



EARLI

SIG 4 & 11



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Symposium: Innovation in Assessing Domain-Specific Critical Online Reasoning and Its Growth in Higher Education

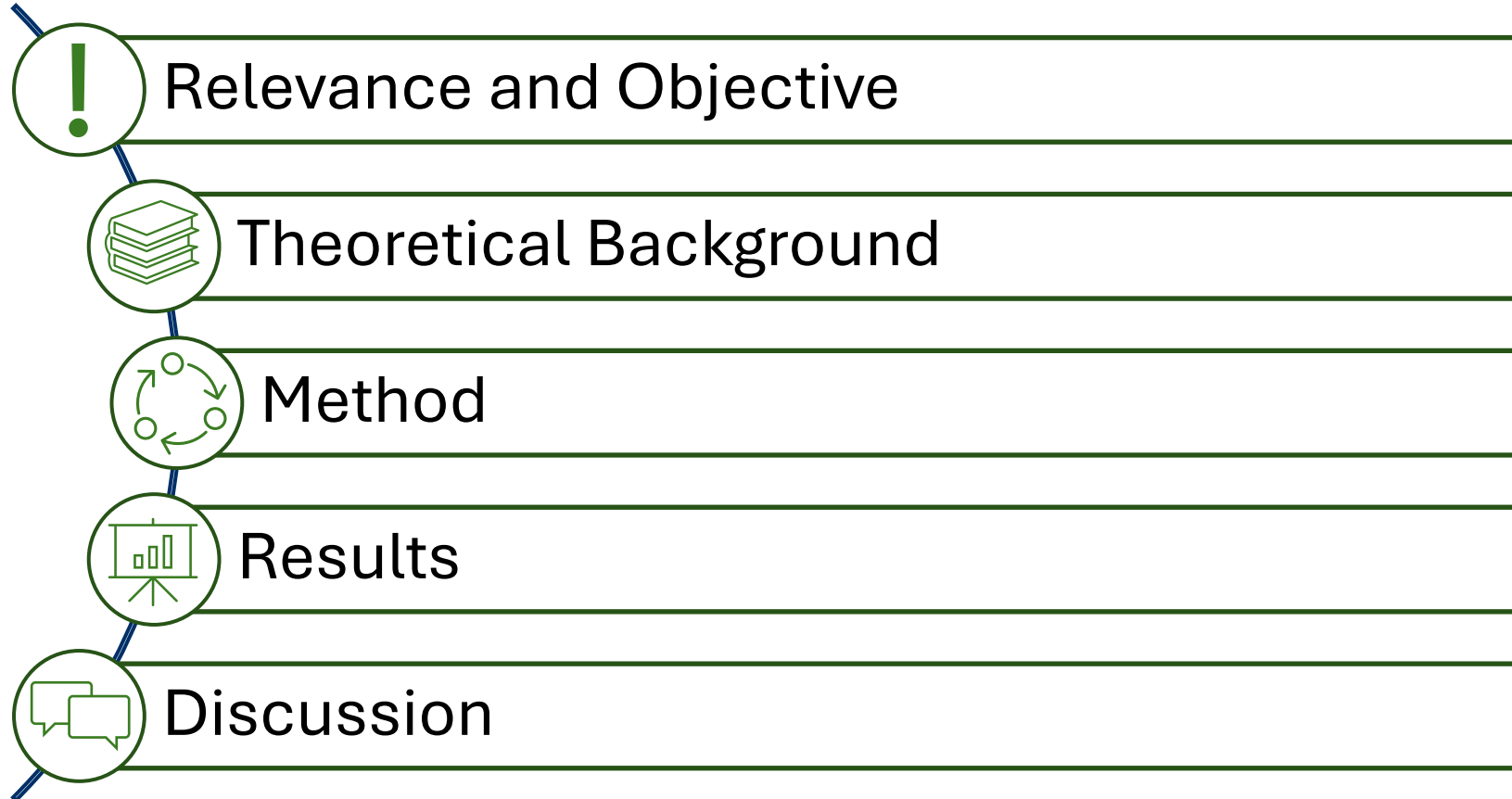


Longitudinal Digital Assessment of Student Development in Domain-Specific Critical Online Reasoning

