technique. Duration: 25 days

Milestones/Badges

MILESTONE/BADGE: Advanced user in Blender

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Content

Facilitator Notes

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M2 - Facilitator Notes English

2.3. MODULE 5 – How to use BC technology to verify credentials

What?

In the introductory process of the module, participants will get acquainted with the organization and functioning of the educational institution, they will get acquainted with the lecturers, the space in which the classes are held and the equipment they will use.

Participants of this education will get acquainted with the credential verification platforms, what platforms there are and how they work. Blockchain is a decentralized, distributed and public digital ledger that is used to record transactions on many computers, so the record cannot be changed retroactively without altering all subsequent blocks and network consensus. These are data blocks that are connected to a one-way chain, and in which each new link, or block, depends on the value of the first older link. In computer science when security and a certain level of privacy are necessary, connecting blocks into a chain is based on cryptography. This allows participants to check and audit transactions cheaply. A blockchain database is managed autonomously using a peer-to-peer network and distributed timestamp server. Using blockchain removes the characteristics of infinite duplication of digital assets. This confirms that each unit of value is transferred only once. Blockchains are described as a value-exchange protocol. This blockchain-based value exchange can be faster, safer and cheaper than with traditional systems.

The main part of the education will be focused on Blockchain platforms as tools for recognizing education credentials and on how to access them, what are requirements and how to use them. The participants will be acquainted with a BC platform, and they will have concrete tasks regarding describing competencies, modules, taxonomy of competencies, their categories etc.

Why?

Blockchain adds a level of external verification for publishers and those acquiring high-value credentials. By issuing digital credentials on the blockchain, it tells users that the organization is using the latest technology that supports large requests to verify credentials for future and unauthorized changes. Also, a network that works on the blockchain can be used for several things, and its implementations are being developed in several industries. It can offer support to the logistics industry in the form of a supply chain platform, the financial sector as a cross-border payment system, or for the distribution of cloud data or information platforms for multinational companies to make payments worldwide. Blockchain is good for many things that together will fundamentally change society in the years ahead.

Education “Game development – How to use BC technology to verify credentials” is carried out by the Development Agency of Sisak Moslavina County SI-MO-RA LTD. The aim of the education is to enable target group with the knowledge about Blockchain technology and its possibilities. The idea is to provide them with information on how they can use this technology to have their education credentials recognized and verified by different institutions in different countries. This will enable then higher mobility within European union.

Who?

- young people who have just graduated from high school and all those with an enterprising spirit who would like to realize their business idea in the future.

When?

This last module "Education blockchain" is going to last 1,5 days. The start is getting to know the educational institution - lasts 1 hour. Next two parts encompass existing tools and models regarding mobility and recognition of skills and competences as well as potentials of BC in the educational context. It lasts 3 hours. Next up is the Presentation of platform(s) where everyone will learn how do platforms work – lasts 2 hours. In the following 3 hours the theme is "How to put your credential on the platform".

How?

THEMES	DESCRIPTION
Getting acquainted with educational institution	Introduction to educational institution operating procedure. Description of the educational process (space, working hours, organizational culture) Duration: 1 hour
Existing tools and models in mobility and recognition of skills and competences	Introducing ESCO Getting acquainted with Europass (the standardized European Curriculum Vitae) Introducing models for the mobility of students and the recognition of knowledge across different national educational frameworks (The Erasmus + project, the Bologna Process, the EQF system, the introduction of the Dublin Descriptors, the Diploma Supplements. Duration: 2 hours
Blockchain Technologies in educational context	Getting familiar with the possibilities to use BC in an educational context (the European scheme for investment in Blockchain technologies, the European Blockchain Service Infrastructure (EBSI), the European Blockchain Partnership (EBP), and the Blockchain Observatory and Forum. Duration: 1 hour
Presentation of platform(s)	Presenting platform for credential verification – A credential is a set of data that represents the user and serves as proof of electronic identity verification (e-ID) to enable access to e-services. How platforms work? (By using the innovation platform, communication, networking, information exchange and distribution of relevant documents it will be facilitated for all stakeholders in the innovation value chain. The platform contains information for all interested parties – from

	citizens to the business, scientific research and public sector) Duration: 2 hours
How to put your credential on the platform	Creation of an educational program and certification on the platform Linking of an educational program with competences Putting the credentials on the platform and linking with educational program Description of badge system Verification of competences on the platform Duration: 3 hours

Milestones/Badges

MILESTONE/BADGE: Knowledge in putting educational credential on blockchain platform

Content

Presentation

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M5 - Presentation English

2.4. MODULE 12 – Coding in Classroom

What?

The main topics of this course are: The language of things, Introduction to Code.org., Creating content and dissemination through Scratch, Practical applications of computational thoughts. The module will employ both frontal lectures and practical activities. Frontal lectures are going to be employed to teach the technical language and to highlight the procedures that shall be employed to learn how to code. Practical activities will be employed to force the students to apply what they have learnt and to check whether such students actually understood the material taught during the frontal lectures.

Education Coding in Classroom is carried out by Universita' degli Studi di Urbino Carlo Bo.

Why?

The main aim of the module is to teach the basics of coding in a simple and direct way. The goal is to improve individuals understanding of coding and show them that such concept is omni-comprehensively present in our daily lives. Moreover, the modules can provide teachers with the tools to teach coding in early stages of education, providing their students with the basic understanding of coding that they can then expand during their educational life.

Who?

- Teachers

When?

