



Towards Open Science in Health Care Technology and Management

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What is this about?



Comenius Teaching Fellow grant



Innovation in
education

Course-level



Teaching Open
Science principles
to IEM students

Theoretical
knowledge
Practice



Open Science (OS)

“[O]pen science is defined as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community. It comprises all scientific disciplines and aspects of scholarly practices, including basic and applied sciences, natural and social sciences and the humanities, and it builds on the following key pillars: open scientific knowledge, open science infrastructures, science communication, open engagement of societal actors and open dialogue with other knowledge systems.”

UNESCO Recommendations on Open Science:

<https://unesdoc.unesco.org/ark:/48223/pf0000379949.locale=en>



Open Science (OS)

- ▶ Open Science Mindset
 - ▶ “(self-)critical attitude towards the academic system and scientific knowledge”
- ▶ Open Science Skillset
 - ▶ Identify, use, produce open data
 - ▶ Research reproducibility
 - ▶ Open access
 - ▶ Pre-prints
 - ▶ Communication
 - ▶ ...

de Knecht S, van der Meer M, Brinkman L, Kluijtmans M, Miedema F.
Reshaping the Academic Self: Connecting Education & Open Science
(Version 2). In: Zenodo, editor.2021.
<https://doi.org/10.5281/zenodo.5345573>



Rational Why focusing on Open Science in education?



Why focusing on Open Science in education?



SCIENCE

Improve / contribute



SOCIETY

Why focusing on Open Science in education?



SCIENCE

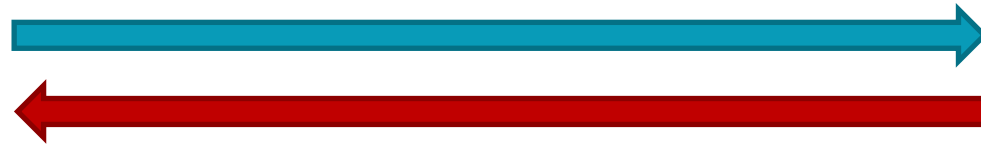


SOCIETY

Why focusing on Open Science in education?



SCIENCE

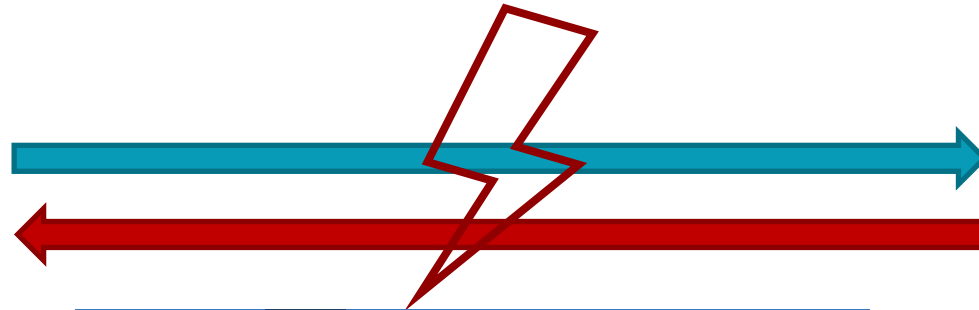


SOCIETY

Why focusing on Open Science in education?



