Empirical evidence for learning outcomes of interdisciplinary higher education: a systematic review

Jessica Oudenampsen

Postdoc interdisciplinary education, Utrecht University, the Netherlands

Review Framework

Aim of this review:

Systematically synthesizing previous empirical findings on the learning outcomes of interdisciplinary education

Provide a basis for constructive alignment between learning outcomes and robust empirical assessment in interdisciplinary education

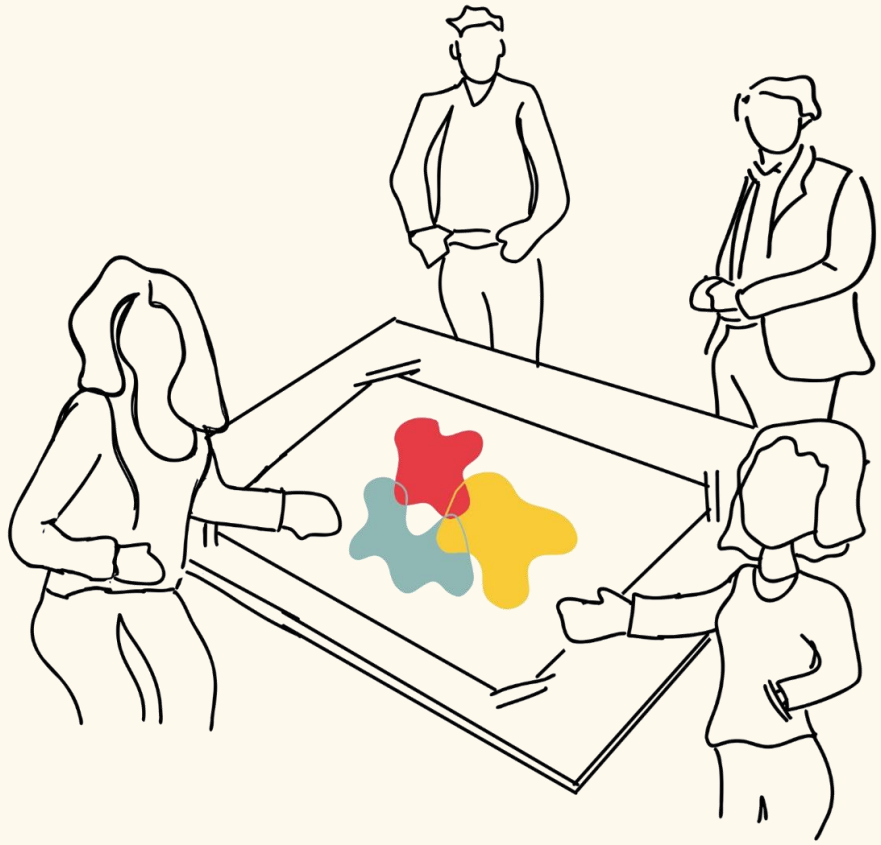
Literature search

- **ERIC, Web of Science and Google Scholar**

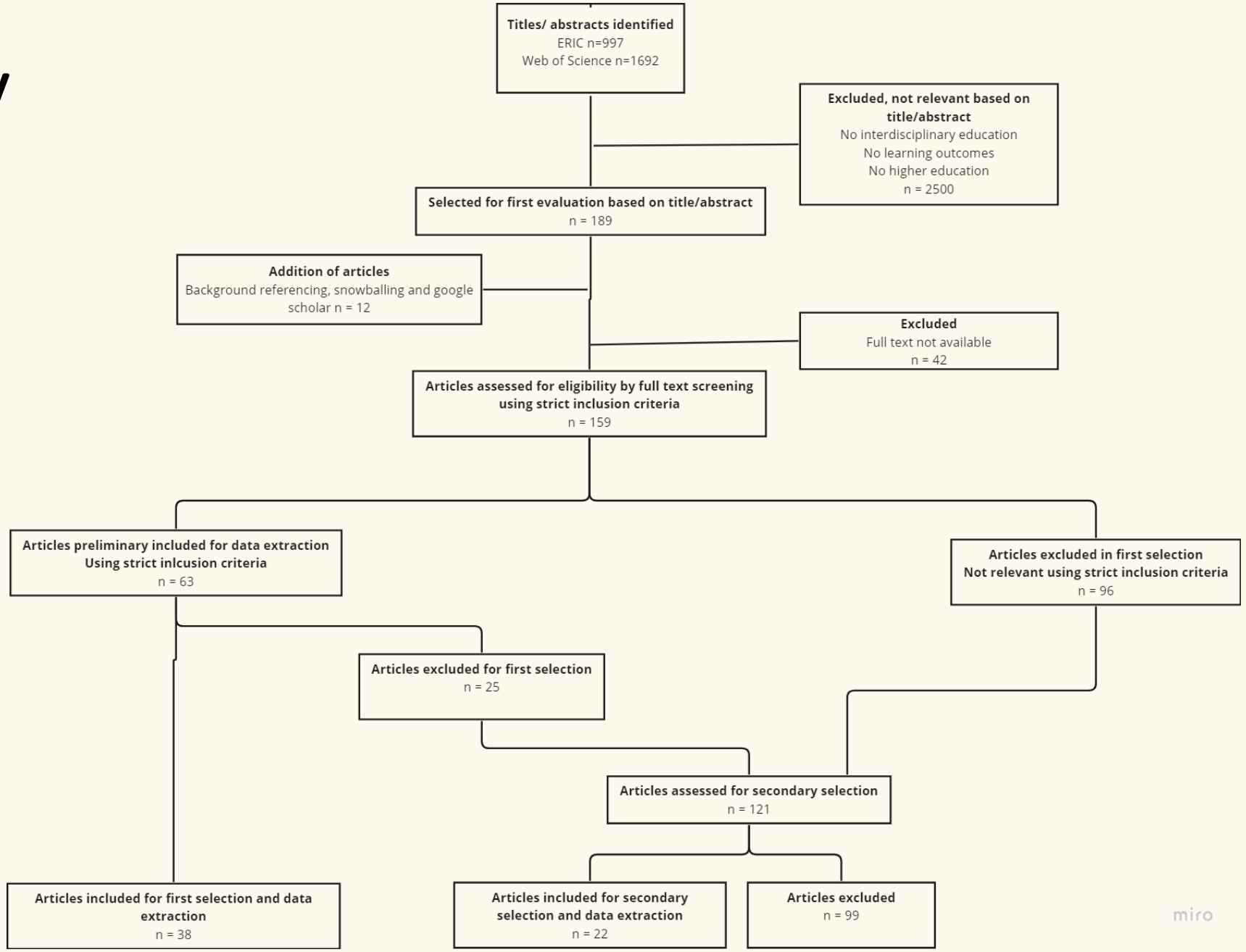
Inclusion criteria	Exclusion criteria
Concerns interdisciplinary education (interdisciplinary students and teachers brought together in an educational setting)	Multidisciplinary, transdisciplinary, crossdisciplinary or interprofessional education*
Higher education	Learning at the workplace or in secondary education
Education with explicitly interdisciplinary aims, methods and learning outcomes	Education where only 'subdisciplines' were involved*
Outcomes demonstrating impact on professional behavior, professional skills, learners' reactions and changes in learners' skills or perceptions of and attitudes to others, changes in learners' behavior	Education where interdisciplinarity was not the main aim of focus of the research and the results did not contain any relevant outcomes focused on the interdisciplinary aspects of the education*
English language	Studies without any scientific examination of teaching and learning
	Studies concerning only disciplinary knowledge-based learning outcomes*

