OBEC

INSPIRING REVOLUTIONARY EDUCATIONAL CREDENTIALS

# Chapter IV

# Logic & Critical Thinking

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 4: Logic & Critical Thinking**
This corresponds to Modules 10 and 11.

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 Italian only, with a summary in English.

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

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# 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).

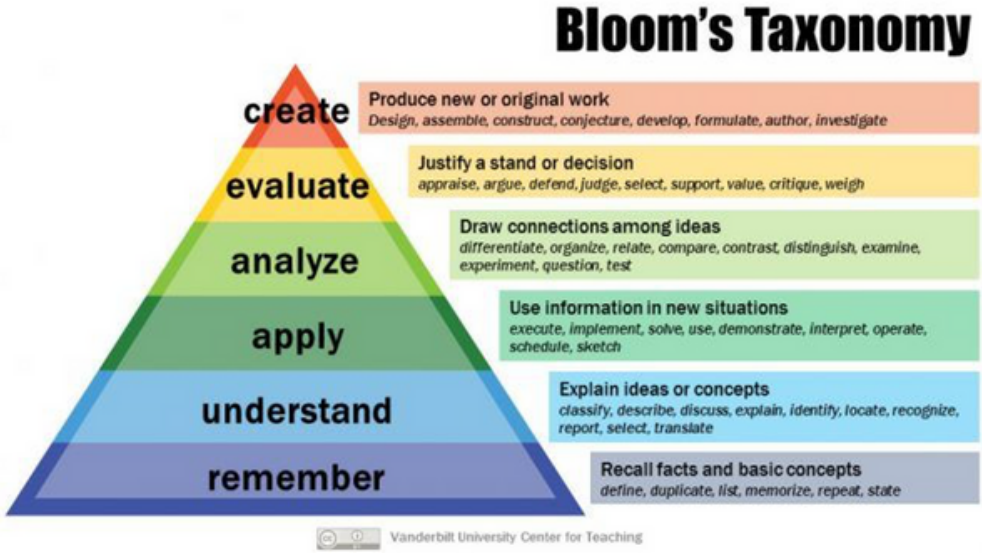
The aim of ESCO is to support job mobility across Europe and therefore a more integrated and efficient labour market, by offering a "common language" on occupations and skills that can be used by different stakeholders on employment and education and training topics".

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 10 – Critical Thinking

### What?

The main topics of this course are: European literacy situation, elements of text, From an informal to a formal argument, What is an argument?, Reconstructing an argument, Complete examples examination, Formally assessing an argument, Basic propositional logic, From an informal to a formal argument. Critical thinking is the ability to think clearly and rationally, understanding the logical connection between ideas. Someone with critical thinking skills can: Understand the links between ideas, Determine the importance and relevance of arguments and ideas, Recognise, build and appraise arguments, Identify inconsistencies and errors in reasoning, Approach problems in a consistent and systematic way, Reflect on the justification of their own assumptions, beliefs and values. The module will employ both frontal lectures and practical activities. Frontal lectures are going to be employed to teach the technical language of critical thinking and to highlight the procedures that shall be employed to correctly assess arguments. 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 Critical Thinking is carried out by Universita' degli Studi di Urbino Carlo Bo.

### Why?

The main aim of the module is to develop critical thinking abilities in the students. Specifically, the hope is that those students become aware of the intricacies of correctly assessing information and how different pieces of this information is tied together. The student shall thus become a better and more aware citizen, resistant to biases and trickery employed to convince him of false information. This should also improve the abilities of the students to study new subjects and to evaluate scientific research. Overall, the module is thought as a general tool to improve the literacy of European students and their ability to form proper and clear thoughts.