SCIENCE



SOCIETY





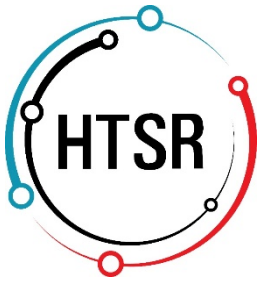
Status quo



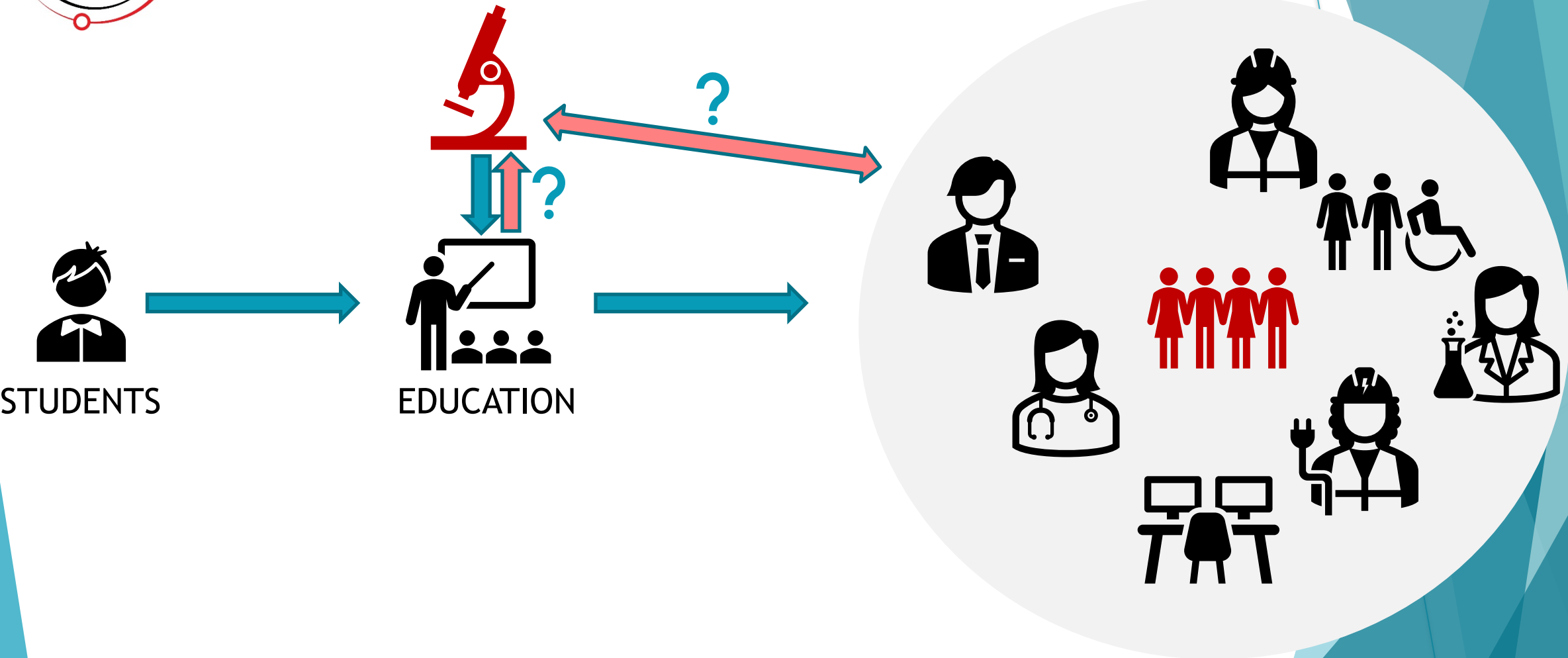
EDUCATION



SOCIETY



Status quo





Ideally

OPEN
SCIENCE



EDUCATION



STUDENTS



SOCIETY

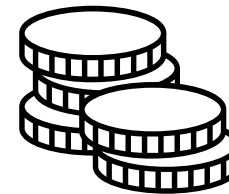
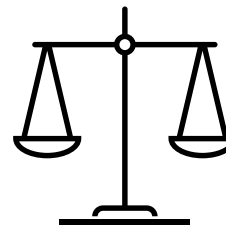
9/22/2022

The project



The course

- ▶ Advanced simulation for health economic analysis (20 students)
- ▶ Project in pairs:
 - ▶ Assessing the cost effectiveness of screening with biomarkers
 - ▶ Data set provided
 - ▶ Patient characteristics
 - ▶ Treatment outcomes
 - ▶ Biomarkers level
 - ▶ ...
 - ▶ Simulation model
 - ▶ Discrete event simulation in R
- ▶ Assessment: group report





The course

Current learning objectives

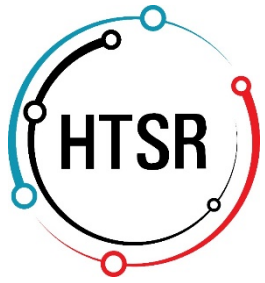
After following this course the student is able to

1. Develop their own advanced a discrete event simulation model in R using available empirical data to assess the expected impact of health care innovations on health outcomes and healthcare costs;
2. Interpret the results obtained from a patient-level discrete event simulation model in a health and economic context;
3. Understand the value and use of probability distributions, methods for uncertainty analysis, and metamodeling approaches in the context of discrete event simulation modeling.



The course Aim Comenius project

At the end of this redesigned course, students will be able to: 1) describe OS principles, 2) understand the benefits and barriers to OS (develop an OS mindset) and partake in the debate on the role of Science in society, 3) develop an OS skillset (beginner's level) by being able to navigate and use digital tools facilitating the implementation of Open Science.