Marie-Theres Nagel, Olga Zlatkin-Troitschanskaia, Paul Hodes, Lukas Trierweiler, Lisa Martin de los Santos, William Walstad



Agenda



Relevance and Objective



- Rapid advancements in digital information have fundamentally altered how online information is sought in economics education and practice (Essien et al. 2024; Korinek 2023)
- Research suggests that economics students' skills in using online information are deficient (Khatri 2021; Nagel et al. 2024)
- Despite students' deficits, there are currently only a few systematic attempts in economics to foster these skills when using online information in higher education (Calma & Davies 2025; Kearney 2022)

Study Objective: Longitudinal examination of the development of students' domain-specific skills in using online information, assessed through **open-ended, scenario-based performance tasks**, as a basis for developing targeted instructional training methods.

Research Questions: How do economics students' skills in using online information for domain-specific economic purposes develop over the course of their first year of bachelor's studies, and what are the main predictors of this development?

Theoretical Background



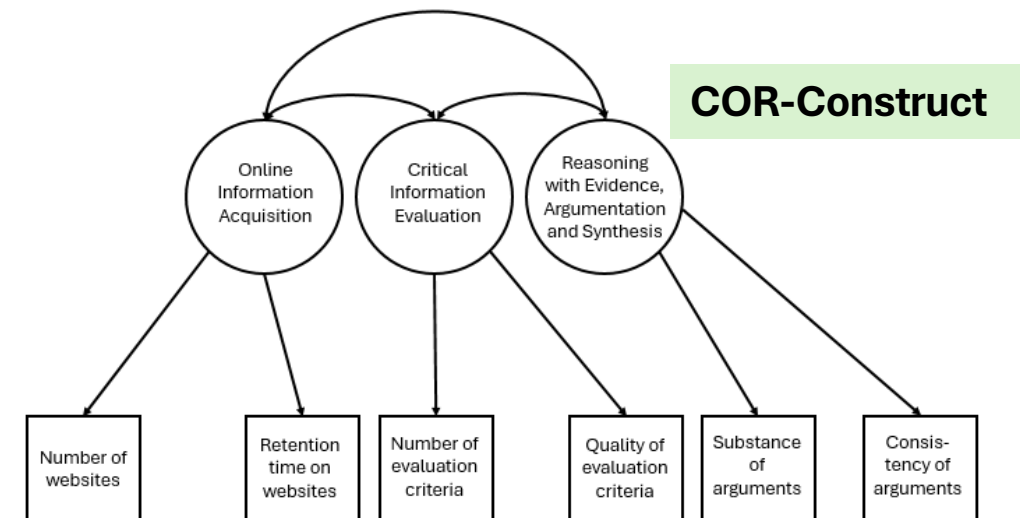
Economic Critical Online Reasoning (COR)

The subdomain of critical economic thinking that encompasses the skills necessary for self-regulated engagement with online, economics-related information. This includes the ability to critically search for and access information (OIA facet), evaluate, select, and reflect on the credibility and relevance of economics-related sources (CIE facet), and synthesize this information to construct coherent economic arguments, make well-founded economic decisions, and draw economically sound conclusions (REAS facet) (Zlatkin-Troitschanskaia et al. in review).

