

Facilitating student engagement through educational technology

Division of Academic Teaching & Faculty Development
TU Dortmund
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Aktive Teilnahme:

<https://www.menti.com/alxz7t8dgqkr>



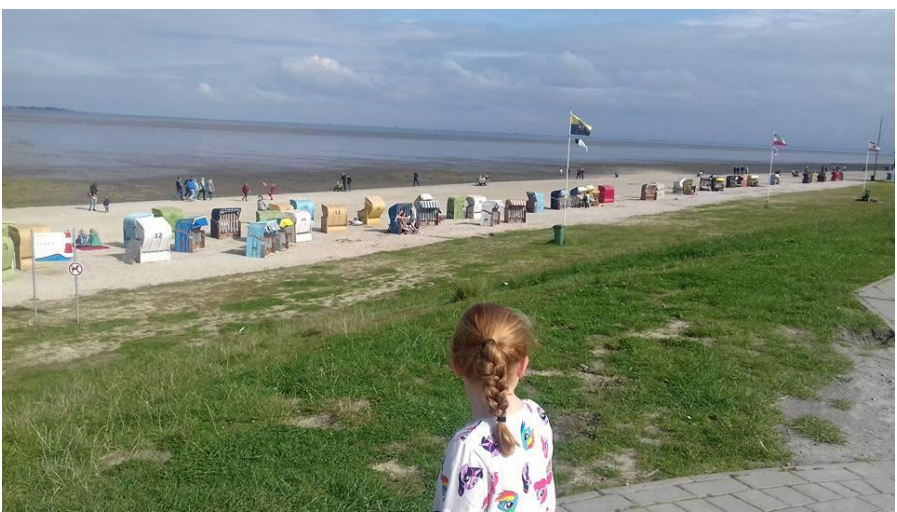
My background

- Born and raised in South Australia
- High school teacher (10 years)
 - > German, Humanities, IT, English, Drama, Music...



My background

- Research Associate
 - > CvO Universität Oldenburg, 2017-2020
 - > ActiveLearn project
 - > PhD, 2020 – *Facilitating student engagement through educational technology: Current research, practices and perspectives*



My background

- EPPI-Reviewer Support Officer
 - > University College London
 - > Feb 2020 – Feb 2022
- Systematic & mapping reviews
 - > T&L during COVID-19
 - > Methodological support



My background

- Lecturer (Digital Technology Education), 2022 - 2023
 - > University of South Australia
 - > Undergraduate & Postgraduate
 - > Research focus: engagement, AI, evidence synthesis, IRC



Source: <https://southaustralia.com/>

Current positions

- Research Fellow, EPPI Centre (UCL, UK)
- Adjunct Associate Professor (University of Stavanger, Norway)
- Research Fellow (National Institute of Teaching, UK)

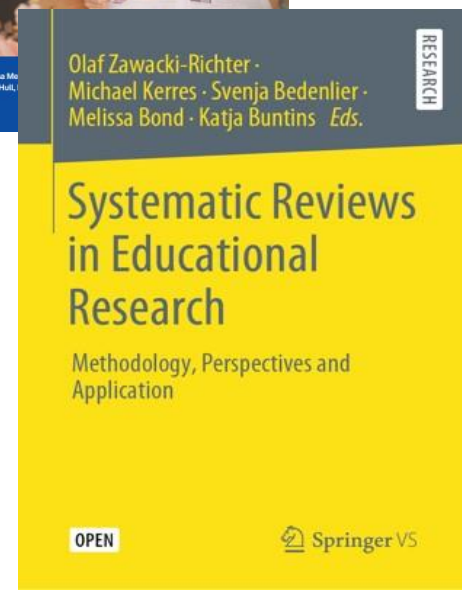
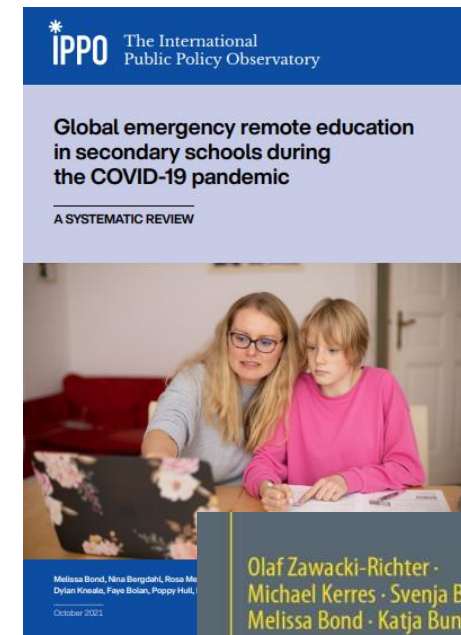


Evidence synthesis

- [Student engagement and educational technology in higher education](#)
- [Student engagement and the flipped learning approach \(K-12\)](#)
- [Artificial Intelligence in Higher Education](#)
- [Systematic Reviews in Educational Research \(co editor\)](#)
- [COVID-19 studies on teaching and learning in K-12 \(rapid review\)](#)
- [COVID-19 studies on teaching and learning in higher education](#)
- [Teaching and learning in secondary schools during COVID-19](#)

Current reviews include...

- Artificial intelligence in education – meta review
- Language bias & methodological approaches to evidence synthesis – meta review
- Mothers undertaking doctoral studies – systematic review
- Disabled pre-service teachers – scoping review
- Programming and computational thinking in K-12 – meta review



Student engagement conceptualisation

Like a black box¹

“A catch-all term”²

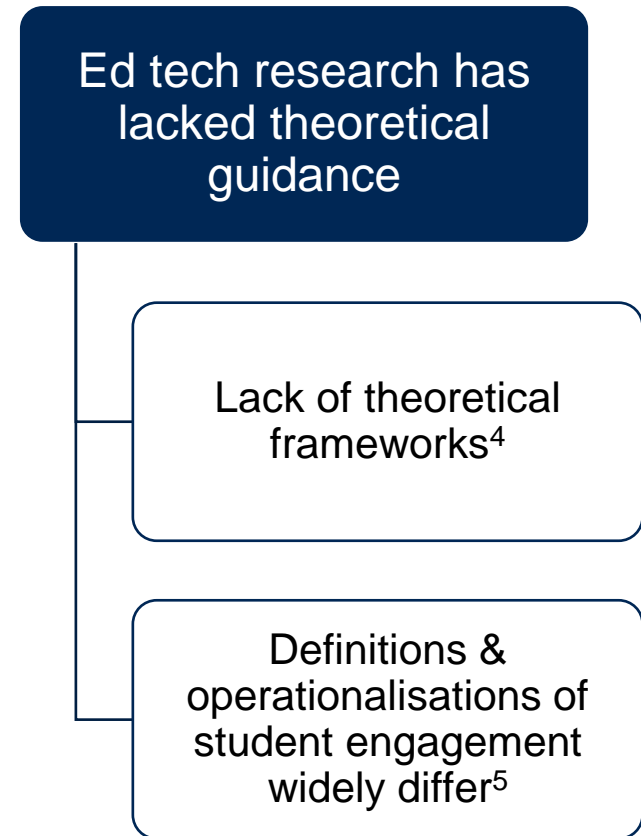
Suffers from indigestion³

“One of the most widely used and overgeneralised constructs found in the educational, learning, instructional and psychological sciences.”⁴

“3 blind men describing an elephant”⁵

1. Bryson & Hardy (2011)
2. Krause (2005, p. 3)
3. Zepke (2018, p. 43)
4. Azevedo (2015, p. 84)
5. Eccles (2016, p. 71); also Baron & Corbin (2012)

Educational technology and engagement



1. Alioon & Delialioglu (2017); Bouta, Retalis & Paraskeva (2012)
2. Salaber (2014); Northey, et al. (2015); Alioon & Delialioglu (2017)
3. Junco (2012); Alioon & Delialioglu (2017)
4. Hew et al. (2019); Karabulut et al. (2018)
5. Henrie, Halverson & Graham (2015)

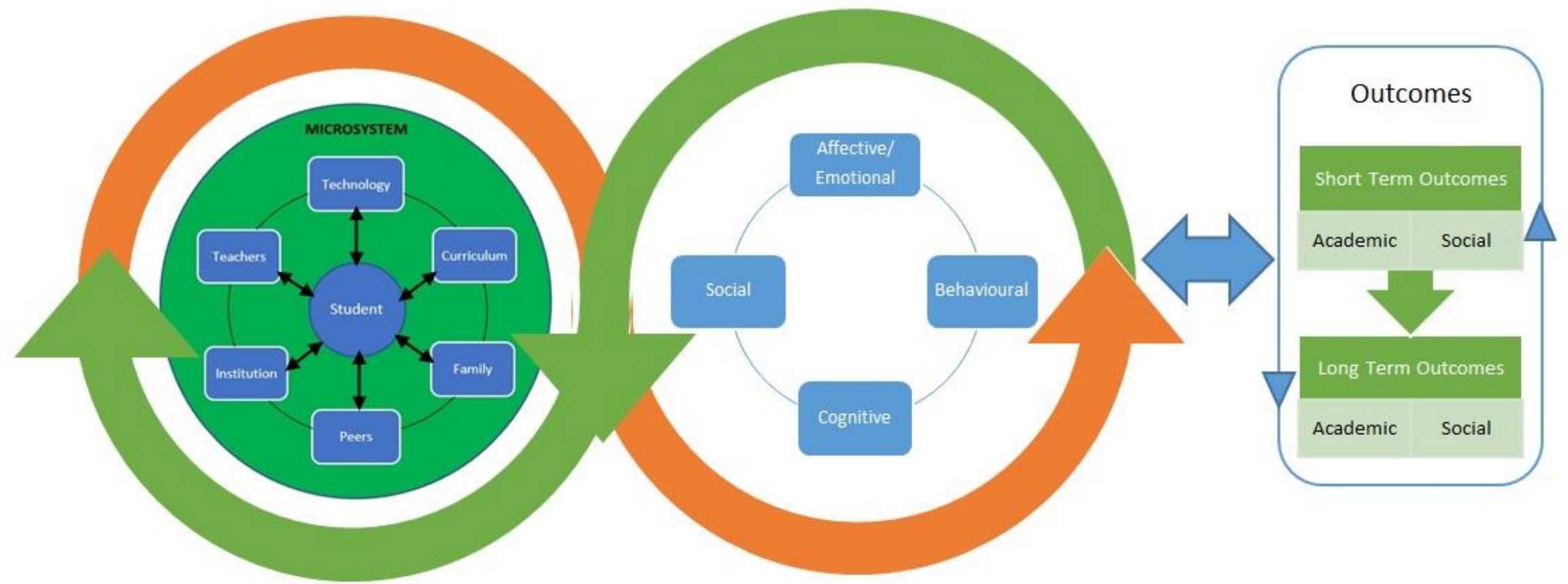
What is student engagement?