### Who?

- last-year high-school
- first-year university students
- high-school teachers

### When?

The students will, first of all, understand the current European and Italian situation concerning the literacy of various demographics. They will learn the importance of being able to properly assess arguments and to apply those in real life scenarios. This first part will cover the first two hours of the course and will lay its foundations. The students will then start to informally recognize and structure the arguments they can encounter in their ordinary lives. Specifically, the sections “Elements of a text”; “What is an argument?”; “Reconstructing an argument” and “Complete examples examination” will all contribute to those specific abilities. This part will take from 12 to 15 hours to be completed. Finally, the course will concentrate on formal techniques that can be employed to better analyse arguments and to assess them objectively. In particular, the language of propositional logic will be introduced to the

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students, allowing them to properly assess the form of the arguments instead of their contents. The three modules "Formally assessing an argument"; "Basic propositional logic" and "From an informal to a formal argument" will all contribute towards those goals. The approximate duration of this last section is between 8 and 12 hours.

## How?

| THEMES | DESCRIPTION |
|---|---|
| European literacy situation | This section of the course will highlight what is the current literacy situation in Europe. The purpose of this section is to provide motivation for the rest of the course. In particular, data from the PISA reports and general research carried out inside Europe will be presented, showing what is Europe's and Italy's current state concerning all forms of literacy. Particular emphasis will be placed on critical thinking abilities and individuals' capacities of interpreting written texts.<br>Duration: 2 hours. |
| Elements of a text. | This section will introduce the main elements of a text, distinguishing between relevant and irrelevant components of a text. Participants will learn how to recognize the rhetorical components of a text, understanding how those components are employed to make a text more convincing, without actually providing any real support to the conclusions of such texts.<br>Duration: 4 hours |
| What is an argument? | This section will introduce the concept of an argument, clarifying the main elements of such concept. Emphasis will be placed on premises and conclusions of an argument, indicating the textual elements that can help identifying those premises and conclusions. At the end of the section, the students shall be able to recognize all the elements of the text and identifying inside those the premises and conclusions of the arguments presented.<br>Duration: 2 hours |
| Reconstructing an argument. | This section will focus on how to properly reconstruct arguments that are presented in a text. The students will learn how to polish the text, eliminating the rhetorical elements, while focusing on premises and conclusions of an argument. Moreover, the students will learn how to properly relate the premises and the conclusions, providing a |

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| | |
|---|---|
| | flow chart that represents the arguments schematically.<br>Duration: 3 hours |
| Complete examples examination | This section will test the students on real world examples, gradually moving away from the toy-models employed in the previous sections. In particular, texts from newspapers and public speeches will be analysed, trying to apply all that the students learnt in the previous sections in a real-world example of text.<br>Duration: 3 hours |
| Formally assessing an argument | This section will focus on how to assess whether an argument is correct or not. In particular, the students will learn how to correctly evaluate whether the premises of the arguments imply the conclusions. The students will also learn how to understand whether or not there are implicit premises, and, if there are, how to make them explicit.<br>Duration: 2 hours |
| Basic propositional logic | The section will introduce basic propositional logic as a language that can allow a formal assessment of an argument. This will enhance the abilities of the students to properly assess arguments, gaining some technical tools that can automatically determine whether an argument is correct or not.<br>Duration: 3 hours |
| From an informal to a formal argument | In this last section, the students will reanalyse all the arguments they analysed in the previous sections employing the recently learnt propositional logic tools. This section aims at developing in the students a sense of when an argument is correct or not. It will also be highlighted that sometimes arguments that look informally valid are indeed invalid from a formal point-of-view.<br>Duration: 3 hours |

## Milestones/Badges

While performing the course, the students are expected to obtain a badge for each component of the course. Moreover, comprehensive badges will be awarded for the completion of each section of the course. Therefore, there will be 6 “part-specific” badges and 2 “section-specific” badges.

The 6 “part-specific” badges will be:

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1. Recognizing the elements of a text.
2. Understanding what an argument is.
3. Being able to reconstruct an argument.
4. Being able to formally assess an argument.
5. Competence in basic propositional logic.
6. Being able to transform an informal argument into a formal one.

The “part-specific” badges are the components of the “section-specific” badges. In particular:

Having badges (1) through (3) will provide the student with the “section-specific” badge (i) Proper Reasoner. Moreover, after acquiring badges (4) through (6), the student will also acquire the “section-specific” badge (ii) Formal Reasoner.

## Content

Lecture Notes

PowerPoint

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M10 - Lecture Notes English

M10 - PPT Italian

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## 2.2. MODULE 11 – Logical fallacies, how to recognize and how to avoid them.