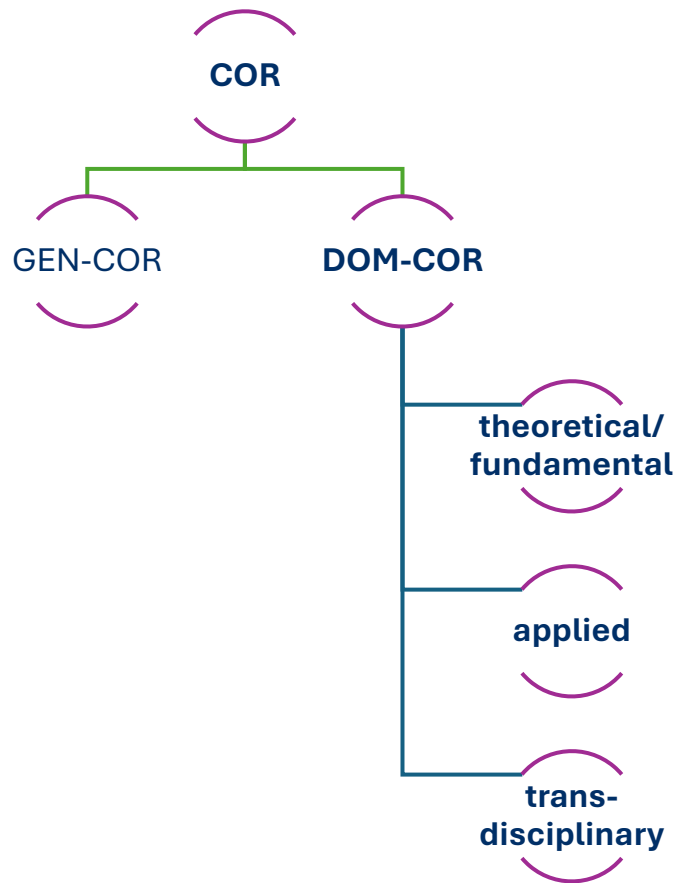
Three interconnecting facets:

- (i) Online Information Acquisition (OIA)
- (ii) Critical Information Evaluation (CIE)
- (iii) Reasoning based on Evidence, Argumentation and Synthesis (REAS)

Activation and regulation of the facets by Metacognitive abilities (MCA) (Molerov et al. 2020)



Theoretical Background



(Zlatkin-Troitschanskaia et al. in review)

- Differentiation between three practical contexts:

Fundamental Economic Reasoning

Accurate recognition, interpretation, and application of core economic concepts such as *opportunity cost*, *break-even point*, or *price elasticity*

Applied Economic Reasoning

Solving real-world economic problems, e.g., resolving contradictory financial data or planning under uncertain conditions, by integrating information from multiple, often conflicting, online sources

Transdisciplinary Reasoning

Applying economic reasoning to complex, multi-perspective real-world problems, e.g. making decisions about costly life-extending medical treatments within limited budgets