Data Extracting Procedure

- Data were extracted using template analysis
- Data were qualitatively analysed using a meta-synthesis approach
- Summaries were created in a systematic way (narrative synthesis approach)
- Studies were evaluated in terms of quality, however not excluded based on their quality

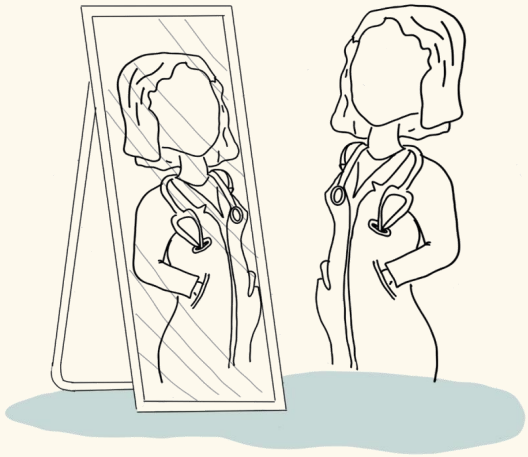


Results – study selection



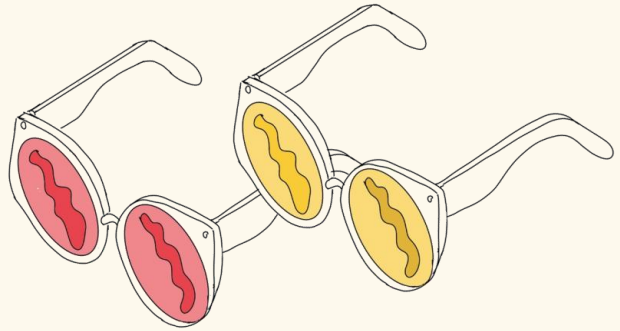
Results – narrative synthesis

1) Academic and disciplinary engagement



2) (Meta)cognitive skills

3) Perspective taking skills

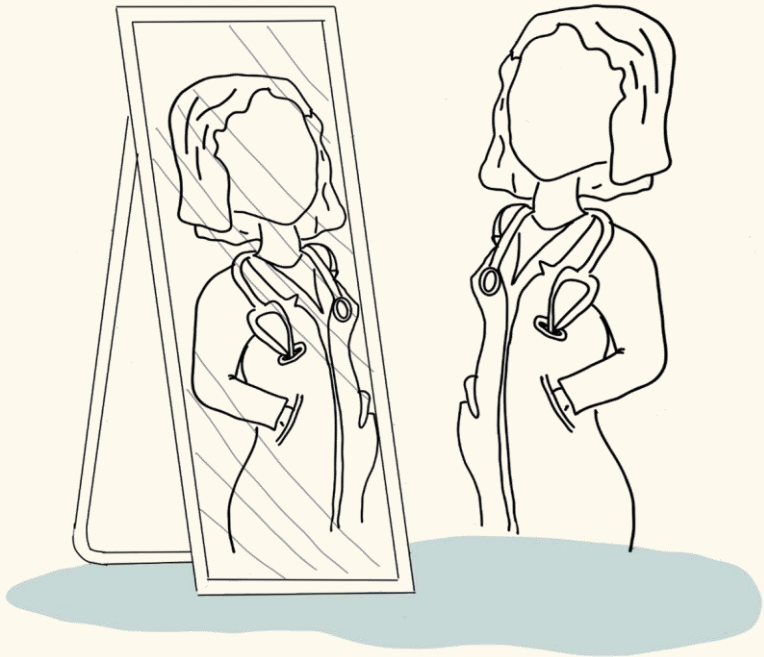


Results – narrative synthesis

Academic and disciplinary engagement : Disciplinary grounding

Understanding of and appreciation for one's own discipline

N=7 (6)