Student engagement is the **energy and effort** that students employ within their learning community, observable via any number of **behavioural, cognitive, affective or social** indicators across a continuum. It is shaped by a range of **structural and internal influences**, including the complex interplay of relationships, learning activities and the learning environment. The more students are engaged and empowered within their learning community, the more likely they are to channel that energy back into their learning, leading to a range of short and long term outcomes, that can likewise further fuel engagement.

Student engagement framework

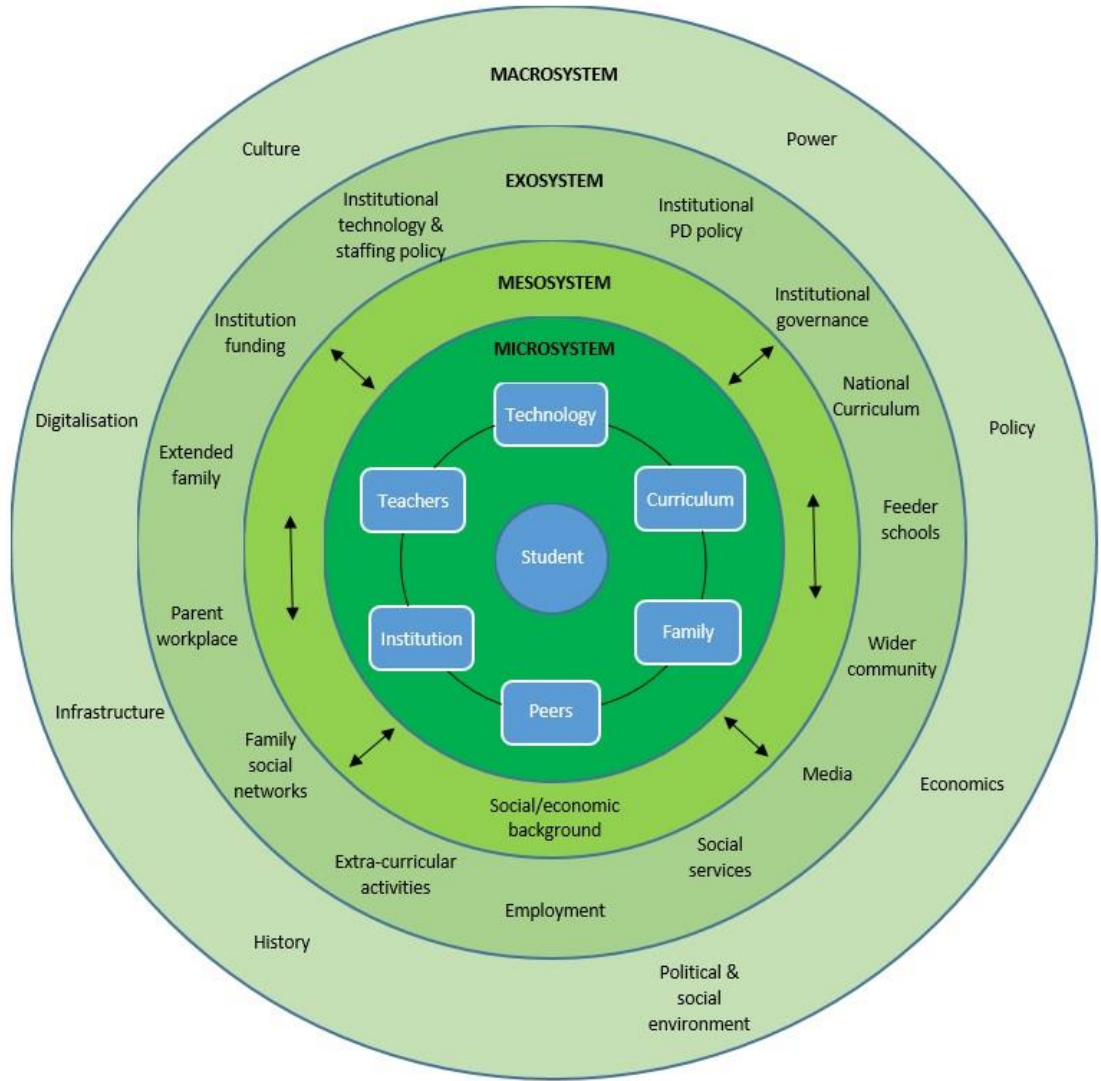
Technology-Enhanced Learning Environment

Student Engagement



Adapted from Bond & Bedenlier (2019, p. 8)

Bioecological Student Engagement Framework



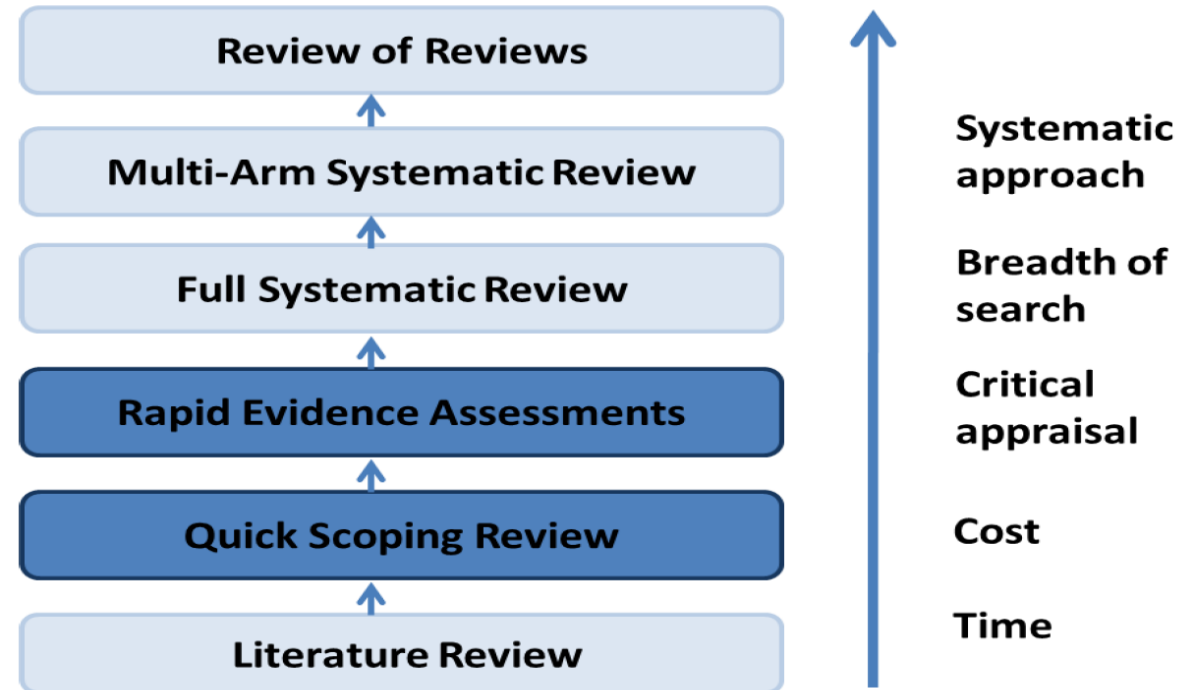
Behavioural Engagement	Cognitive Engagement	Affective Engagement	Social Engagement
Effort	Critical thinking	Enthusiasm	Collaborating & interacting with peers
Study habits/homework completion	Self-regulation	Interest	Collaborating & interacting with teachers
Attending live lessons	Reflection	Satisfaction	Shared knowledge building
Assuming responsibility	Deep learning	Pride	Asking for help
Participation/involvement	Focus/concentration	Excitement	Caring for others

Behavioural Disengagement	Cognitive Disengagement	Affective Disengagement	Social Disengagement
Procrastination	Unwilling	Boredom	Feeling isolated
Absence	Apathy	Anger	Not feeling cared for
Giving up	Opposition/rejection	Dislike	Withdrawing
Poor conduct	Avoidance	Disinterest	Social anxiety
Task incompleteness	Unfocused/inattentive	Frustration	Challenging interactions

Systematic Review Methodology

- “Rather than looking at any study in isolation, we need to look at the body of evidence”¹

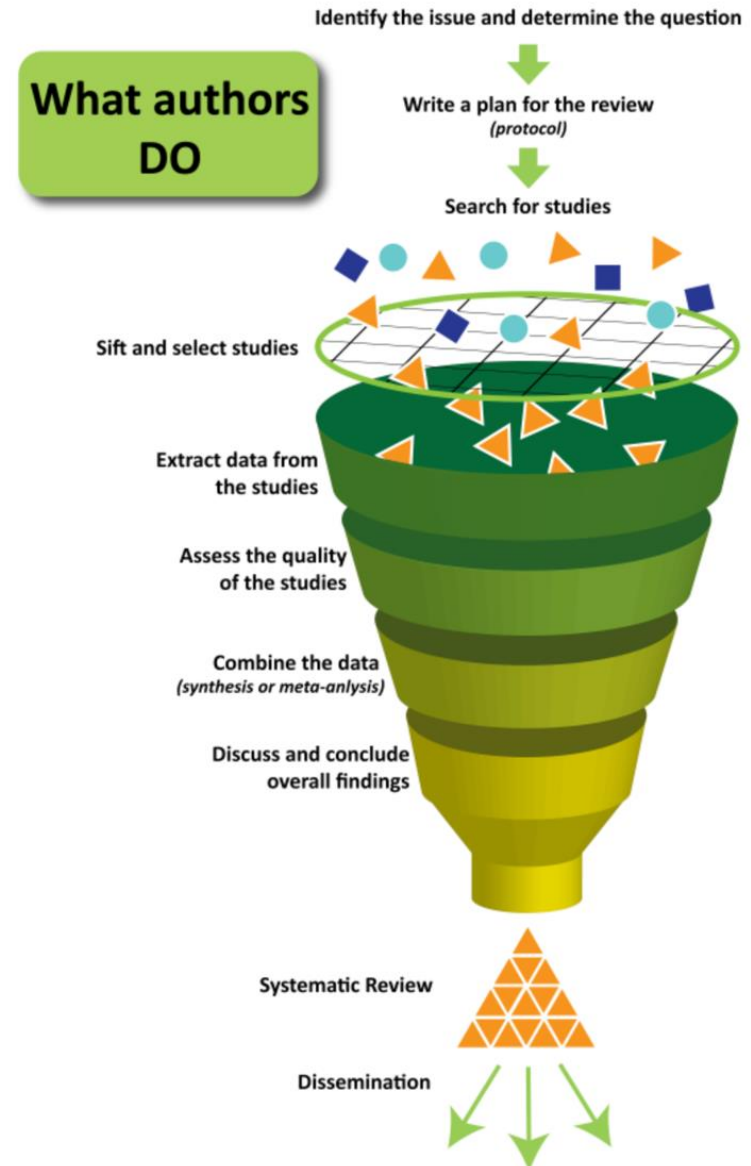
- “a review of research literature using systematic and explicit, accountable methods”²
 - Transparent and explicit
 - Replicable and updatable
 - Identify gaps, contradictions or (in)consistencies



Collins, Coughlin, Miller, & Kirk (2015, p. 1)

Systematic Review Process

- Review question and conceptual framework
- Search strategy: search string and selection criteria
- Study screening
 - ❑ Title & Abstract
- Study retrieval
- Screen on full text
- Data Extraction
- Quality assessment
- Synthesis
- Report



Online and blended learning in secondary schools during the COVID-19 pandemic

Research questions

1. In what ways did emergency remote education affect motivation and engagement in secondary students?
2. How did research report on emerging online assessment practices in secondary schooling during the pandemic?
3. Are new approaches to peer collaboration emerging and what does this suggest?
4. How did online learning in secondary schools affect parent engagement?
5. What emerging uses of online and blended learning approaches in secondary schools could continue to be implemented going forward?