Project plan



SURVEY:
ASSESSMENT OF OS
KNOWLEDGE



DEVELOPMENT OF
THE TEACHING
MATERIALS



TEACH THE COURSE



EVALUATION OF
THE TEACHING
INNOVATION



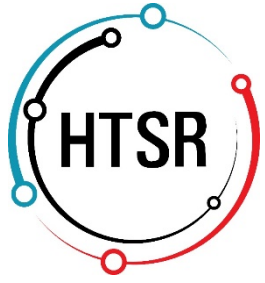
DISSEMINATION
ACTIVITIES



Survey

- ▶ Current involvement in (open) scientific endeavour
- ▶ Definition of Open Science
- ▶ Aspects of Open Science
- ▶ Open Science skills willing to develop (list)

- ▶ Any idea...?



Development of the teaching materials

- ▶ Address each phase of the research cycle
- ▶ “adopt, adapt, develop” principles
- ▶ Teaching activities
 1. introduce OS principles for each phase of the research cycle,
 2. provide practical examples of implementing OS principles,
 3. provide an opportunity to apply OS practices.

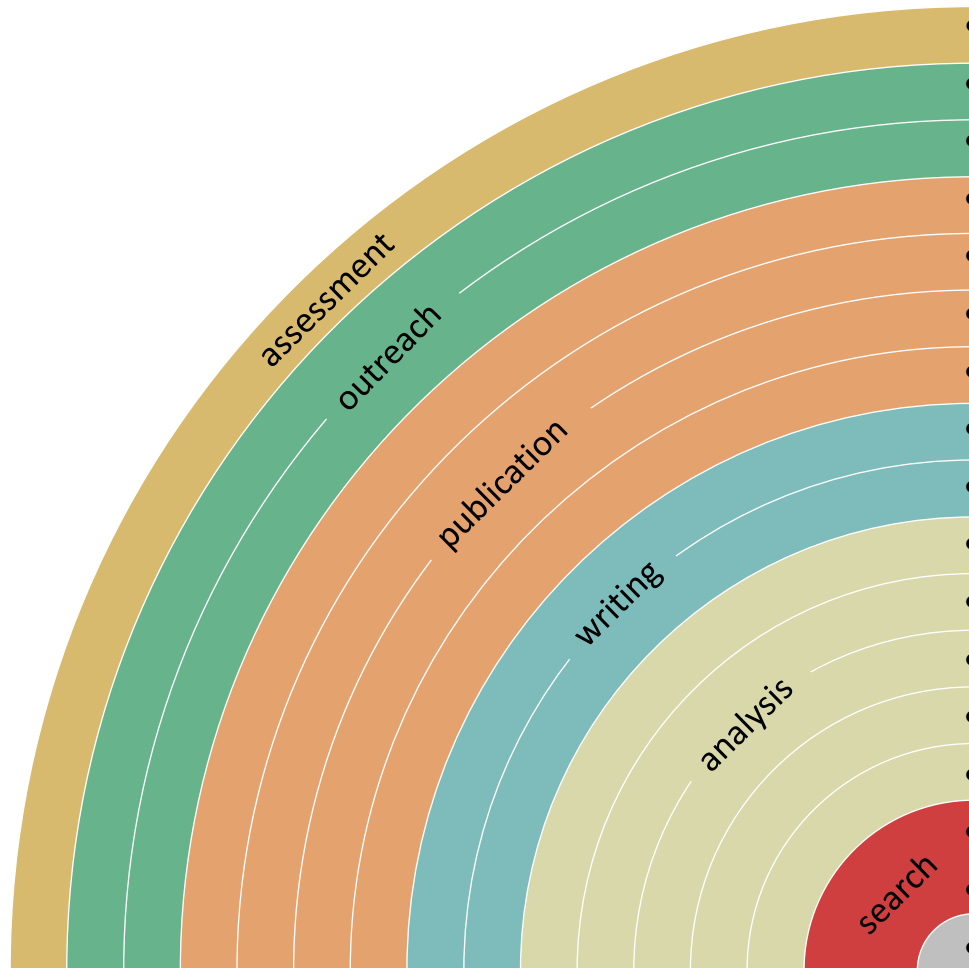


Development of the teaching materials

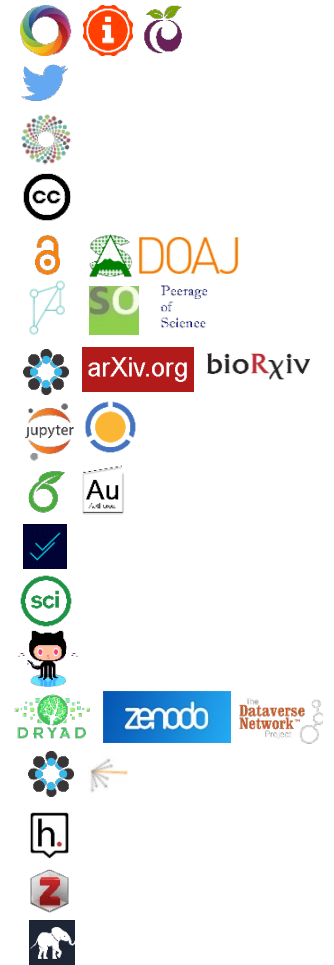


Source: [2019 Summerschool Open Science - Introduction - Google Presentaties](#)

You can make your workflow more open by ...



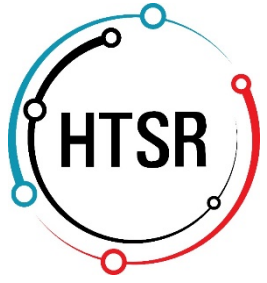
- adding alternative evaluation, e.g. with altmetrics
- communicating through social media, e.g. Twitter
- sharing posters & presentations, e.g. at FigShare
- using open licenses, e.g. CC0 or CC-BY
- publishing open access, 'green' or 'gold'
- using open peer review, e.g. at journals or PubPeer
- sharing preprints, e.g. at OSF, arXiv or bioRxiv
- using actionable formats, e.g. with Jupyter or CoCalc
- open XML-drafting, e.g. at Overleaf or Authorea
- sharing protocols & workfl., e.g. at Protocols.io
- sharing notebooks, e.g. at OpenNotebookScience
- sharing code, e.g. at GitHub with GNU/MIT license
- sharing data, e.g. at Dryad, Zenodo or Dataverse
- pre-registering, e.g. at OSF or AsPredicted
- commenting openly, e.g. with Hypothes.is
- using shared reference libraries, e.g. with Zotero
- sharing (grant) proposals, e.g. at RIO





Envisioned activities

 Preparation	Writing and sharing your own project plan Openly commenting on each other's project plan
 Discovery	Searching for literature and data Reuse available data or code FAIR data
