Joint development, piloting and validation of entrepreneurial mindset and key skills curricula and training materials for third countries

Entrepreneurial Mindset and Key Skills for All

ERF CURRICULUM: [SCIENCE & TECHNOLOGY] – METHODOLOGICAL TOOLS

TASK ID AND TITLE 2.2: JOINT DEVELOPMENT OF THE CURRICULA AND TRAINING MATERIALS FOR ERF

PARTNER RESPONSIBLE FOR THIS ACTIVITY: MMC MEDITERRANEAN MANAGEMENT CENTER

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PROJECT MAIN DETAILS

Programme:	Erasmus+
Key Action:	Lump Sum Grants
Project title:	Joint development, piloting and validation of entrepreneurial mindset and key skills curricula and training materials for third countries
Project Acronym:	EMSA
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COORDINATED BY

MMC Mediterranean Management Centre

PROJECT PARTNERS

Cyprus Certification Company

DIMITRA educational organization

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ARAB COLLEGE OF APPLIED SCIENCES

Jordan Youth Innovation Forum
المـلتقى الأردنـي للإبـداع الشـبابي

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SUMMARY OF THE METHODOLOGICAL TOOLS

Competence Title	ERF Competence: SCIENCE & TECHNOLOGY
Learning Outcomes for the Competence	• *Learners will understand the fundamental scientific and technological concepts and recognize their relevance in addressing societal challenges.* • *Understand the principles and applications of the scientific method and technological tools in problem-solving and decision-making processes.* • *Recognize the impact of science and technology on individual empowerment and societal advancement* *In terms of **skills:*** • *Demonstrate the ability to use basic technological tools responsibly and analyze the social and ethical implications of science and technology in society.* • *Apply scientific methods and technological tools to identify problems, formulate hypotheses and support data-informed decision-making.* • *Apply strategies to overcome technology-related anxiety and build confidence in technology use* *In terms of **competences:*** • *Develop curiosity and ethical behavior on technology use, including data privacy and social equity.* • *Demonstrate responsibility and ethical awareness when applying technological solutions* • *Take initiative in setting personal goals for technology skill development and maintain a positive approach*

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Methodological tool Type	Number of Methodological tools
☒ Lecture (compulsory)	1
☐ Open-ended questions	
☒ Closed questions	**1**
☒ Group discussion	**2**
☐ Brainstorming	
☒ Individual exercise / Case study	**1**
☒ Group exercise	
☐ Experiential workshop	
☐ Role play	
☐ Video projection and analysis	**1**
☐ Other (Please indicate)	
Total Number of Methodological tools:	

Referencing the Methodological tools

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PPT for PowerPoint Presentation/MT for other Methodological Tools + Competence number_Number_of_methodological_tool

Example:

PPT2.2_0 = PowerPoint presentation, on ERF competence Science & Technology, 1st tool

MT2.2_1 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

MT2.2_2 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

MT2.2_3 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

MT2.2_4 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

MT2.2_5 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

MT2.2_6 = Methodological tool, on ERF competence Science & Technology, 2.2 Topic

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COMPULSORY METHODOLOGICAL TOOLS

1. POWERPOINT PRESENTATION

Methodological tool Code and Title	Science & Technology 2.2_0 PPT
Competence Title	Science & Technology
Learning Outcomes covered by the Methodological tool	1. *Understand the principles and applications of the scientific method and technological tools in problem-solving and decision-making processes.* 2. *Apply scientific methods and technological tools to identify problems, formulate hypotheses and support data-informed decision-making.* 3. *Demonstrate responsibility and ethical awareness when applying technological solutions.*
Methodological tool Aim	To deliver a lecture on the topics and subtopics of the module.
Hints and tips for the trainer to use the Methodological tool	*The competence in Science and Technology involves understanding the basic principles, methods, and applications of scientific knowledge and technological innovation, and recognizing their impact on society. It also includes an awareness of the ethical, and social implications of technological advancements, encouraging responsible and informed decision-making.*
Attachment for the usage of the Methodological tool	PPT2.2_0

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ADDITIONAL METHODOLOGICAL TOOLS

Methodological tool Code and Title	SCIENCE & TECHNOLOGY MT2.2_1 Case Study
Competence Title	SCIENCE & TECHNOLOGY
Learning Outcomes covered by the Methodological tool	1. *Understand the principles and applications of the scientific method and technological tools in problem-solving and decision-making processes.* 2. *Apply scientific methods and technological tools to identify problems, formulate hypotheses and support data-informed decision-making.* 3. *Demonstrate responsibility and ethical awareness when applying technological solutions.*
Methodological tool Aim	To provide the trainees with a real-life example on the topic and give them the opportunity to study the conditions, actions taken, consequences.
Hints and tips for the trainer to use the Methodological tool	Identify the stages of the scientific method (Observation, Hypothesis, Experimentation, Analysis)
Attachment/s to use the Methodological tool	Provided in the activity description below (if applicable).