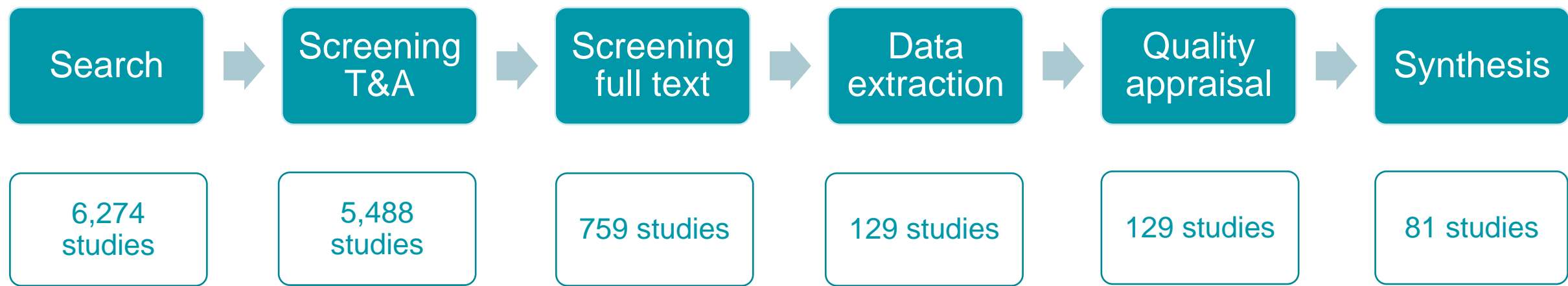
METHOD

Systematic review

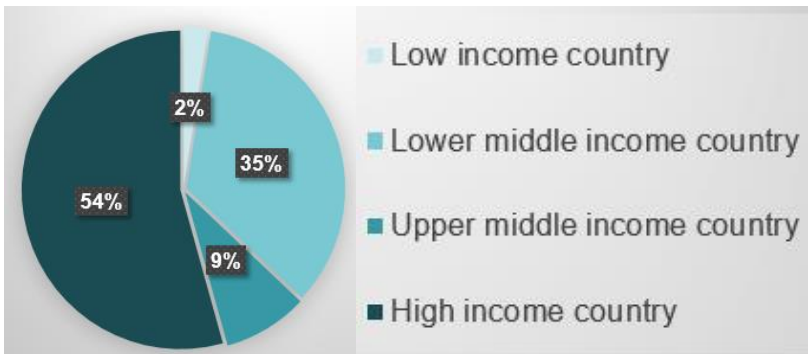
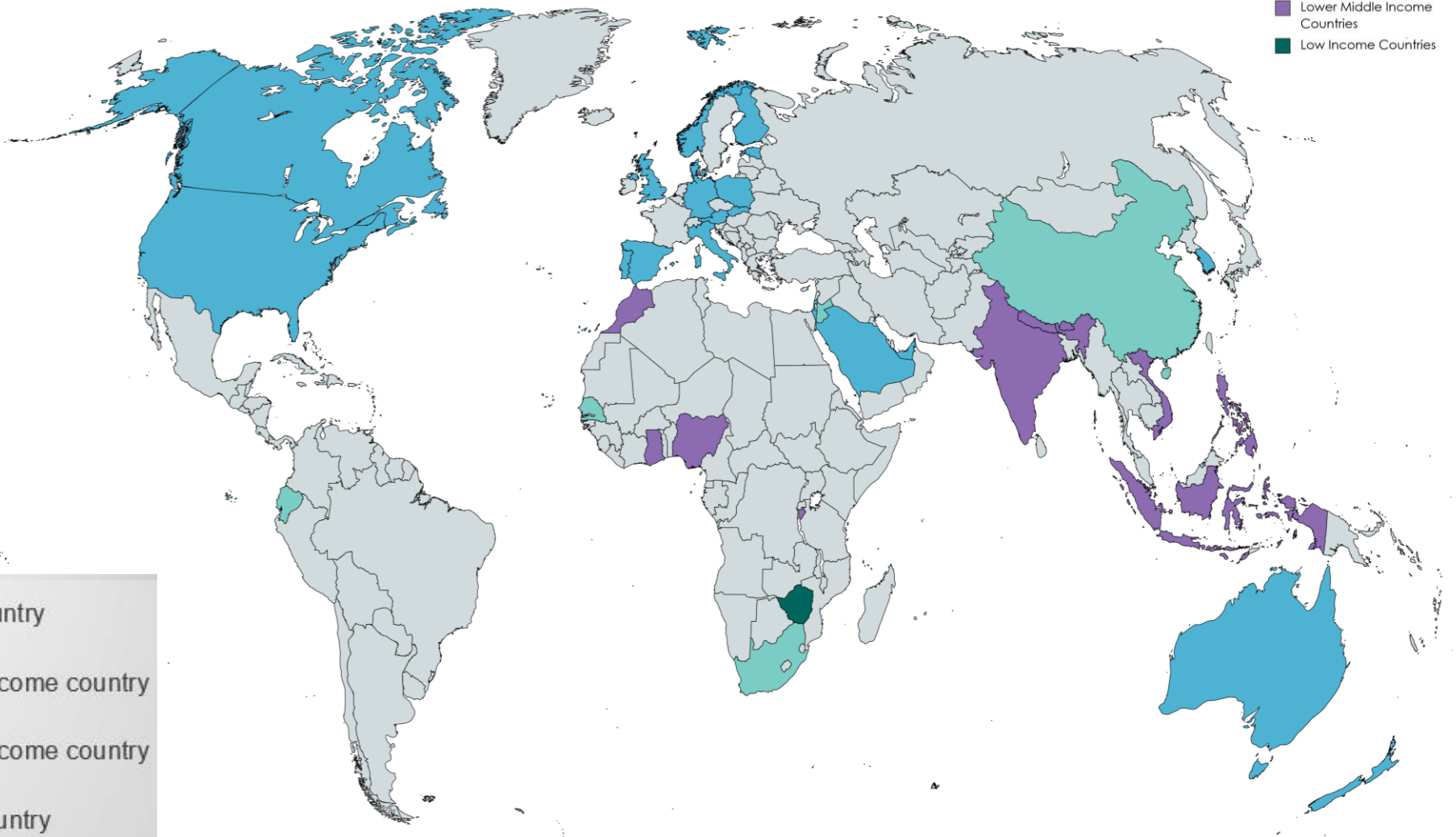
This is a systematic review of research, using rigorous methods for identifying evidence, conducting quality appraisal and synthesis: 81 studies met our criteria and were included in the review.

Inclusion criteria

- Secondary school only
- English
- Teaching and learning
- Online or blended learning
- Primary, empirical research
- Undertaken during the pandemic



Continent	N	%
Asia	34	42%
Europe	21	26%
North America	12	15%
Africa	5	6%
Middle East	5	6%
Oceania	3	4%
South America	1	1%



This review

- Some students were more motivated to learn and complete school work.
 - Increased ability to study.
 - Heightened sense of responsibility.
- Some reserved students were found to interact and participate more.
- Emotional and physical distance.
- More instances of behavioural disengagement in studies from high income countries (59%) as opposed to lower middle income countries (29%).
- Having to learn to use new tools, as well as learning online, was quite overwhelming, alongside life load.

Engagement Indicators		
1	Heightened self-regulation	26%
2	Understanding of topics/tasks	19%
3	Enjoyment	17%
4	Positive study habits	17%
5	Sense of wellbeing	16%

Disengagement Indicators		
1	Feeling isolated socially	27%
2	Absence from live lessons	19%
3	Confusion	19%
4	Feeling overwhelmed	14%
5	Dislike	12%

Flipped learning review pre-pandemic

Engagement Indicators		
1	Increased interaction with peers	47%
2	Enjoyment	39%
3	Participation/involvement	36%
4	Increased interaction with teachers	35%
5	Increased confidence	31%

Disengagement Indicators		
1	Task incompleteness	21%
2	Frustration	15%
3	Unwillingness	14%
4	Confusion	14%
5	Dislike	13%

This review

Engagement Indicators		
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In what ways did emergency remote education affect motivation and engagement in secondary students during the COVID-19 pandemic?










An interactive evidence gap map to accompany the systematic review 'Emergency remote education in secondary schooling during COVID-19'

		Study Characteristics													
		Technology used													
		Synchronous collaboration tools	Multimodal production tools	Knowledge organisation & sharing tools	Text-based tools	Social networking tools	Assessment tools	Learning games	Website creation tools	Non-tech printed materials	Other technology (e.g. radio)	Data analysis tools	Virtual worlds	N	
Outcomes	Student engagement	Positive/Increased Motivation													
	Positive overall engagement														
	Cognitive engagement														
	Affective engagement														
	Behavioural engagement														
	Learning gains														

WHAT WAS FOUND ENGAGING?

- Assessment tools, especially quizzes
- Learning management systems with collaborative tools
- Breakout rooms with chat for peer interaction and teaching
- Live synchronous lessons including social time
- Teacher-made videos, alongside videos from others

PARTICULAR CHALLENGES

-  Lack of student attendance in live lessons
-  Decreased opportunities for interaction
-  Unexpected changes to the school day
-  Fewer opportunities to ask questions
-  Written explanations sometimes unclear
-  Volume of work assigned by teachers
-  Distractions in the home

Educational technology & engagement in higher education before the pandemic

Research Questions

1. How do the studies in the sample ground student engagement and align with theory?
2. Which indicators of cognitive, behavioural and affective engagement were identified in studies where educational technology was used? Which indicators of student disengagement?
3. What are the learning scenarios, modes of delivery and educational technology tools employed in the studies?

