STAGE
scientists and public engagement

“Innovative professional development approaches for the development of skills needed for public engagement in science”

Learning Teaching Training Activity

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SCIENTISTS' PROFESSIONAL DEVELOPMENT TRAINING ON SCIENCE COMMUNICATION & PUBLIC ENGAGEMENT

WHY?

- Contemporary socioscientific issues
- Debates among scientists
- Debates among societal actors
- Misinformation through public media

Need for public evaluation of the credibility of the scientific information & trust in science

- Important the role of scientists
- No official training

(Osborne & Pimentel, 2023; Roche et al., 2023; Wan & Bi, 2020; Baram-Tsabari & Lewenstein, 2017a)

THRESHOLD CONCEPTS OF A SCIENCE COMMUNICATION TRAINING

- Audience – centered communication

(Baram-Tsabari & Lewenstein, 2017a)

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- Co-production of science and society, making values a fundamental part of science

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THRESHOLD CONCEPTS OF A SCIENCE COMMUNICATION TRAINING

- Audience – centered communication
- Deficit model vs. public engagement
- Co-production of science and society, making values a fundamental part of science
- Trust

(Baram-Tsabari & Lewenstein, 2017a)

LEARNING GOALS OF A SCIENCE COMMUNICATION TRAINING

- ❑ Affective
- ❑ Content Knowledge
- ❑ Methods
- ❑ Reflection
- ❑ Participation
- ❑ Identity

(Baram-Tsabari & Lewenstein, 2017b)

LEARNING GOALS OF A SCIENCE COMMUNICATION TRAINING

GOALS	
Affective	Values science communication & public engagement Values varied perspectives among different stakeholders about science and society Recognizes usefulness of science communication for career & institutional goals
Content knowledge	Recognizes multiple goals of science communication Knows the opportunities, resources, affordances, and constraints of different science communication environments (journalism, social media, museums, citizen science etc.) Pays attention to science communication theory, goals and processes Knows that good science communication requires multiple kinds of knowledge (scientific knowledge, benefits & risks of science, social aspects of science etc.)
Methods	Knows how to connect with audiences Develop messages suitable for specific audiences Has media skills Has public speaking skills

(Baram-Tsabari & Lewenstein, 2017b)

LEARNING GOALS OF A SCIENCE COMMUNICATION TRAINING

Reflection	Knows something of the history, philosophy and social context of science Knows aspects of the nature of the scientific knowledge Is self – reflective about his/her own practice of science communication Shares experiences with other science communicators for the purpose of learning
Participation	Increases involvement in science communication events Practices one's skills in authentic science communication in a variety of environments Becomes a member of a network of science communicators
Identity	Feels confident and able to engage Identifies one's self as a science communicator Includes "science communication" as a fundamental component of what it means to be a scientist Is perceived by others to be a science communicator

(Baram-Tsabari & Lewenstein, 2017b)

STAGE

PROFESSIONAL DEVELOPMENT TRAINING PROGRAM

ASPECTS OF STAGE TRAINING

ASPECTS
1. Effective science communication practices (oral and writing)
2. Social, ethical & cultural dimensions of climate change
3. Public's misconceptions about climate change – Public's distrust towards science
4. The role of public engagement in scientists' career
5. Sustainability issues

STAGE PD MATERIALS

ASPECTS	TEAM
Effective science communication practices (oral and writing)	RUG
Social, ethical & cultural dimensions of climate change	UNIBO / USB
Public's misconceptions about climate change – Public's distrust towards science	UOC
The role of public engagement in scientists' career	CARDET
Sustainability issues	RUG

LEARNING GOALS OF STAGE TRAINING

LEARNING GOALS	FREQUENCY
Affective	8
Content knowledge	6
Method	9
Reflection	8
Participation	3
Identity	2

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TYPE OF ACTIVITIES OF THE STAGE TRAINING

TYPE OF ACTIVITIES	FREQUENCY
Case studies	2
Concept mapping/ Reflection	3
Debate	1
Group discussion	10
Lecture	3
Planned reading	8
Role play	2
Story telling	1
Brainstorming	2
Workshop	6

TOOLS OF THE STAGE TRAINING

TOOLS	FREQUENCY
Assignment	3
Forum	1
Papers	5
Videos	4
Whiteboards (e.g. padlets, jamboards)	4
Word cloud	1
Presentation	2
Infographics	8
Toolkit	14