The course is split into four parts. The first part will introduce the concept of a programmable object and will give the students the terminological proficiency that s/he might employ later in the course. This first part will last around 3 hours, depending on the ability of the students to complete the assignments. Following this first part, a second part will follow which will focus on the introduction of the platform code.org. All the elements of such platform will be explained, and the students will learn how to employ it to teach programming to children. This part will last around 10 hours. The third part of the course will then focus on Scratch, teaching the students how to use this second platform to create contents and teaching materials. Such part will last around 5 hours. Finally, the fourth part will provide practical examples of how the platforms that have been introduced have been used to create innovative contents. This final part will last around 10 hours and will mostly be composed of assignments.

How?

THEMES	DESCRIPTION
The language of things	This section will highlight that we are surrounded by programmable objects in our daily lives. Moreover, it will be highlighted that those programmable objects have been coded by someone who wants to tell the object to perform a

	specific action which is desirable by us. Finally, it will be shown that coding is indeed the easiest way to get objects to do things that are desirable by us. 4) Practical applications of computational thoughts. In this last section, all the things that students learnt in the previous sections will be put into practice. The students will learn how to actually program objects and get them to do what they desire them to do. Duration: 3 hours.
Introduction to Code.org.	This section will introduce the code.org platform. In particular, the opportunities that code.org offers will be presented, highlighting how such platform could be employed to enhance the learning experience of students that are learning coding in a simple fashion. Duration: 10 hours.
Creating content and dissemination through Scratch	This section will introduce the Scratch project. In particular, it will be shown how Scratch can be employed to code employing already existing code blocks. Emphasis will be placed on practical understanding of the concept of block coding. Duration: 5 hours.
Practical applications of computational thoughts	In this last section, all the things that students learnt in the previous sections will be put into practice. The students will learn how to actually program objects and get them to do what they desire them to do. Duration: 10 hours.

Milestones/Badges

The course will provide the students with 3 main badges, each indicating a competence they acquired while following the course:

1. Competence with code.org.
2. Competence with Scratch.
3. Being able to practically apply the theoretical knowledge about code.org and Scratch.

M12 - Material English/Italian

Content

Material

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2.5. MODULE 13 – Ethical and Moral Problems of Artificial Intelligence

What?

The main topics of this course are: What is artificial intelligence (AI), Ethical problems of the use of AI and technology, Ethical problems of AI and technology, Living with robots and technological objects, Social robotics, its use and limits. The module will employ both frontal lectures. Those lectures are going to be employed to teach the technical language and to highlight the practical and theoretical issues related to the use and presence of technological objects in our daily lives.

Why?

The main aim of the module is to show how technology is shaping our lives and what advantages and disadvantages this omni-comprehensive presence of technological objects in our daily lives are creating. Emphasis is placed on ethical rather that technical concepts.

Who?

- All citizens that wish to get a better understanding of the implications of the presence of technological objects in daily lives

When?

The course is composed of three main parts. In part one the students will be introduced to the topic of artificial intelligence. They will learn what artificial intelligence is, its origins and the technicalities that define it. This first part will mainly be theoretical and will lay the foundation for all subsequent parts. This first part will last around 6 hours. In the second part, the ethical problems of employing A.I. tools and the ethical problems of A.I.s themselves will be analysed and discussed, providing the student with a broad picture of what are the advantages and limits of employing A.I. systems in our daily lives. This second part will last around 12 hours and will also include active discussions between the students. The third and final part will move the focus towards social robotics, highlighting the roles that such robots might fill in our societies and the consequences that those shifts in our societies might cause. This final part will last 12 hours and will include active presentations by the students.

How?

THEMES	DESCRIPTION
What is artificial intelligence (AI)?	This section will introduce the concept of artificial intelligence, highlighting the historical facts that led to the development of such forms of intelligence. Artificial intelligence will be put into comparison with human intelligence and the differences and similarities between the two will be presented and explained. Arguments in favor and against the recognition of artificial intelligence will be presented. Duration: 6 hours.

Ethical problems of the use of AI and technology.	This section will focus on the ethical challenges that the use of artificial intelligence technologies creates. Focus will be placed on the issues that those technologies produce and how we might try to solve those issues. Theoretical as well as practical issues will be analyzed, showing both real problems and potential problems. Duration: 6 hours.
Ethical problems of AI and technology	This section will focus on the ethical challenges that artificial intelligence technologies face. Differently from the previous section, where the ethical challenges were produced by the use of those technologies and the main agents that faced those challenges were human beings, in this section, the main agents that will be analyzed are the artificial intelligent ones. Thus, focus will be placed on whether those agents can face ethical challenges and, if they do, how could they find solutions to those issues. Duration: 6 hours
Living with robots and technological objects	This section will introduce the concept of social robotics. In particular, all the technical and terminological details will be introduced, setting the stage for the next section on the use and limits of social robots. Emphasis will be placed on the characteristics that are required from robots to consider them social robots. Duration: 6 hours.
Social robotics, its use and limits.	This section will describe the current and potential uses of social robots. Emphasis will be placed on social robots that substitute humans in specific tasks and what kind of opportunities and issues those substitutions might cause. Moreover, it will be shown how the use of social robots is limited by some technological, social and legal aspects, indicating the work that still has to be done in order to have a complete applicability of social robotics. Duration: 6 hours.

Milestones/Badges

The course will provide 3 badges, each tied to a specific part of the course:

1. Understanding what A.I. is.
2. Knowledge of the ethical problems of A.I.
3. Understanding the concepts of social robotics.

Content

PowerPoint

Synopsis

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