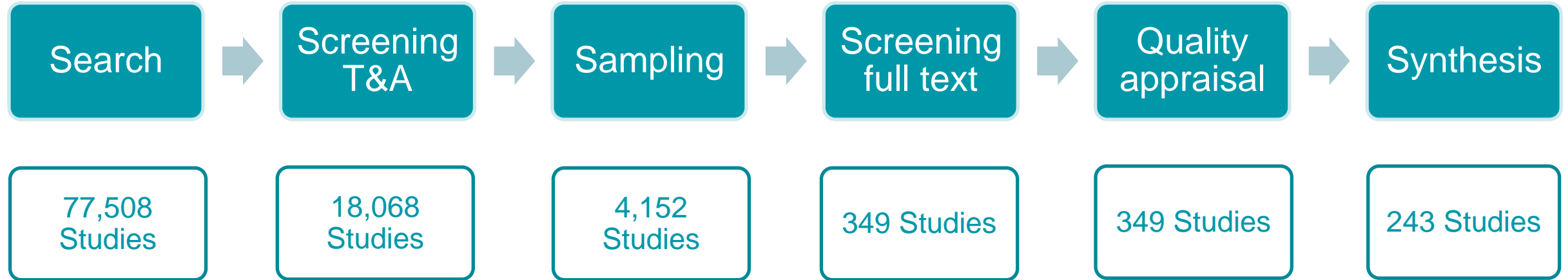
METHOD

Systematic review

- Comprehensive search string
- ERIC, Web of Science, Scopus, PsycINFO

Inclusion criteria

- 2007-2016
- Higher education
- English
- Teaching and learning
- Peer-reviewed
- Primary, empirical research
- Educational technology
- Student engagement



Student Engagement

- Almost all studies lacked a definition of student engagement (93%, $n = 225$)
- Evidence of at least one dimension of engagement in 94% ($n = 229$)
 - Behavioural engagement 86%
 - Affective engagement 67%
 - Cognitive engagement 56%

Top 5 Engagement und Disengagement Indicators

Engagement Indicators		
1	Participation/involvement	49%
2	Achievment	44%
3	Positive interaction with teachers/peers	41%
4	Enjoyment	23%
5	Learning from peers	22%

Disengagement Indicators		
1	Frustration	14%
2	Opposition/rejection	8%
3	Disappointment	7%
4	Pressured	7%
5	Worry/anxiety	7%

Digital tools

- Over 50 different tools
- Top 3 tool categories with engagement:
 1. Text-based Tools
 2. Knowledge organisation and sharing Tools
 3. Multimodal production tools

Halt! Bis 2016!

	TBT	MPT	WCT	KO&S	DAT	DST	AT	SNT	SCT	ML	MOOCs	VirWor	LS	OL	Hardware	Peer eTutors	Games	Sum Engagement
Affective (+)	0.63	0.36	0.15	0.46	0.01	0.01	0.21	0.09	0.06	0.04	0.01	0.06	0.04	0.02	0.08	0.03	0.01	163
Affective (-)	0.56	0.37	0.18	0.49	0	0.01	0.24	0.09	0.1	0.07	0	0.1	0.03	0.03	0.1	0.03	0	68
Behavioural (+)	0.59	0.35	0.11	0.42	0.01	0	0.28	0.08	0.07	0.04	0.01	0.08	0.04	0.04	0.07	0.03	0.01	209
Behavioural (-)	0.58	0.38	0.18	0.4	0	0	0.22	0.18	0.11	0.07	0.02	0.04	0.02	0.02	0.04	0	0	45
Cognitive (+)	0.63	0.38	0.16	0.47	0	0.01	0.2	0.1	0.07	0.05	0.01	0.07	0.05	0.02	0.06	0.03	0	136
Cognitive (-)	0.63	0.33	0.18	0.47	0	0	0.27	0.12	0.04	0.04	0	0.04	0.02	0.04	0.06	0	0	49
overall	0.36	0.43	0.07	0.29	0	0	0.36	0	0	0.07	0	0.21	0.14	0	0.07	0.07	0	14
Sum Tool	138	89	29	104	2	1	65	21	16	10	3	18	9	10	15	8	3	

Fig. 5 Engagement and disengagement by tool typology. *Note.* TBT = text-based tools; MPT = multimodal production tools; WCT = website creation tools; KO&S = knowledge organisation and sharing tools; DAT = data analysis tools; DST = digital storytelling tools; AT = assessment tools; SNT = social networking tools; SCT = synchronous collaboration tools; ML = mobile learning; VW = virtual worlds; LS = learning software; OL = online learning; A&H = Arts & Humanities; BA&L = Business, Administration and Law; EDU = Education; EM&C = Engineering, Manufacturing & Construction; H&W = Health & Welfare; ICT = Information & Communication Technologies; ID = interdisciplinary; NS,M&S = Natural Science, Mathematics & Statistics; NS = Not specified; SoS = Social Sciences, Journalism & Information

Emergency remote teaching in higher education during the pandemic

Research Questions

1. Where, when and by whom has research on teaching and learning in higher education during the COVID-19 pandemic been published?
2. What are the characteristics of, methods used, and topics studied in teaching and learning research in higher education during the COVID-19 pandemic?
3. What technology has been used during emergency remote teaching in higher education?

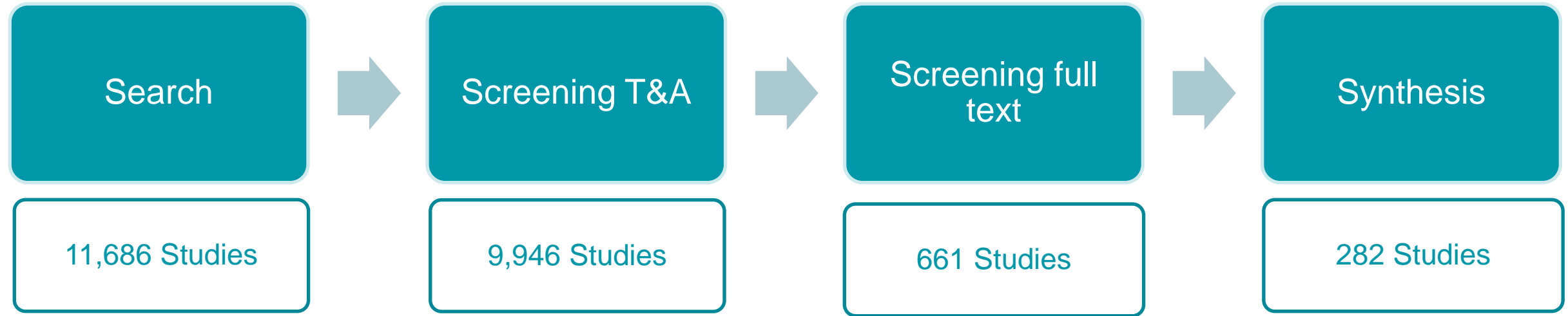
METHOD

Systematic review

- Comprehensive search string
- ERIC, Web of Science, Scopus, PsycINFO, ProQuest, EBSCOHost, Google Scholar, Microsoft Academic Graph

Inclusion criteria

- During first 6 months of pandemic
- Higher education
- English, German or Spanish
- Teaching and learning
- Primary, empirical research
- Published after January 2020
- Students, educators or administrators as units of analysis



Key Findings

Continent	N	%
Asien	78	27,7%
Europa	77	27,3%
Nordamerika	64	22,7%
Naher Osten	40	14,2%
Süd- und Mittelamerika	18	6,4%
Afrika	17	6,0%
Ozeanien	6	2,1%

- Mostly focused on undergraduates (46.1%)
- Health & Welfare (27.3%)
- Natural Science, Maths & Stats (24.1%)
- Education (16%)