### What?

The main topics of this course are: What is a valid argument? What is a fallacious argument? Understanding the context and the objectives of an argument, the fallacy fork problem, shall we abandon discourses about fallacies? Logical fallacies revamped. 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 correctly assess arguments. 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 Critical Thinking is carried out by Universita' degli Studi di Urbino Carlo Bo.

### Why?

The main aim of the module is to further develop the critical thinking abilities of individuals. This will allow them to perform sophisticated analysis of arguments, identifying subtleties that are not commonly captured after a basic critical thinking course. Those students will also learn how to individuate different argumentative contexts and how to distinguish between formal and informal discourses.

### Who?

Students - that have already completed a basic critical thinking course and wish to further improve their abilities to properly assess arguments

### When?

The students will first of all understanding when an argument shall be considered formally valid. Building on such understanding, the students will learn what formally fallacious arguments are and they will also be made aware of the existence of non-formal fallacious arguments. Those parts will constitute the main elements of the course and shall last roughly 10 hours (composed of the parts “What is a valid argument?” and “What is a fallacious argument?”). Building up from this section, the course will focus on the goals and uses of arguments in different scenarios. This shall help to provide the students with the tools to understand whether a formal or an informal analysis of the argument is required. This will further refine the list of fallacies that the students might encounter during their lives. This part will last 4 hours and will lead directly into the third section on the fallacy fork problem. In this third section, the students will learn what the fallacy fork problem is and how they can potentially solve it employing informal tools that can improve the quality of the arguments they employ. This last section will last between 8 and 12 hours and will conclude the course.

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## How?

| THEMES | DESCRIPTION |
|---|---|
| What is a valid argument? | This section of the course will explain what a valid argument is from a logical point-of-view. The section will show examples of valid arguments from both the propositional logic level and the predicate logic level. Emphasis will be placed on common structures of valid arguments, highlighting how the conclusions of such arguments will always follow from specific premises which have a standard form.<br>Duration: 4 hours. |
| What is a fallacious argument? | This section will follow a similar path to the previous section, focusing on invalid and fallacious arguments, rather than valid ones. Emphasis will be placed on the different forms of fallacies, showing that there might be fallacies that are not formal. A taxonomy of all possible fallacies will be presented, teaching how to recognize a specific fallacy from another.<br>Duration: 4 hours. |
| Understanding the context and the objectives of an argument | This section will teach the students how to properly assess the scope and context of an argument. This will be done to highlight how a fallacious argument in one context might not be fallacious in another. The students will be presented with various real-life examples and they will have to learn how to properly assess what was the aim of the author of the argument.<br>Duration: 4 hour. |
| The fallacy fork problem | This section will present the fallacy fork problem. Such problem will highlight that while formal methods of analysis of arguments are suitable in specific contexts (e.g., scientific and academical contexts), they might not be suited to analyse well arguments in other kinds of contexts. Some potential solutions to the fallacy form problem will also be presented, highlighting how it is possible to properly analyse arguments also in contexts where common formal techniques are not applicable.<br>Duration: 2 hours. |
| Shall we abandon discourses about fallacies? | This section will put the solutions to the fallacy form problem into perspective. This should help the students to properly evaluate whether they should apply the techniques learnt in previous part of the module and how to decide when the situation requires a formal analysis. |

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| | Duration: 2 hour. |
| Logical fallacies revamped. | This section will show how knowing formal analysis tools might help the students to navigate the intricacies of argument presentations. It will be shown that this is true in spite of the presence of the fallacy fork problem. The students will then learn the importance of being able to properly assess arguments, even in contexts where normal formal techniques are not applicable, but where a critical analysis might still improve the quality of the debates.<br>Duration: 4 hours. |

## Milestones/Badges

While performing the course, the students are expected to obtain 4 "section specific" badges.

The badges will be:

1. Understanding what a valid argument is.
2. Being able to contextualize an argument according to its goals.
3. Being able to classify and recognize fallacious arguments.
4. Knowledge of the fallacy fork problem and potential solutions to it.

## Content

Lecture Notes

PowerPoint

Synopsis

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