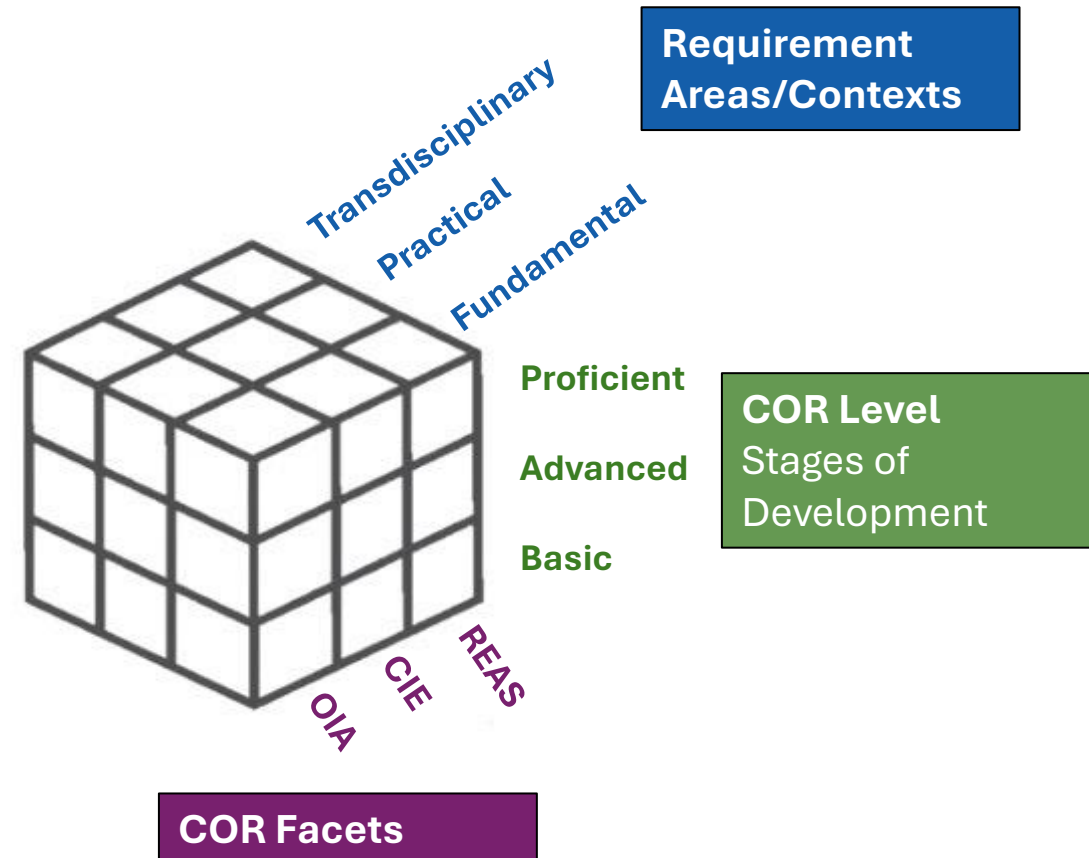
Theoretical Background



Development of a digital **COR Assessment** in evidence-centered design (Mislevy 2018)

- Every task covers
 - i. All three DOM-COR facets
 - ii. All three reasoning contexts
- 2 out of 7 scenario-based tasks, 25-30 minutes per task
 - ✓ Performing an open web search
 - ✓ Evaluation of found online information
 - ✓ Short text-based answer for each task
- Data
 - ✓ Recording of response texts and task-solving processes (log data) in the assessment environment in real-time
 - ✓ Subsequent scoring by 3-4 trained raters using a newly developed rating scheme (Hartig et al. 2026)

(Zlatkin-Troitschanskaia et al. in review)



DOM-COR Task example excerpt: Nudging

The Ministry of Economic Affairs is exploring ways of reducing electricity consumption and sees potential in using incentives to encourage energy-saving behavior (Nudging). One idea is to equip electrical appliances with intelligent display systems and sensors which show power consumption, allowing users to track their daily energy use through their cell phones. There are two options for providing this information: either through a fixed "default" setting that is automatically displayed when the cell phone is turned on or through a daily reminder pop-up. The government would decide on which version, either (a) or (b), cell phone manufacturers would be required to implement. These measures aim to promote energy-saving practices without enforcing strict regulations and offer individuals the freedom to make their own choices.

You have the task of preparing an exposé for a draft resolution. This involves the following three assignments. You have a maximum of 25 minutes to complete these assignments.

- 1. Which economic factors should be taken into account when regulating energy consumption through nudging measures in respect of current economic developments? In the next 10 minutes, research two current sources on the Internet.**
- 2. Write a concise statement in which you outline the key economic factors which may positively or negatively influence the effectiveness of the measures mentioned above on energy saving (150-250 words). Base your answer on at least two of the sources you found in your search (max. 10 min.).**
- 3. (...)**

Method



Econ DOM-COR scoring rubrics for REAS facet.

Reasoning Context	Abbreviation	Short Description	Points
All	Problem	The statement references the problem?	Yes: 1 point
All	Coherence	Coherence of argumentation	Up to 3 points
All	Conclusion	The statement comes to a clear conclusion?	Yes: 1 point
All	Sources	Number of sources that are clearly referred to in the statement	1 point per source up to a maximum of 4 points (4 sources).
All	Arguments	Number of comprehensible arguments with clear source reference	1 point per argument up to a maximum of 4 points (4 arguments).
Fundamental & Applied	Argumentation	Does the statement contain a stringent economic argumentation?	Yes: 1 point
Applied & Transdisciplinary	Balance	The statement lists both pro and con arguments regarding the question?	Yes: 1 point
Transdisciplinary	Perspective	Perspective from other discipline(s) / consequences considered? (e.g. social, political)	Yes: 1 point each (max. 2)