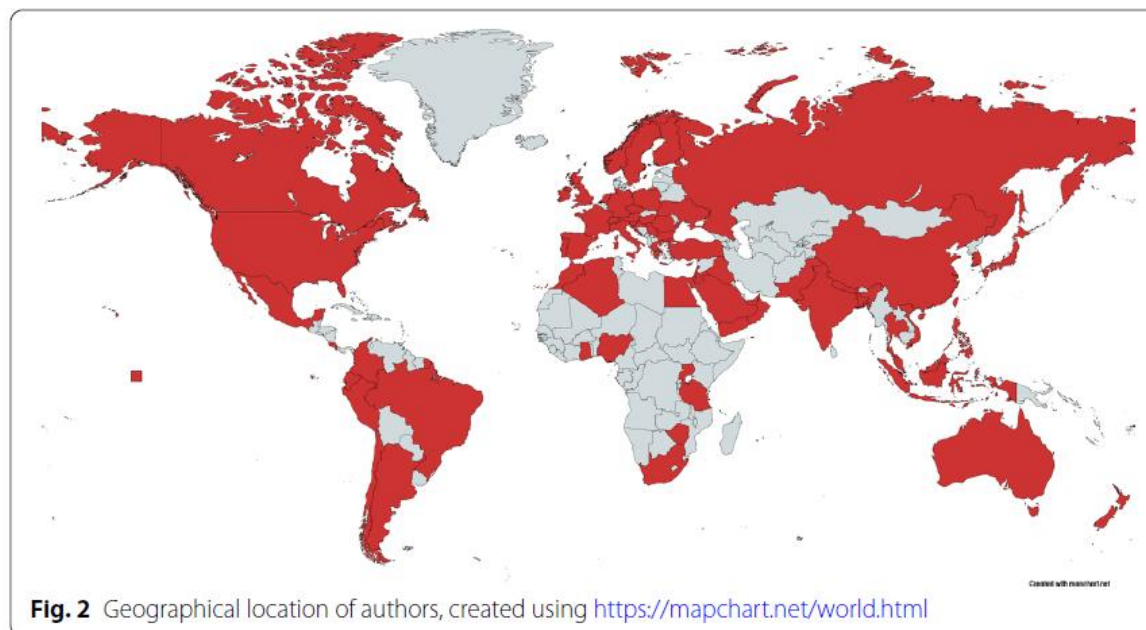
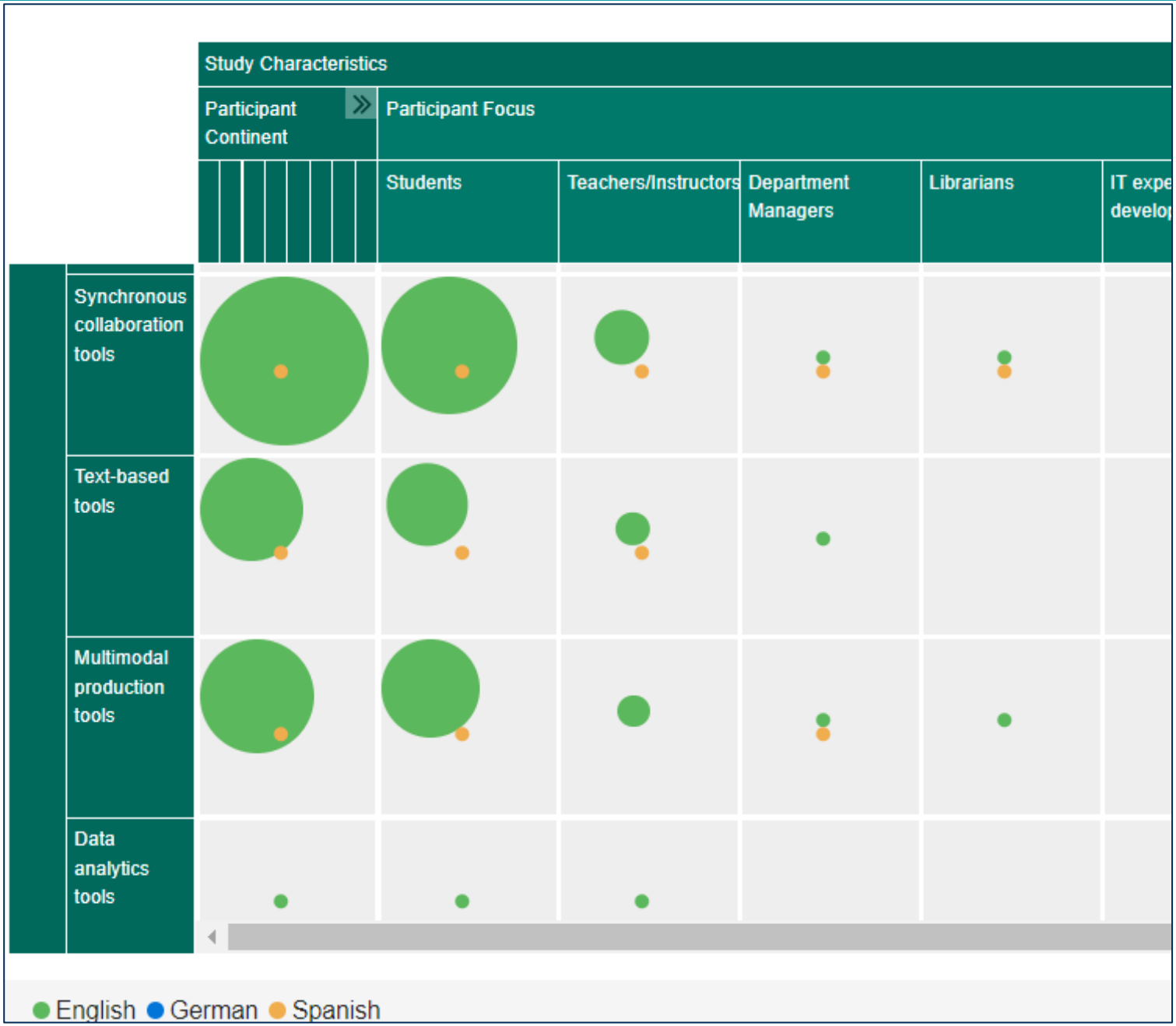


Table 7 Top five topic focus of studies ($n = 282$)

Area of focus	N studies	N studies [%]
Student perceptions of online learning	171	60.6
Impact of shift to online learning	84	29.8
Teacher perceptions of online learning	54	19.1
Students' technical equipment	38	13.5
Course redesign	31	11.0



- Top 3 Tool categories:
- Synchronous collaboration tools (51.8%)
 - LMS (41.5%)
 - Multimodal production tools (34.8%)

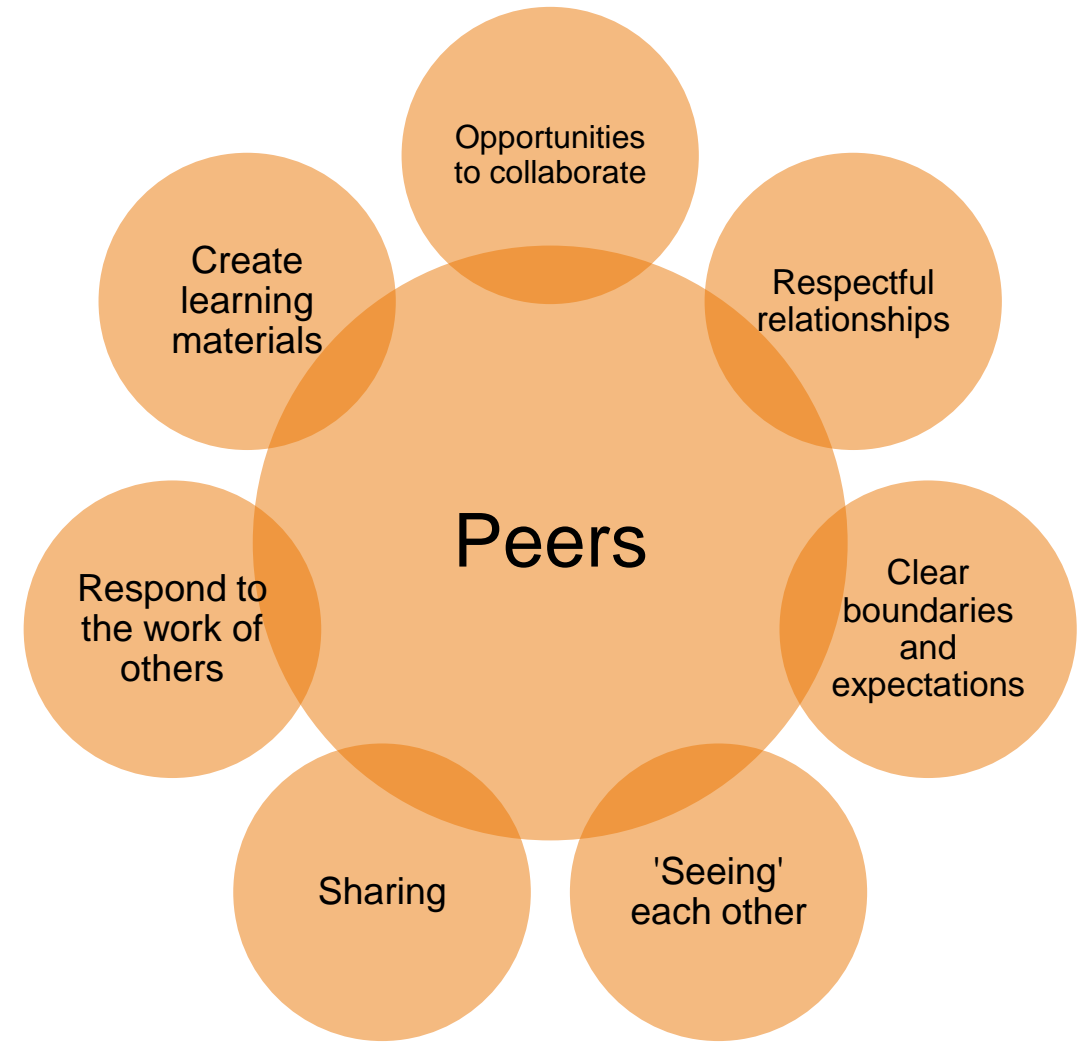
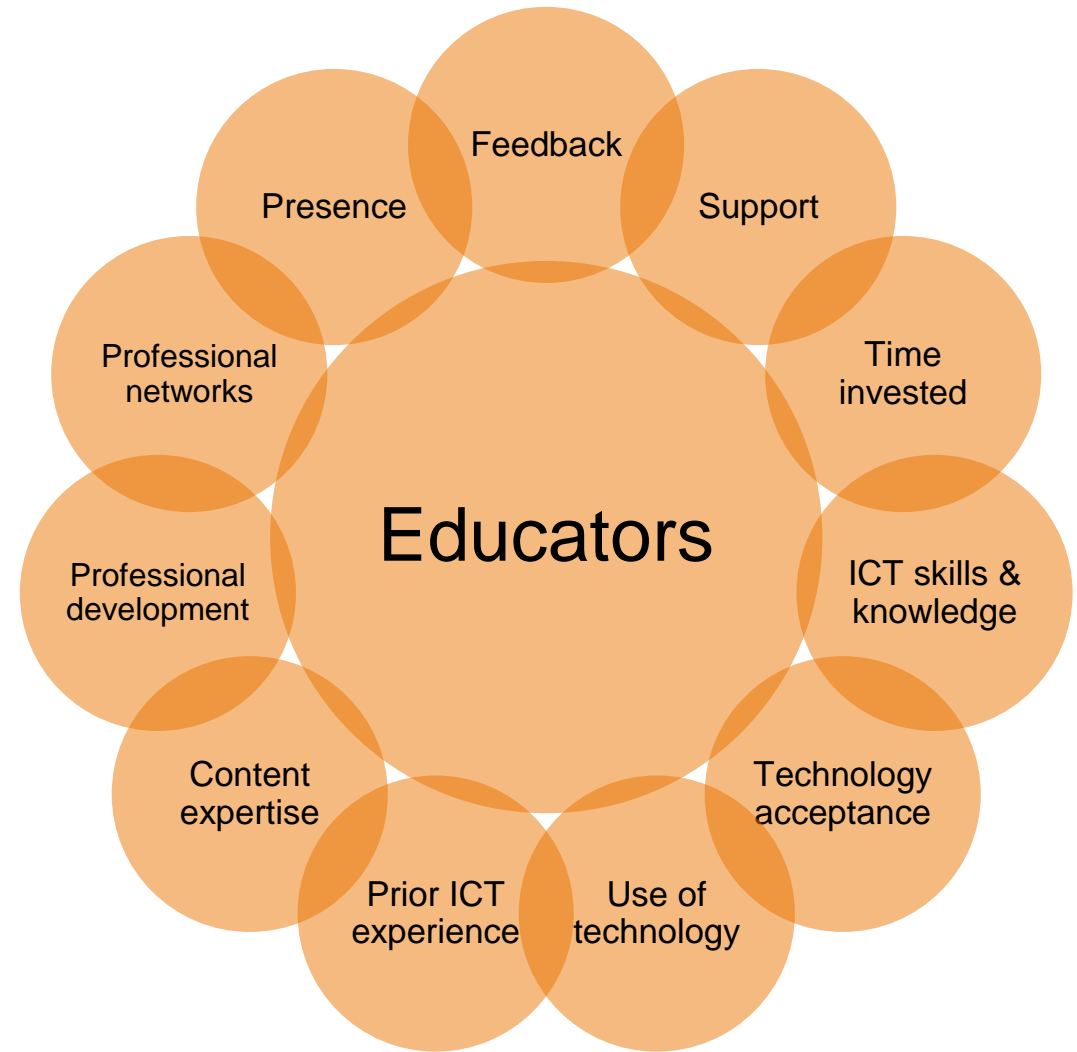
Engagement in higher education learning analytics: A systematic review