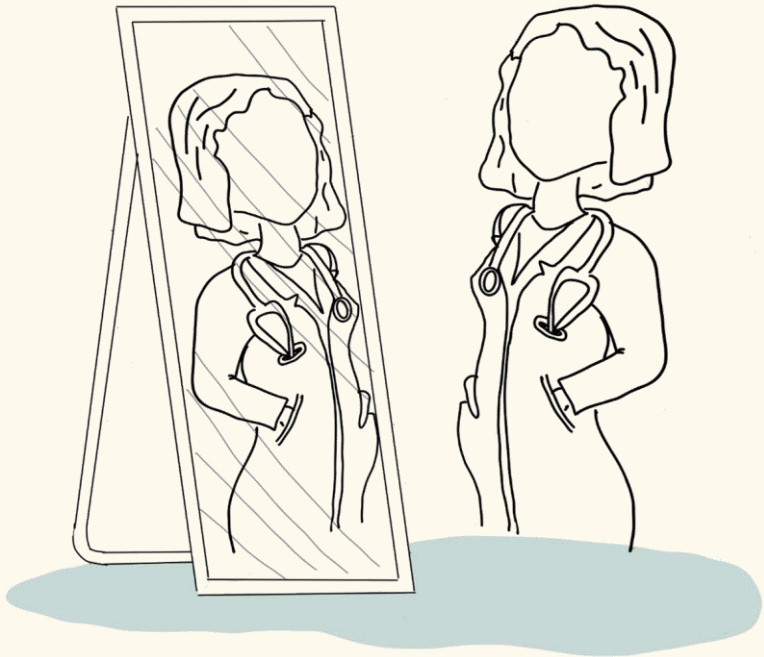


Results – narrative synthesis

Academic and disciplinary engagement : Academic engagement

Willingness to continue studying in their field of study

N = 5 (3)

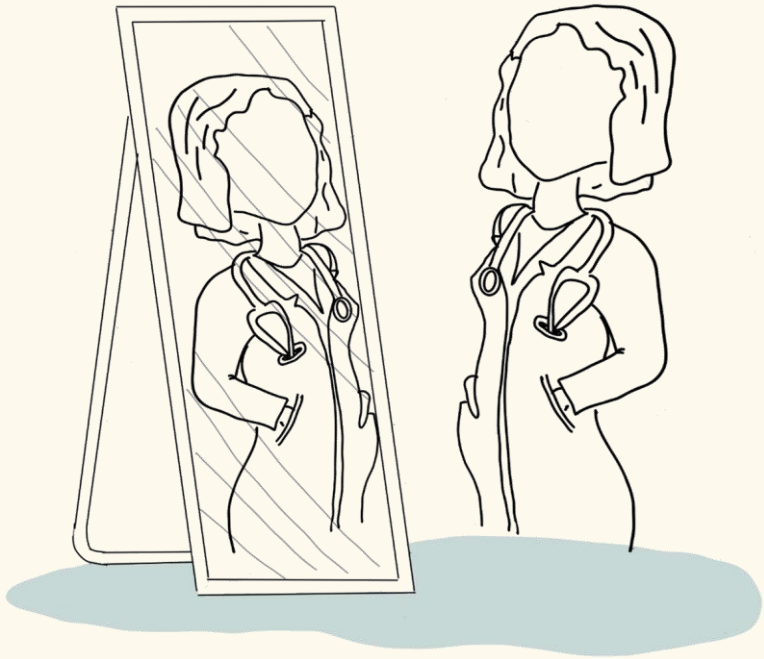


Results – narrative synthesis

Academic and disciplinary engagement : Career perspectives

New career perspectives or career opportunities for students

N=4



Results – narrative synthesis

(Meta)cognitive skills :