Method

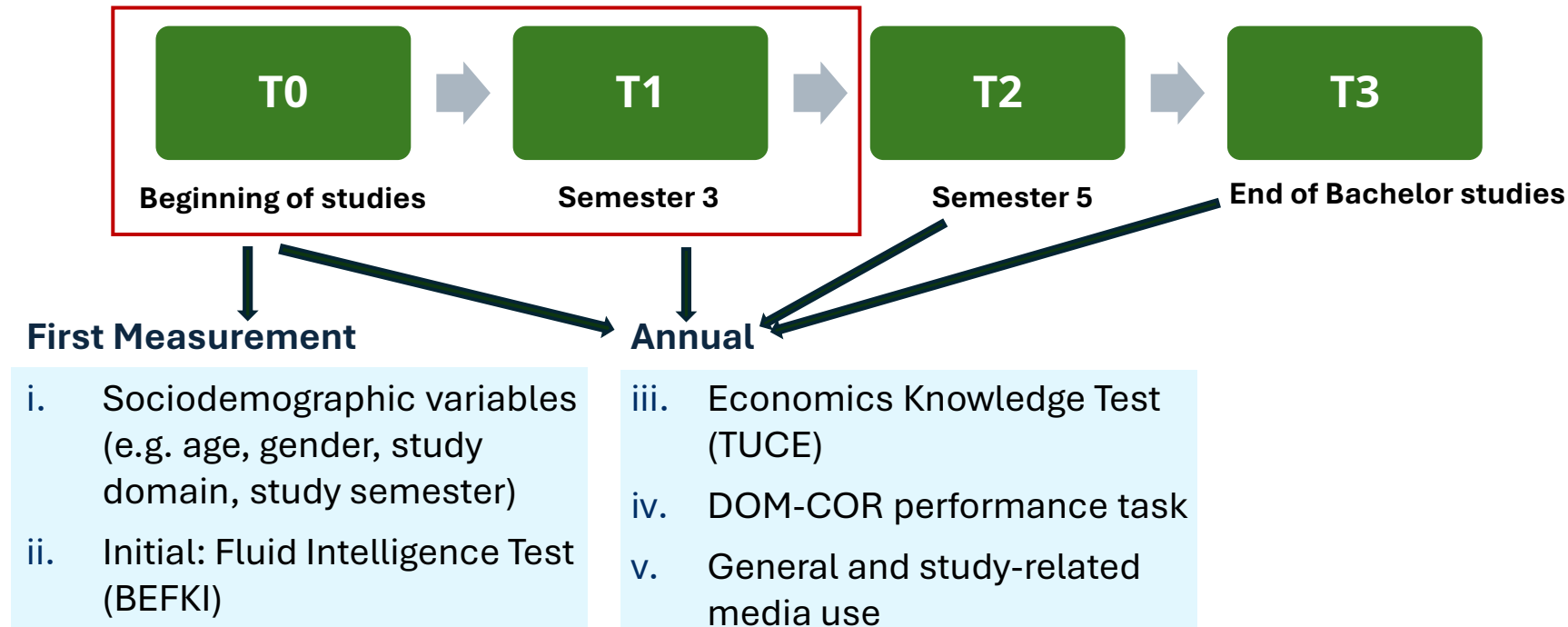


Excerpt from the rating scheme category “Coherence of argumentation”.

Rating of Response Texts	Category	Level	Short Description	COR Facet
	Coherence of argumentation	0	The statement is wholly incoherent. It contains only incoherent statements / information or is so short that no connections can be made.	REAS
		1	The statement is mostly incoherent. It contains partially consecutive statements / information, but also incoherent elements or internal contradictions.	REAS
		2	The statement is mostly coherent. 2. The transitions between individual statements / information are mostly coherent, although there are repetitions and/or possible leaps in the thought process.	REAS
		3	The statement is coherent. It has a consistently comprehensible structure in which the information/arguments cited follow from one to another.	REAS

Study Design

- Longitudinal measurement of development of DOM-COR skills in economics during bachelor studies
- Study domains Economics & Social Sciences (for comparison)
- First assessment in WS 2023/2024, second assessment in WS 2024/2025



Sample



- Longitudinal sample (participation T0 & T1)

Sample description (Total Sample)

Variable	N	M / Mode	SD	Min	Max
Domain					
Economics	124	67%	-	-	-
Social Science		33%			
Study semester	124	1.00	0.00	1.00	1.00
Gender Male	124	48%	-	-	-
Age	123	20.25	2.60	18.00	30.00
Main language German	124	81%	-	-	-
UEQ ¹ Grade	124	1.92	0.60	1.00	3.40
Vocational education	124	11%	-	-	-
Work experience	124	54%	-	-	-

¹UEQ: University entrance qualification. Grades can vary from 1 (very good) - 5 (insufficient).