A work in progress

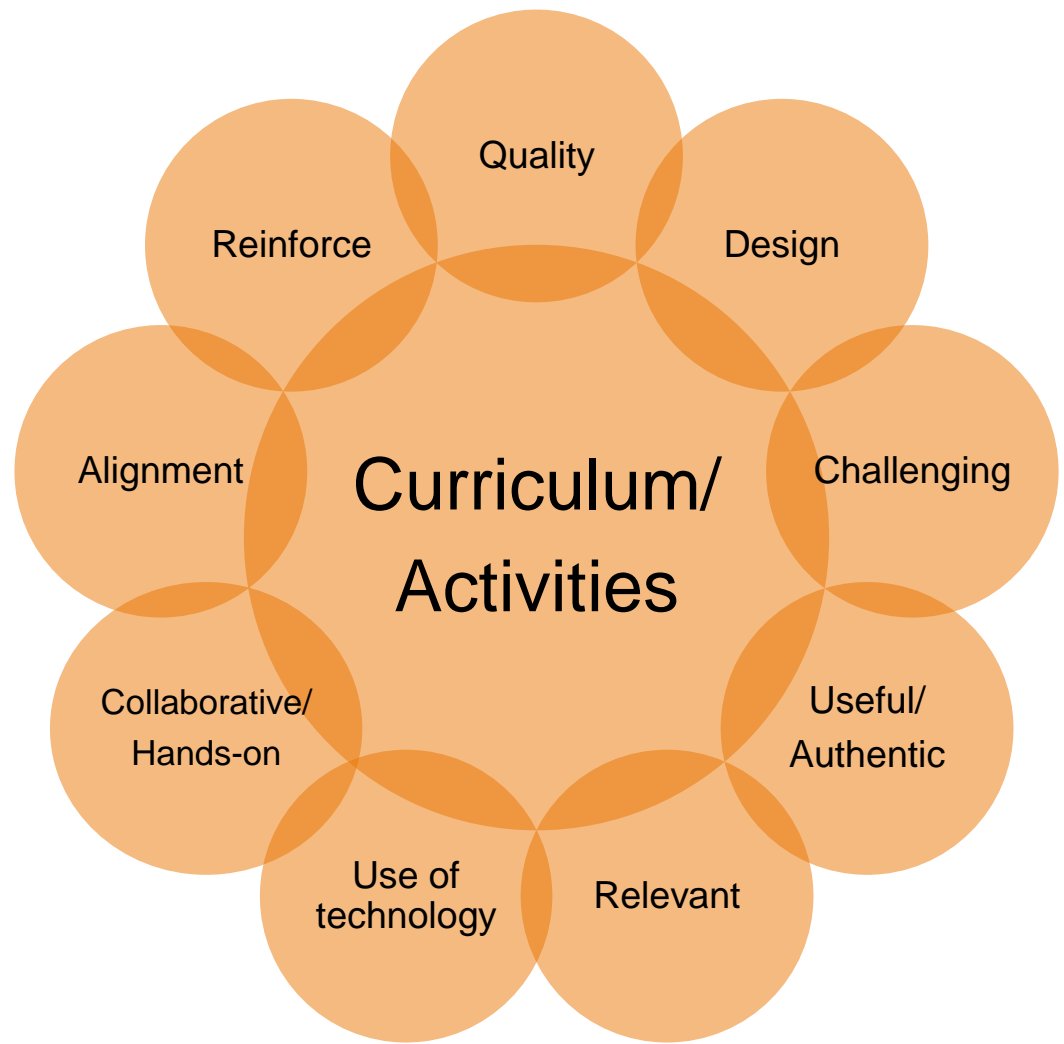
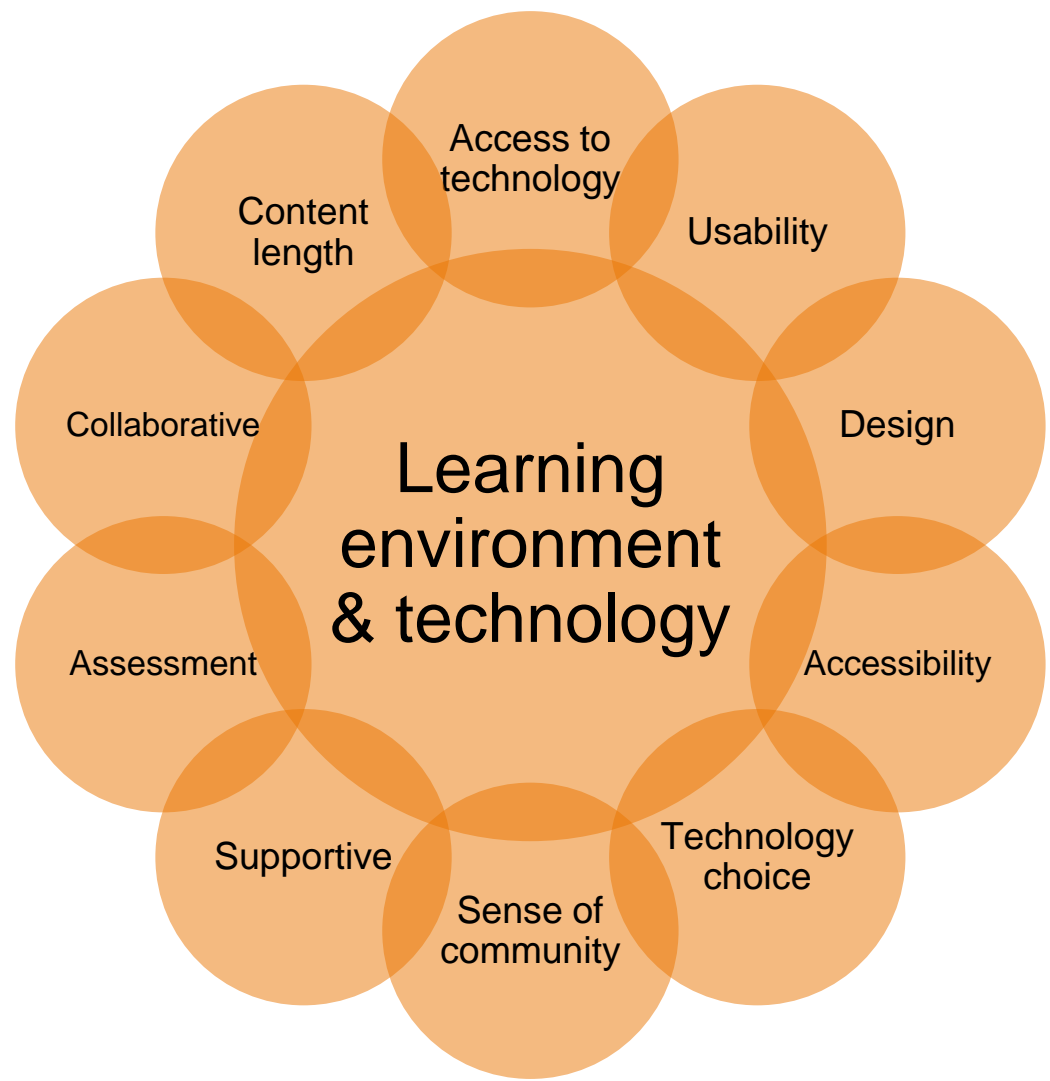
Research Questions

1. What are the trends of learning analytics research on student engagement distributed across scientific disciplines?
2. How are engagement research and theories used?
3. How did the LA research collect and analyse data?
4. What are the key findings in relation to engagement?
5. How are the methods linked to the key findings of engagement?

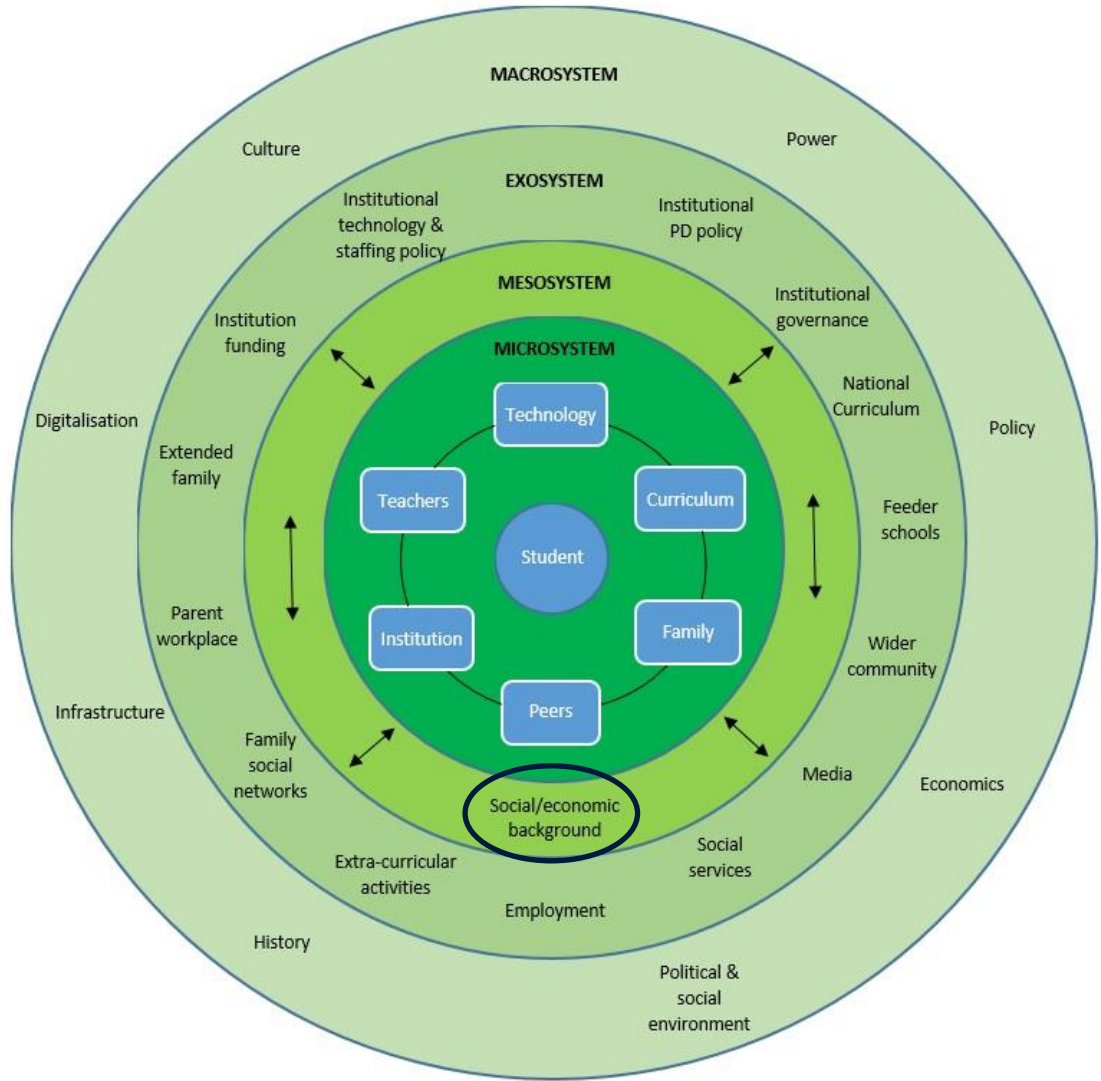
External influences on student engagement