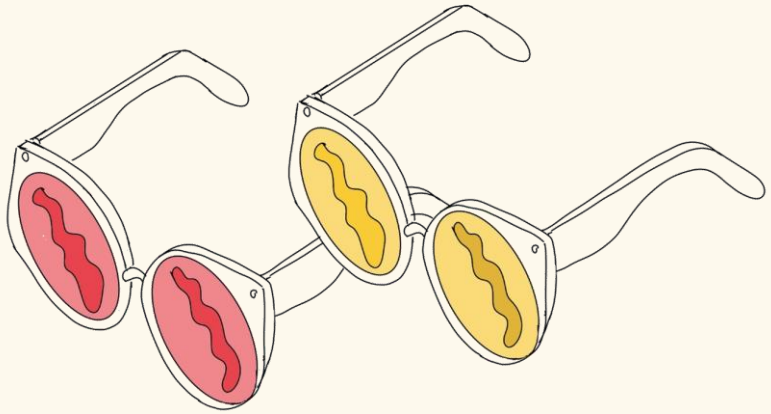
- Interdisciplinary communication > N = 8 (6)
- Problem solving > N = 5
- Teamwork > N = 12 (8)
- Critical Thinking > N = 4 (3)
- Creativity > N = 4 (3)
- ‘Interdisciplinary’ skills > N = 4

Results – narrative synthesis

Perspective taking skills : Perspective change

A particular way of viewing things or considering things in relation to another, which depends on one's experience and personality

N = 12 (9)

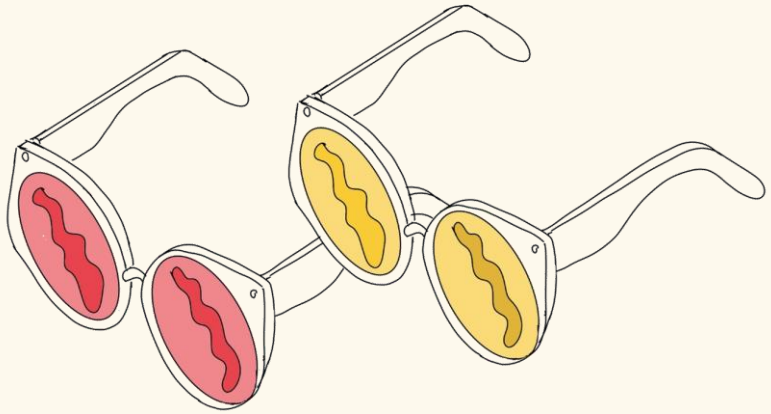


Results – narrative synthesis

Perspective taking skills : Perception change

A change of opinion about students or professionals from another discipline, or about the value of another discipline.

N = 5 (4)

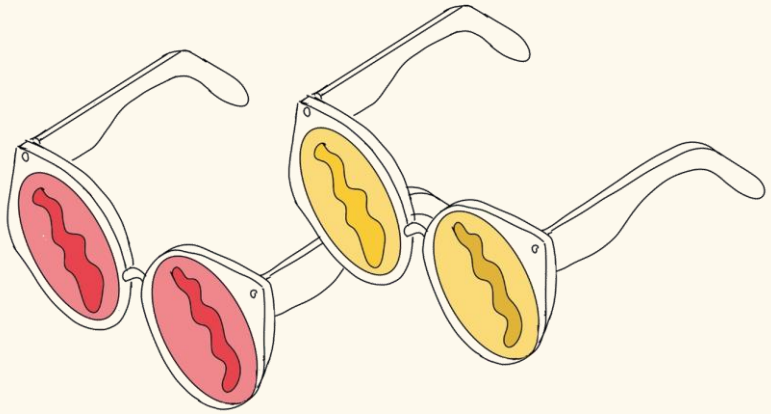


Results – narrative synthesis

Perspective taking skills : Interdisciplinary outlook

Understanding the importance of interdisciplinary collaboration and becoming more aware of an interdisciplinary epistemology.

N = 8 (5)



Discussion

Research recommendation: Beyond the pioneering stage

* Further research to develop and validate assessment tools focused on (individual) learning outcomes of interdisciplinary education, i.e.:

  - Disciplinary grounding;
  - Academic engagement;
  - Interdisciplinary communication;
  - Teamwork;
  - Perspective changing;
  - Perception changing;
  - Interdisciplinary outlook.