Sample description (Economics)

Variable	N	M / Mode	SD	Min	Max
Study semester	84	1.00	0.00	1.00	1.00
Gender Male	84	57%	-	-	-
Age	83	20.04	2.54	18.00	30.00
Main language German	84	80%	-	-	-
UEQ ¹ Grade	84	1.91	0.58	1.00	3.30
Vocational Education	84	13%	-	-	-
Work experience	84	52%	-	-	-

¹UEQ: University entrance qualification. Grades can vary from 1 (very good) - 5 (insufficient).

Results: REAS scores T0 & T1



REAS Score development from T0 to T1 by application contexts

	N	M	SD	Min	Max
Fundamental T0	60	0.53	0.21	0.00	0.83
Fundamental T1	52	0.50	0.19	0.00	0.79
Fundamental Diff.	73	-0.03	0.27	-0.50	0.58
Practical T0	75	0.52	0.21	0.00	0.88
Practical T1	60	0.56	0.20	0.00	1.08
Practical Diff.	52	0.04	0.30	-0.67	0.87
Transdisciplinary T0	68	0.54	0.19	0.00	0.88
Transdisciplinary T1	69	0.51	0.19	0.00	0.86
Transdisciplinary Diff.	55	-0.03	0.21	-0.64	0.43

Note. Scores can vary from 0 (lowest possible score) to 1 (best possible score).

- Overall mediocre REAS performance in T0 and T1
- Averaged slightly lower performance in Fundamental and Transdisciplinary Contexts, and higher performance in Practical Context in T1; not significant

Results: REAS scores T0 & T1



Predictors of REAS Score development from T0 to T1 (overall score)

Predictor (n=84)	N	B	SE	t	p	Sig	R2
Gender	84	-0.020	0.045	-0.440	0.661		0.002
UEQ Grade	84	0.030	0.039	0.768	0.445		0.007
Age	83	0.008	0.009	0.882	0.380		0.010
Main language German	84	0.415	0.194	2.142	0.035	*	0.172
Google use frequency for learning	84	0.055	0.021	2.682	0.009	**	0.081
Economics knowledge (T0)	79	-0.009	0.010	-0.996	0.322		0.013
Earned credit points¹	39	0.001	0.000	2.150	0.038	*	0.111
Passed exams	39	0.017	0.007	2.299	0.027	*	0.125
Business Administration Grade	34	-0.065	0.028	-2.299	0.028	*	0.142
Computer Science Grade	21	-0.101	0.048	-2.115	0.048	*	0.191

Note. B = unstandardised coefficient. SE = standard error. R² = coefficient of determination. + p < .10. * p < .05. ** p < .01. *** p < .001.

¹=Grades can vary from 1 (best grade)-4 (lowest grade).

Discussion



Conclusion

- Students' REAS performance at t0 (start of studies) is largely at a medium level; no substantial improvement in performance over the first year of the economics degree program; only small differences across application contexts → overall, indicating a need for targeted support in higher economics education.
- Attended learning opportunities show influence on REAS performance.
- Non-native language status appears to be associated with lower COR development; a similar pattern for social media use (YouTube); early practice in online information searching appears to be an advantage for COR development.

Limitations

- Limited database due to sample size and possible sample selection effects (Trierweiler et al.).
- Analyses don't include CIE/OIA facets; levels and development of abilities may be different.

Outlook

- Longitudinal OIA, CIE, and REAS analyses with all measurement points are in progress.
- In-depth analyses on the influence of other socio-demographic factors (e.g., vocational experience; Hodes et al.) and information landscape properties (Touzos et al., Braunheim et al., Griesbeck-Bachmann et al.).
- Ongoing research including AI: LLM usage as influencing factor (e.g., Trierweiler et al. in review) and LLM-supported task ratings (Schmidt et al.).



Thank you for your attention!

Marie.nagel@uni-mainz.de
core@uni-mainz.de

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