External influences on student engagement



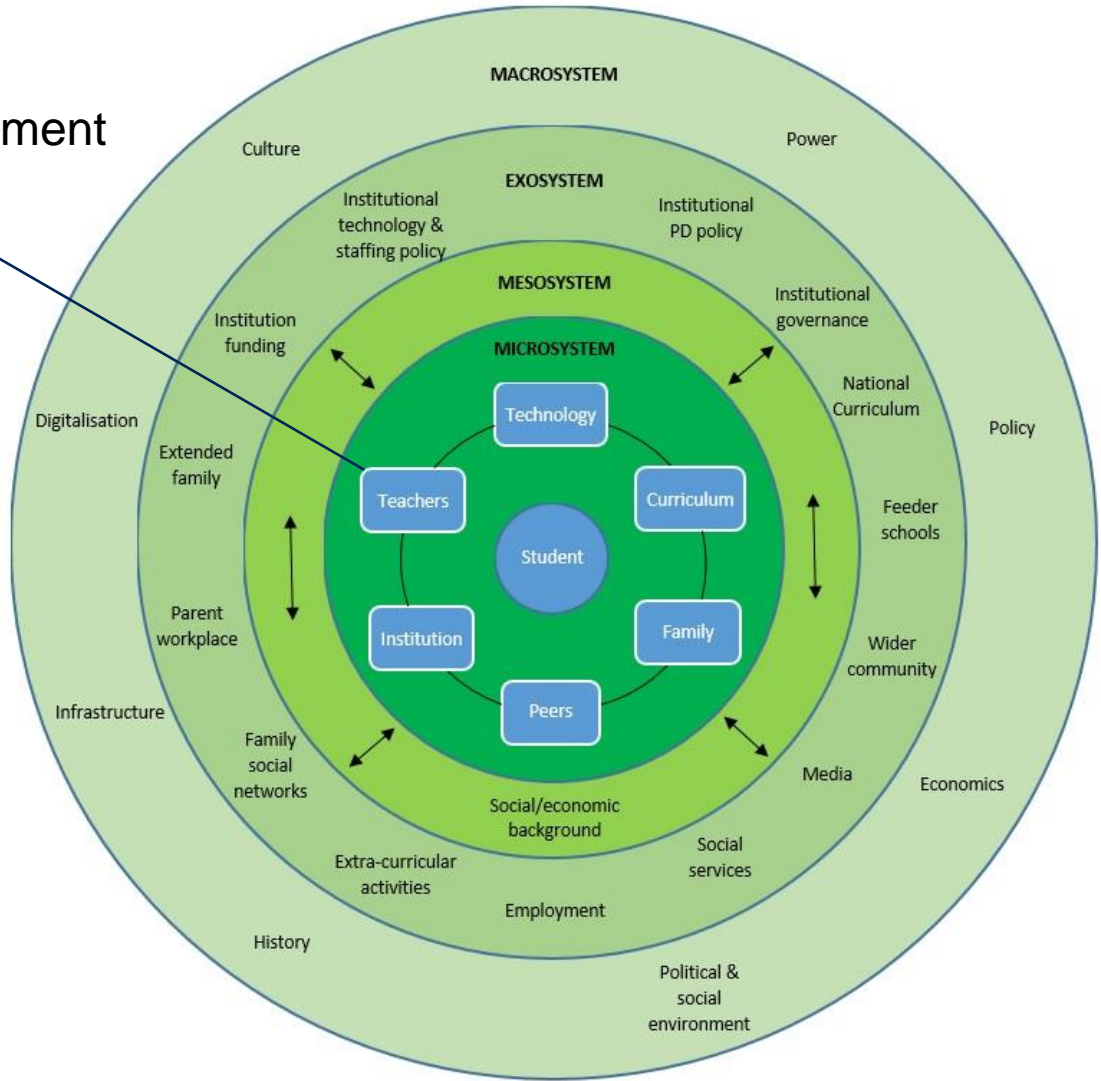
Implications for practice



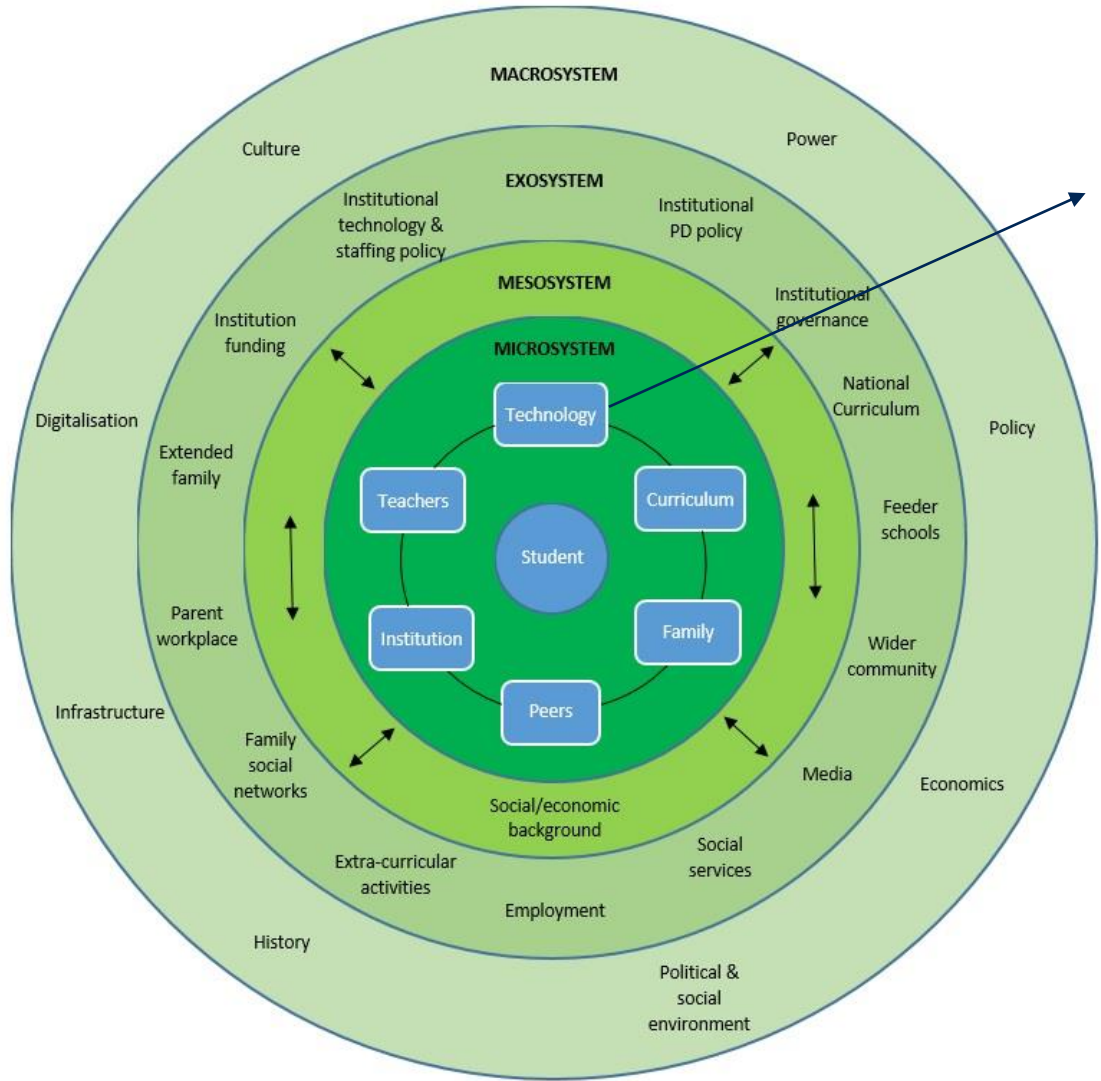
- Needs analysis
- Loan equipment
- Multiple methods