Methodological Tool Title
MT2.2_1 Case Study

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Case Study Title (if different from the MT title)
Case study on identifying the 4 stages of scientific method for problem solving in real situation problem : observation, hypothesis, experimentation, analysis
Case Study Content
Reducing Littering in a School At a local school, the principal noticed that littering was a significant issue, especially in the schoolyard. Despite having trash bins available, students were still leaving waste scattered around the area, creating an unpleasant and unsanitary environment. To address this, the principal decided to try a new approach. She suggested that if the trash bins were painted in bright colors and labeled with fun slogans, students might be more encouraged to use them. The principal tested this idea by organizing a student art contest to design the bins. Over the course of a month, the brightly colored and creatively labeled bins were placed around the schoolyard. The staff monitored the litter levels daily and recorded how much waste ended up in the bins versus on the ground. At the end of the month, the staff reviewed the data. They found that littering had decreased by 40%, and students were visibly more engaged in keeping their environment clean. The bright bins and slogans seemed to make throwing trash away more appealing, but some areas still had higher littering rates. The principal decided that additional strategies, such as placing more bins in those areas, might be necessary. Identify the stages of the scientific method (Observation, Hypothesis, Experimentation, Analysis) in this case study? • Observation • Hypothesis • Experimentation • Analysis

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Estimated Duration (broken down into steps, if necessary)
Duration 30 Minutes
General Guidelines (for the trainer)
This activity is designed to help learners understand and apply the scientific method to real-world problems. Follow the steps below to facilitate the session effectively: ***1. Introduce the Activity*** *Begin by explaining the objective: to identify the four stages of the scientific method (Observation, Hypothesis, Experimentation, Analysis) within a simple case study.* *Briefly describe the importance of the scientific method in structured problem-solving, emphasizing its logical approach to finding effective solutions.* ***2. Distribute the Case Study*** *Ensure everyone has the opportunity to read through the case study individually or as a group.* ***3. Explain the Task*** *They need to identify where each of the four stages of the scientific method appears in the case study.* *For each stage, they should underline or highlight the corresponding text and write down the stage name (e.g., Observation, Hypothesis, etc.) next to it.* *Encourage learners to work collaboratively if they are in groups, sharing and discussing their interpretations.* ***4. Facilitate Discussion*** *After the learners have completed the task, bring the group back together for a discussion.*

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Use guiding questions to encourage critical thinking:

Why do you think this part represents Observation?

How does the Hypothesis connect to the problem identified?

What was being tested during the Experimentation phase?

What conclusions were drawn during Analysis?

5. Provide Feedback

Validate correct answers and gently guide learners if they misunderstand a stage.

Highlight how each stage logically flows into the next, reinforcing the importance of following the scientific method systematically.

6. Wrap Up

Summarize the key takeaways:

The scientific method starts with careful observation.

A hypothesis should be specific and testable.

Experimentation collects data to test the hypothesis.

Analysis evaluates the data to draw conclusions and refine solutions.

Ask learners to reflect on how they could apply this process to challenges they face in their daily lives or work.

Instructions (for the participants)

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Identify the stages of the scientific method (Observation, Hypothesis, Experimentation, Analysis) in this case study? • *Observation* • *Hypothesis* • *Experimentation* • *Analysis*

5. GROUP EXERCISE

Methodological tool Code and Title	SCIENCE & TECHNOLOGY MT2.2_2 Group Exercise
Competence Title	SCIENCE & TECHNOLOGY
Learning Outcomes covered by the Methodological tool	1. *Learners will understand the fundamental scientific and technological concepts and recognize their relevance in addressing societal challenges.* 2. *Demonstrate the ability to use basic technological tools responsibly and analyze the social and ethical implications of science and technology in society.* 3. *Develop curiosity and ethical behavior on technology use, including data privacy and social equity*
Methodological tool Aim	E.g., To practice individuals to reflect on the most important scientific and technological inventions
Hints and Tips for the trainer to use the Methodological tool	✓ E.g., Ensure that the participants understand the instructions for the activity fully before they start; clarify if necessary.

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Attachment/s for the usage of the Methodological tool	Provided in the activity description below (if applicable).