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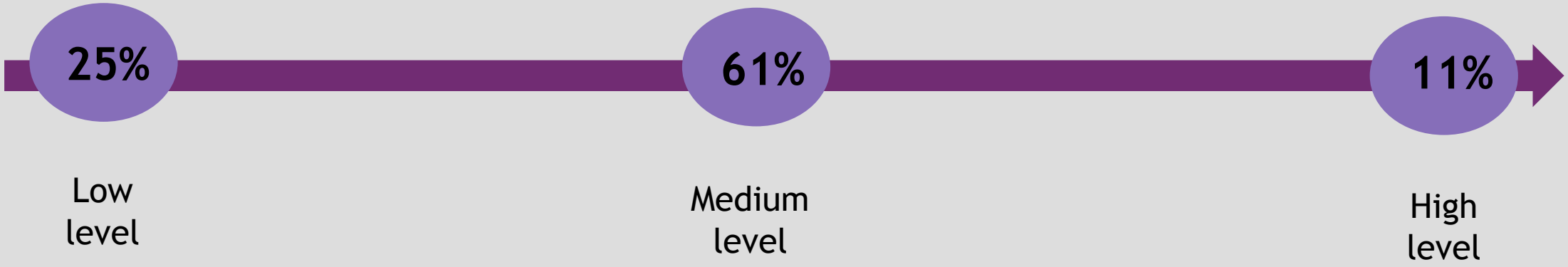
THE CASE OF UOC MATERIALS

TRUST IN SCIENCE

"Whenever people are dependent on agents (persons, organizations) and whenever they are willing to accept the risks that come along with this dependency, they put trust into these agents (the trustees)"

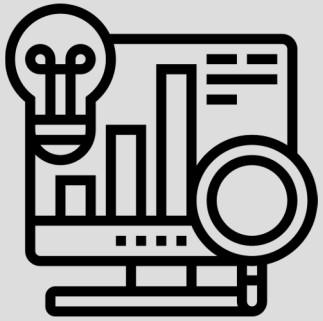
(Hendriks, 2016)

LEVEL OF PUBLIC TRUST IN SCIENCE

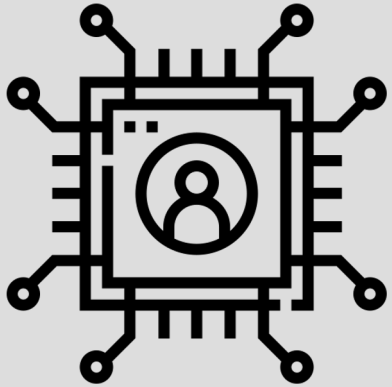


(Wellcome Global Monitor, Gallup, 2019)

FACTORS CAUSING DISTRUST TOWARDS SCIENCE

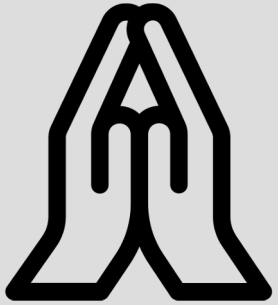


Scientific Literacy



Sociocultural Background (e.g. low income)

Political beliefs



Religion beliefs

(Hendriks, 2016; Krüger et al., 2022)

FOSTERING TRUST IN SCIENCE

Organize authentic outreach activities by implementing authentic scientific methods

Promote contact with scientists

Promote work with real data

Discuss uncertainty

(Osborne & Pimentel, 2023; Hendriks, 2016; Krüger et al., 2022)

FOSTERING TRUST IN SCIENCE

Organize authentic outreach activities by implementing authentic scientific methods

Promote contact with scientists

Promote work with real data

Discuss uncertainty

- Scientific methods & practices
- Norms and values that scientists employ in their work
- How scientists engage in professional settings
- The social mechanisms through which scientists review, evaluate, and validate scientific knowledge
- How science is arranged in institutional settings
- The underlying financial and political dimensions of science
- The inherent uncertainty of science in-the-making by dismissing the idealized and unrealistic image of an absolutely certain science.