* Existing assessment tools : suitable for interdisciplinary education?

Discussion

Research recommendation: Systematic, empirical evidence

Further conceptualisation and validation of several suggested learning outcomes, i.e.

* Career perspectives;
* Creativity;
* Critical thinking;
* Problem solving;
* Interdisciplinary skills.

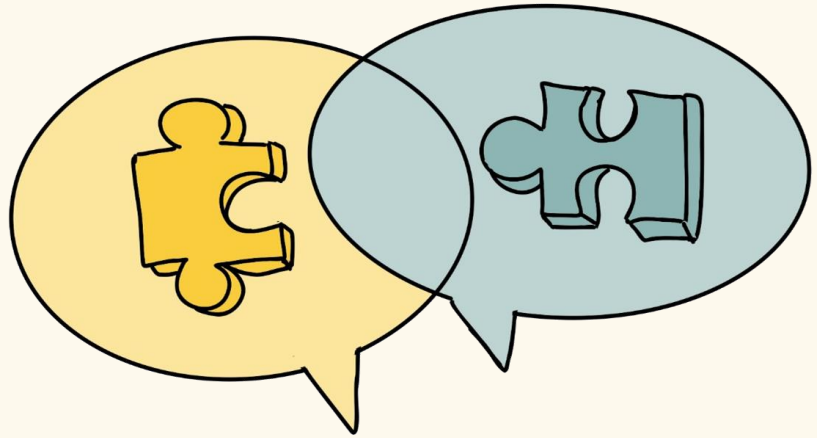
Discussion

“Houston, we have a complex problem”

“Interdisciplinary education learns students to solve complex problems”

* Not supported by empirical evidence in this research
  - The construct was not made explicit in any of the papers
  - Not clear wat was investigated

* Does ‘problem solving’ represents the comprehensive learning outcome encompassing various other learning outcomes of interdisciplinary education?



Discussion

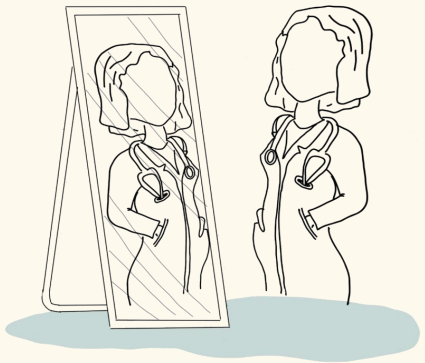
Practical educational recommendations

Develop interdisciplinary education with constructive alignment (based on the possible learning outcomes)

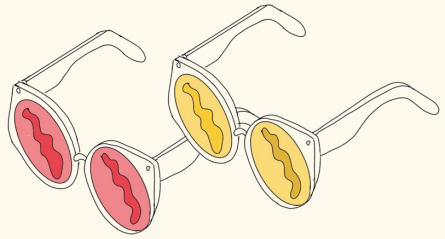
Implement interdisciplinary education tailored to the study progress of students and to specific student groups

>Is interdisciplinary education as effective in Bachelor courses as in Master courses?
>And is this the case for all learning outcomes or just for specific ones?

Conclusion



- 12 different learning outcomes in three categories:
  - *Academic and disciplinary engagement*
  - *(Meta)cognitive skills*
  - *Perspective taking skills*
- Heterogeneous research methods, study quality and study outcomes
- Recommendations for further research:
  - *Develop and validate assessment tools*
  - *Further empirical research*
- Recommendation for education:
  - *Interdisciplinary education with constructive alignment*
  - *Tailored to students' study progress*



Questions?

A preprint of this article is available:
Project MUSE - The State of the Empirical Evidence for Interdisciplinary Learning Outcomes in Higher Education: A Systematic Review (jhu.edu)

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