Methodological Tool Title
MT2.2_2
Group Exercise/Individual Exercise Title (if different from the MT title)
Take 5 minutes to think of a situation from your personal or professional life where you used research skills to solve a problem.
Description of the Group Exercise/Individual Exercise
Take 5 minutes to think of a situation from your personal or professional life where you used research skills to solve a problem. Consider the following prompts: • *What was the problem or challenge?* • *How did you gather information about it?* • *What steps did you take to analyze the information and identify a solution?* • *What was the outcome?*
Estimated Duration (broken down into steps, if necessary)
25 Minutes
General Guidelines (for the trainer)

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Step-by-Step Guide

Introduce the Activity *(3-5 minutes)*

Explain the purpose: "This activity will help you explore how research skills can be used in problem-solving by reflecting on and sharing your own experiences."

Briefly review what research skills involve (e.g., gathering information, critical analysis, finding solutions).

Provide an example from your own experience to model what participants will be doing.

Reflection Phase *(5 minutes)*

Ask participants to individually reflect on a personal or professional experience where they applied research skills to solve a problem.

Share prompts to guide their thinking:

What was the problem or challenge?

How did you gather information about it?

How did you analyze the information and arrive at a solution?

What was the outcome?

Take 5 minutes to think of a situation from your personal or professional life where you used research skills to solve a problem. Consider the following prompts:

What was the problem or challenge?

How did you gather information about it?

What steps did you take to analyze the information and identify a solution?

What was the outcome?

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Instructions (for the participants)
Take 5 minutes to think of a situation from your personal or professional life where you used research skills to solve a problem. Consider the following prompts: • *What was the problem or challenge?* • *How did you gather information about it?* • *What steps did you take to analyze the information and identify a solution?* • *What was the outcome?*
*Online Classroom Setting **(if applicable)***
You use a mentimeter and set an open ended question to see their reaction

MT2.2_3 Methodological Tool Title Please indicate whether the statement(s) below is/are true or false.	
Statement: **The scientific method includes the following four steps: Observation, Hypothesis, Experimentation, and Conclusion.**	
True	
False	
Correct Answer	False
Level of Difficulty	☒ Low ☐ Medium ☐ High

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Statement: **Technological skills focus exclusively on data analysis and software engineering.**	
True	
False	
Correct Answer	False
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: **AI-driven decision-making enhances fairness by reducing human biases and maintaining consistency across decisions.**	
True	
False	
Correct Answer	True
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: **Decision-making processes in third countries always adhere to the same strict regulations and data transparency as in the EU.**	
True	
False	
Correct Answer	False
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: **The steps of the scientific method are essential for systematically improving technological solutions.**	
True	
False	
Correct Answer	True
Level of Difficulty	☒ Low ☐ Medium ☐ High

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9. E.G., VIDEO PROJECTION AND ANALYSIS

Methodological tool Code and Title	MT2.2_4 Video Analysis
Competence Code and Title	SCIENCE & TECHNOLOGY
Learning Outcomes covered by the Methodological tool	*Apply scientific methods and technological tools to identify problems, formulate hypotheses and support data-informed decision-making.*
Methodological tool Aim	To teach participants how to apply scientific methods and technological tools to identify problems, formulate hypotheses and support data-informed decision-making.
Hints and tips for the trainer to use the Methodological tool	Present the following video and ask participant the following question.
Attachment/s to use the Methodological tool	Provided in the activity template below (if applicable).

Methodological Tool Title
MT2.2_4
Video Title (if different from the MT Title)
The science behind decision making
Video Source (e.g., URL)

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https://www.youtube.com/watch?v=WiW4IITEfZw
Video Creator (Person/Organisation/Authority)
CSIRO's Data61
Video Duration (if a segment of the video should be projected, please indicate also start and end time)
9:40
Estimated Duration (of the Activity) (broken down into steps, if necessary)
30 Minutes
General Guidelines (for the trainer)
The video "The Science Behind Decision Making" explores the intricate processes that govern our choices, emphasizing the interplay between the prefrontal cortex and the limbic system. The prefrontal cortex is responsible for rational analysis and logical reasoning, while the limbic system drives our emotional responses. This dynamic between logic and emotion significantly influences our decisions. The video also highlights common cognitive biases, such as confirmation bias—the tendency to favor information that aligns with our existing beliefs—and the availability heuristic, where recent or easily recalled information disproportionately impacts our judgments. Additionally, the video examines how external factors like stress and fatigue can impair decision-making abilities. Under stress, the body's fight-or-flight response can overshadow rational thinking, leading to impulsive choices. Similarly, fatigue diminishes cognitive function, making it challenging to evaluate options effectively. By recognizing these influences, individuals can develop strategies to mitigate their effects, such as ensuring adequate rest and managing stress levels, thereby enhancing the quality of their decisions.
Instructions (for the participants)
Please review the following video and answer the following questions.
Debriefing Questions

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Which part of the brain is primarily responsible for rational analysis and logical reasoning in decision-making?