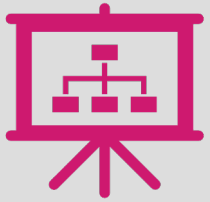
(Osborne & Pimentel, 2023; Hendriks, 2016; Krüger et al., 2022)

DESIGN & DEVELOPMENT OF UOC MATERIALS

MATERIALS

Toolkit

Infographics



STRUCTURE OF THE MATERIALS

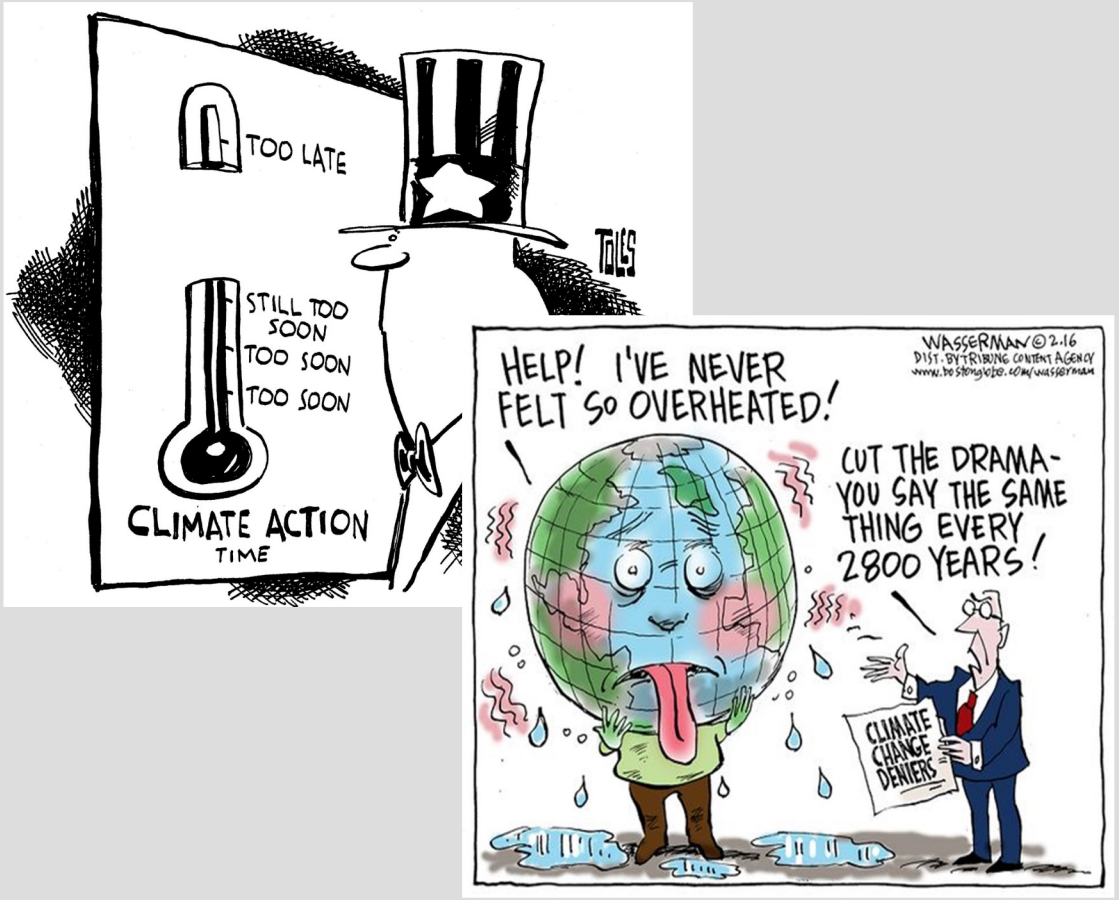
PARTS	Content – Description
Part 1	Misinformation regarding climate change – The role of media
	Debunking fake news / misconceptions about climate change
Part 2	Public's distrust towards science
	The value of entrusting science
	What can be done to increase public's trust in science
Part 3	Implications for science communication activities & practices

ACTIVITIES

1. Common misinformation regarding climate change
2. Analysis of public media resources
3. Practices for debunking of misinformation
4. Negotiation of the social aspects of science
5. Redesign of current science communication activities for fostering public trust in science