 Analysis	Make your health economic model reproducible (Github) Extensive documentation, version control
 Writing	Visual abstract Collaborative writing & commenting platforms (Hypothesis) Plain language summary 3 sentence summary
 Publication	Publish your project as a pre-print Perform Open Peer Review Code & data archiving and sharing How Open is a health economic evaluation?
 Outreach	Alternative way of communicating (up-goer five, video's, blog) Introduction to Citizen Science
 Assessment	Introduction to Recognition & Reward Introduction to Altmetrics (use available paper)



Teach the course



Teaching activities

OS principles introduction (30 min),
practical examples (15 min),
apply OS practices (45 min).



At least one OS principle / group

More is allowed
Requirement to obtain a grade



Final group session to discuss

Application of OS principles to their
project
Discuss barriers and facilitators of OS
based on own experiences
(key-terms game)



Evaluating the teaching innovation



Survey

Differences with the first survey
Evaluation of the OS activities



Group discussion

Evaluation of OS knowledge
Evaluation of the OS activities



Dissemination activities

Presentations	Learning materials	Publications	Online	Other?
<ul style="list-style-type: none">• Grant proposal• Progress• Results• Congress	<ul style="list-style-type: none">• Zenodo• Linking with available resources• FOSTER	<ul style="list-style-type: none">• Grant proposal (RIO journal)• Open access publication	<ul style="list-style-type: none">• LinkedIn• Own website/blog?	<ul style="list-style-type: none">• ...?



The future?



OPEN SCIENCE, EDUCATION &
SOCIETY



Thank you for your attention!

Questions?

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Questions / Discussion

- ▶ Do you teach OS principles in your teaching?
 - ▶ Which activities?
- ▶ Peer review during the course
 - ▶ How often to prevent convergence of the report?
- ▶ Data and structural model re-use next year?
 - ▶ Code-sharing restrictions?
- ▶ Learning a new software (R) and OS, too much?
- ▶ Still looking for two student assistants!