A. Limbic system

B. Prefrontal cortex

C. Cerebellum

What is confirmation bias?

A. The tendency to seek out information that contradicts our existing beliefs

B. The tendency to favor information that aligns with our existing beliefs

C. The tendency to ignore all information when making decisions

How does stress typically affect decision-making?

A. It enhances rational thinking and leads to better choices

B. It has no significant impact on decision-making

C. It can overshadow rational thinking, leading to more impulsive choices

What is the availability heuristic?

A. Making decisions based on the most readily available information

B. Making decisions based on thorough and comprehensive data analysis

C. Making decisions by ignoring recent information

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Remarks by the Trainer
1. ***Answers:*** 2. **B. Prefrontal cortex** 3. **B. The tendency to favor information that aligns with our existing beliefs** 4. **C. It can overshadow rational thinking, leading to more impulsive choices** 5. **A. Making decisions based on the most readily available information**

GROUP EXERCISE

Methodological tool Code and Title	SCIENCE & TECHNOLOGY MT2.2_5 Group Exercise
Competence Title	SCIENCE & TECHNOLOGY
Learning Outcomes covered by the Methodological tool	• *Learners will understand the fundamental scientific and technological concepts and recognize their relevance in addressing societal challenges.* • *Demonstrate the ability to use basic technological tools responsibly and analyze the social and ethical implications of science and technology in society.* • *Develop curiosity and ethical behavior on technology use, including data privacy and social equity*
Methodological tool Aim	To practice individuals to reflect on the most important scientific and technological inventions

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Hints and Tips for the trainer to use the Methodological tool	Ensure that the participants understand the instructions for the activity fully before they start; clarify if necessary.
Attachment/s for the usage of the Methodological tool	Provided in the activity description below (if applicable).

Methodological Tool Title
MT2.2_5
Group Exercise/Individual Exercise Title (if different from the MT title)
Reflect on the technological tools you use in your social or professional lives and how these tools simplify decision-making processes.
Description of the Group Exercise/Individual Exercise
Think about the technological tools you use in your daily life, either socially or professionally, to help make decisions easier. Consider tools such as: *Apps or platforms for organization (e.g., calendars, task managers).*
Estimated Duration (broken down into steps, if necessary)
25 Minutes
General Guidelines (for the trainer)

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Think about the technological tools you use in your daily life, either socially or professionally, to help make decisions easier. Consider tools such as: Apps or platforms for organization (e.g., calendars, task managers). *Tools for data analysis (e.g., Excel, Google Analytics).* *Communication tools (e.g., Slack, Microsoft Teams).* *Specialized software (e.g., simulation tools, design software).* *Write down one or two examples and how they assist you in decision-making.*
Instructions (for the participants)
Show them examples of those tools *Tools for data analysis (e.g., Excel, Google Analytics).* *Communication tools (e.g., Slack, Microsoft Teams).* *Specialized software (e.g., simulation tools, design software).* *Write down one or two examples and how they assist you in decision-making.*
*Online Classroom Setting **(if applicable)***
You use a mentimeter and set an open ended question to see their reaction

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.2 MULTIPLE-CHOICE QUESTIONS

Methodological Tool: MT2.2_6 Please select the correct answer from the options below.	
Statement: Which step in the scientific method involves proposing a testable solution based on observations?	
1. Observation	
2. Hypothesis	
3. Analysis	
Correct answer	2
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: What is a key characteristic of AI-driven decision-making?	
1. It relies solely on human intuition for decision-making.	
2. It uses large datasets and pattern recognition to enhance consistency and scalability.	
3. It avoids data analysis to save time.	
Correct answer	2
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: How does the EU approach decision-making differently from some third countries?	
1. The EU uses informal processes based on cultural norms.	
2. The EU emphasizes strict regulatory frameworks and data transparency.	
3. The EU avoids reliance on data for decision-making.	
Correct answer	2
Level of Difficulty	☒ Low ☐ Medium ☐ High

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Statement: What role does adaptability play in AI-driven decision-making?	
1. It allows AI to continuously learn and adjust to new patterns and trends.	
2. It limits AI to solving only predefined problems.	
3. It prevents AI from being used in dynamic industries.	
Correct answer	1
Level of Difficulty	☒ Low ☐ Medium ☐ High

Statement: Why is sexual citizenship considered important in modern societies?	
1. Ensuring the fastest implementation regardless of outcomes	
2. Demonstrating responsibility and ethical awareness in decision-making	
3. Prioritizing cost-effectiveness over social impacts	
Correct answer	2
Level of Difficulty	☒ Low ☐ Medium ☐ High

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