ACTIVITY 1: Common misinformation regarding climate change

1. Comics
2. Participants discuss in their groups the misinformation conveyed by the comics



ACTIVITY 2: Analysis of public media resources

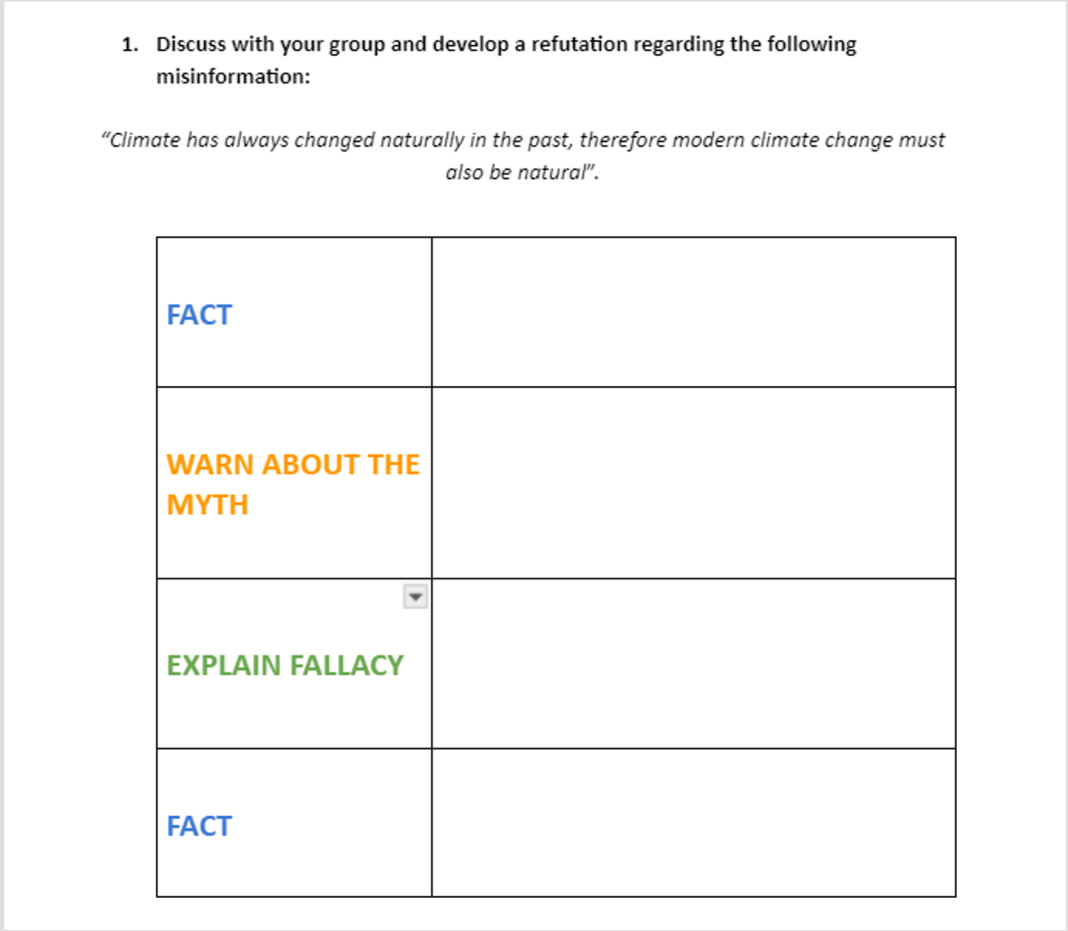
1. Participants analyze online articles and social media posts that convey misinformation on CC

2. Participants discuss in their groups and come to a conclusion regarding the features of misinformation (e.g. use of emotional language, highlighting scientific uncertainty etc.).

ACTIVITY 3: Practices for debunking of misinformation

1. Participants get familiar with a common practice for debunking misinformation during their science communication activities

2. Participants implement this practice in order to develop a refutation on a specific misinformation regarding climate change



1. **Discuss with your group and develop a refutation regarding the following misinformation:**

"Climate has always changed naturally in the past, therefore modern climate change must also be natural".

FACT	
WARN ABOUT THE MYTH	
EXPLAIN FALLACY	
FACT	

ACTIVITY 4: Negotiation of the social aspects of science

1. Initially, participants discuss and brainstorm on the skills public should be equipped with in order to respond to current socioscientific issues

2. Participants get familiar with the social aspects of science (based on the social aspects of science provided through Family resemblance approach framewor

3. Participants discuss in groups the social aspects of science they consider import for fostering public trust in science

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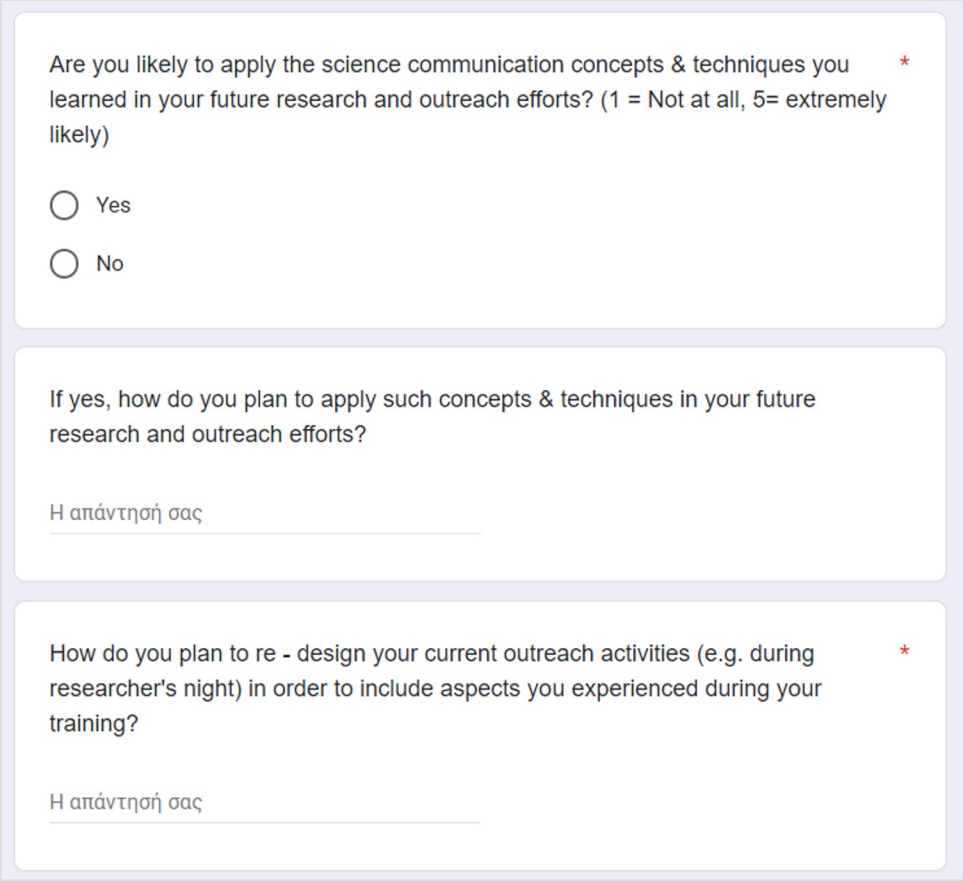
1. Which nature of science aspects would you include/communicate in your science communication activities in order to foster public trust in science? Why?

2. How will the above aspects support the public to understand the way scientific knowledge is established?

ACTIVITY 5: Re – design of current science communication practice

1. Participants are called to describe they way they would change the features of the current science communication activities in order to foster public's trust in science



PARTICIPANTS

- 20 researchers
  - University institutions
  - Research centers
  - Science centers

IMLPEMENTATION

Mode	Duration	Content
Asynchronously	1 h	Planned reading & Infographics
Synchronously	2 h	Analysis of common misinformation & public media resources
Asynchronously	1 h	Planned reading & Infographics
Synchronously	2 h	Practices of debunking misinformation & Negotiation of social aspects of science
Asynchronously	2 h	Redesign of science communication activities

DATA COLLECTION

- Initial open questionnaire on their current science communication practices

  (before the implementation)

- Responses in the worksheets

- Final open questionnaire regarding the re-design of their current practices

CATEGORIZATION

CATEGORIES	CRITERIA
Social aspects of science	• Professional activities
	• Social certification and dissemination
Cognitive & epistemic aspects of science	• Aims and values
	• Methods
	• Authentic scientific practices
	• Use of real data
Evaluation of information & sources	• Check the credibility of the source
	• Check the expertise of the source
Use of interactive materials	• Video, animations, images etc.

PRELIMINARY RESULTS

SCIENCE COMMUNICATION PRACTICES

BEFORE THE IMPLEMENTATION
• School visits
• Participation in STEM education research projects
• Participation in the “Researcher’s night” outreach activities
• Public talks

SUGGESTIONS FOR RE-DESIGNING THE CURRENT PRACTICES

CATEGORIES	FREQUENCY
Social aspects of science	8
Cognitive & epistemic aspects of science	11
Evaluation of information & resources	5
Use of interactive materials	12

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FIRST INSIGHTS

- Activities for the dissemination of their research findings

(Tillinghast et al., 2020)

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- Activities for the dissemination of their research findings

(Tillinghast et al., 2020)

- Enrichment of the current activities with aspects of the nature of science

Time for discussion!

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Thank you!