Implications for practice

- Professional development
- Practitioner research
- Record feedback

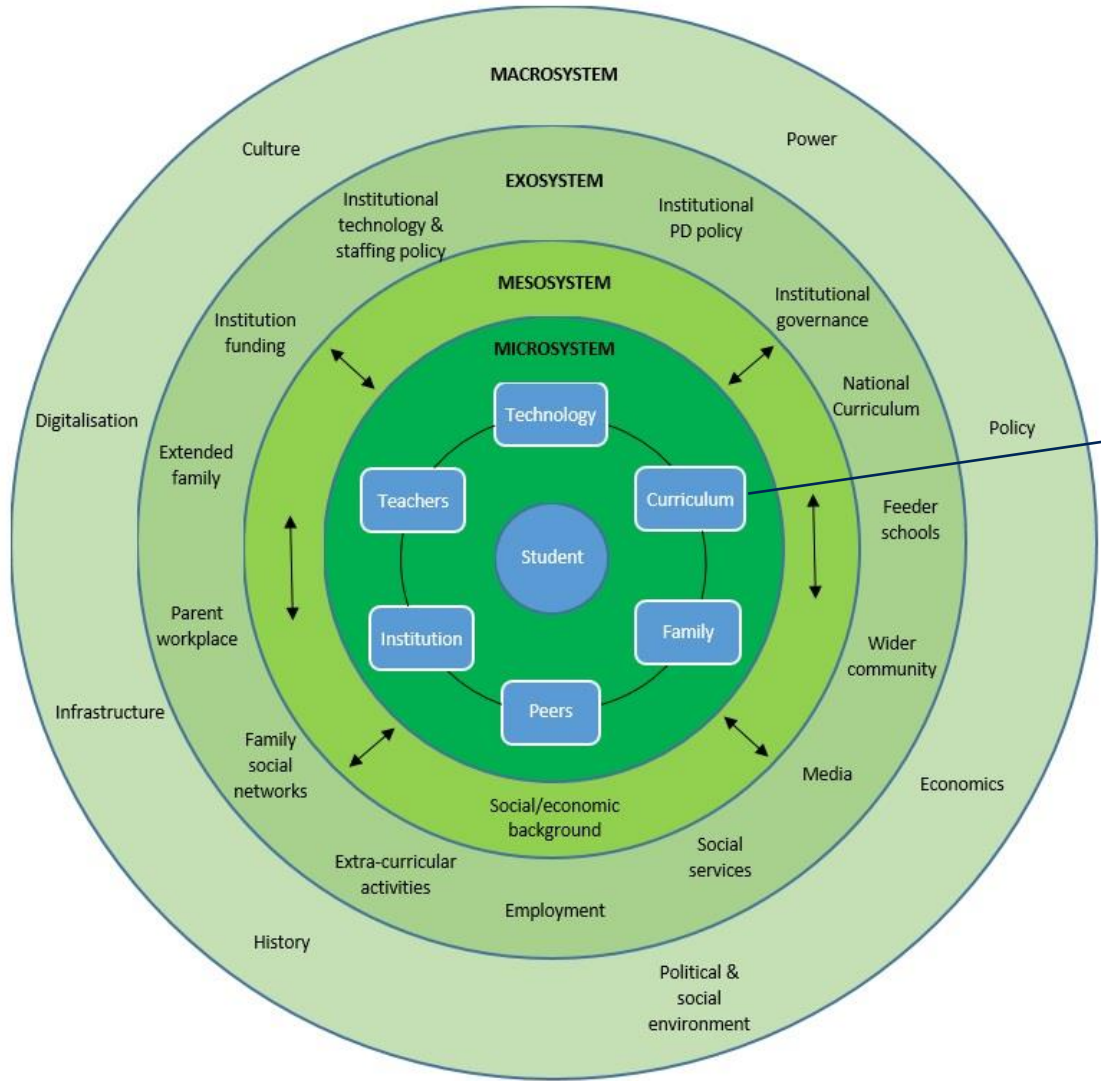


Implications for practice



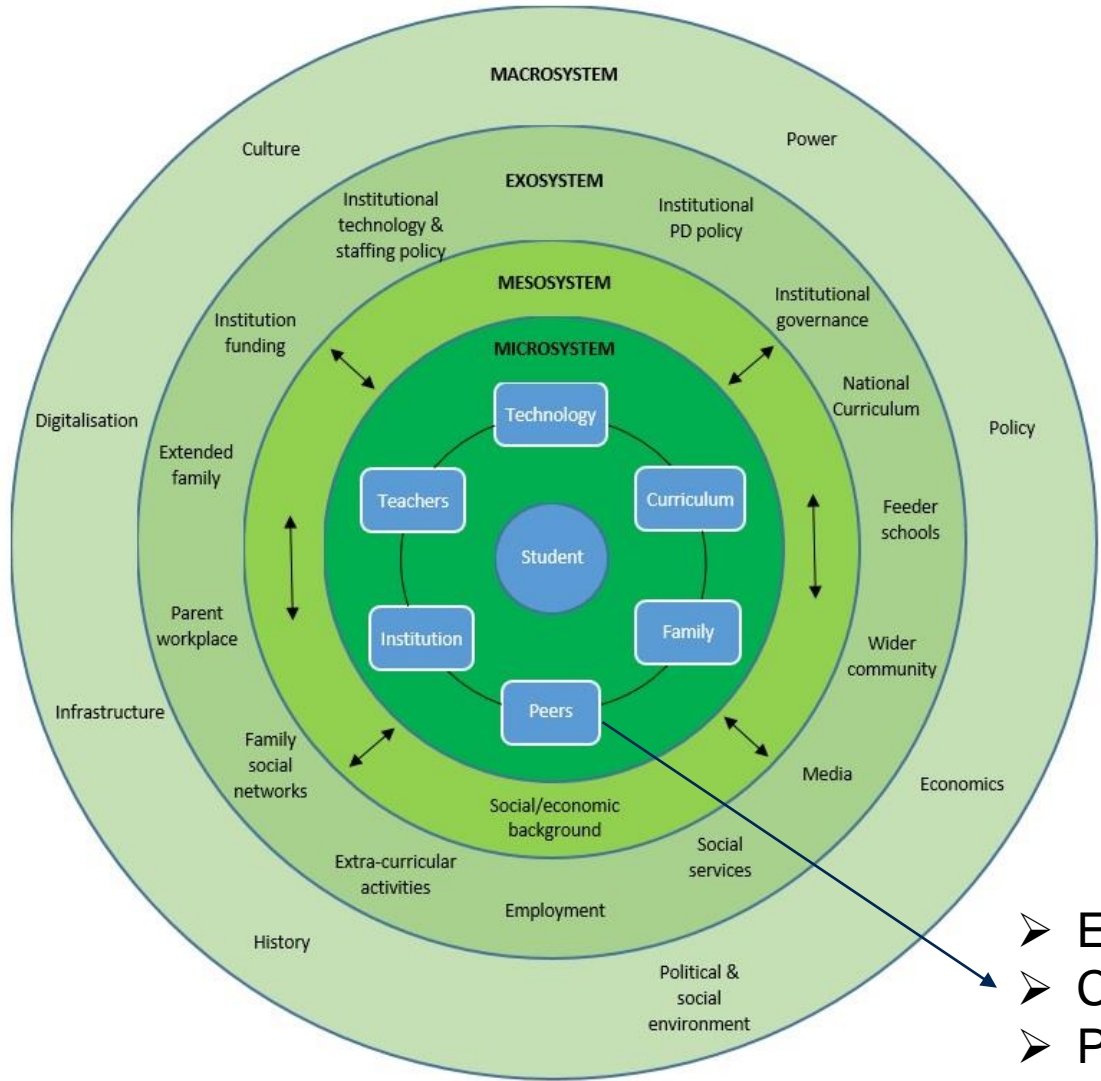
- Collaborative
- Record own videos (max. 6 mins)
- One topic per video

Implications for practice



- Align videos
- Embed quizzes
- Differentiation

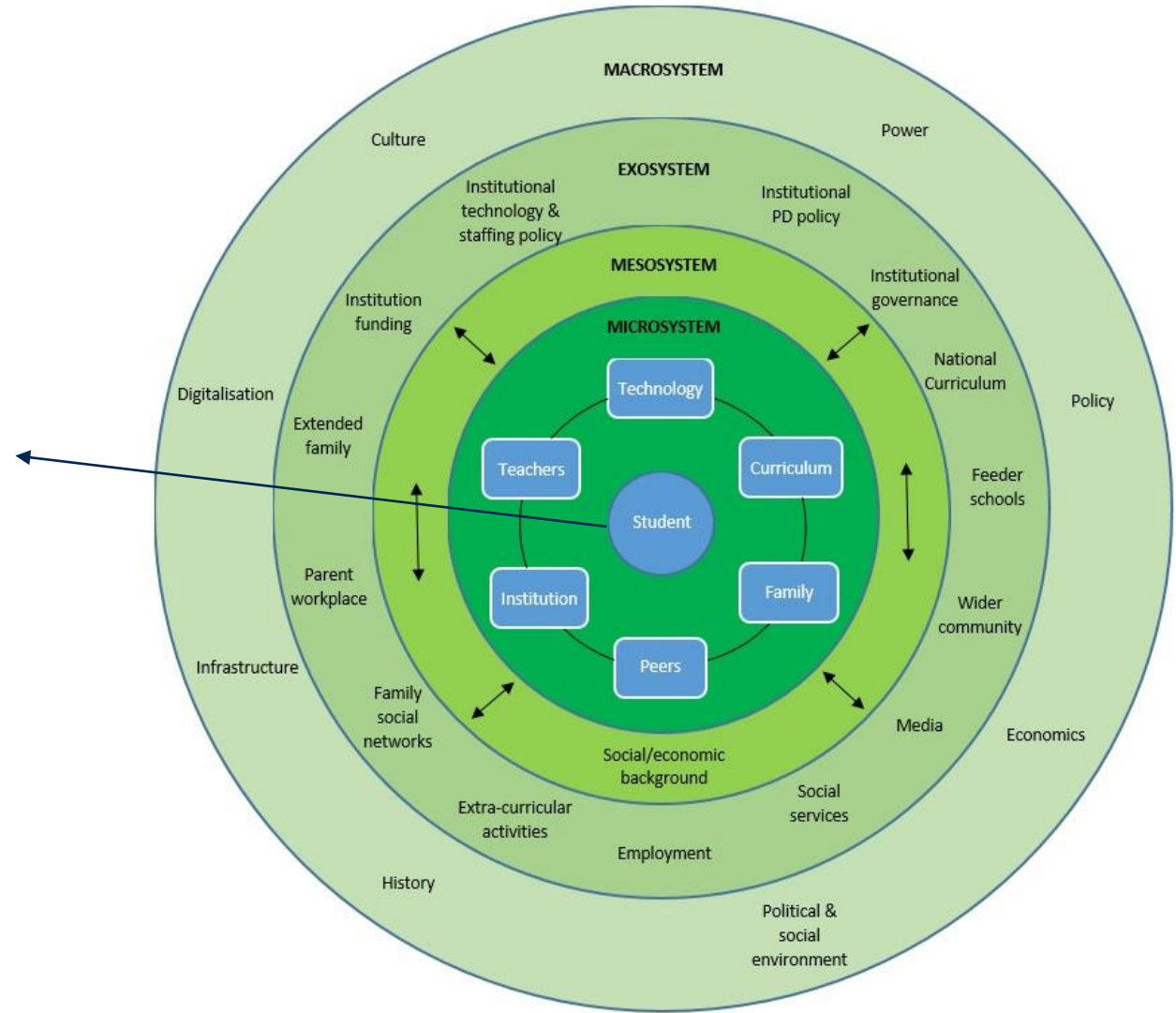
Implications for practice



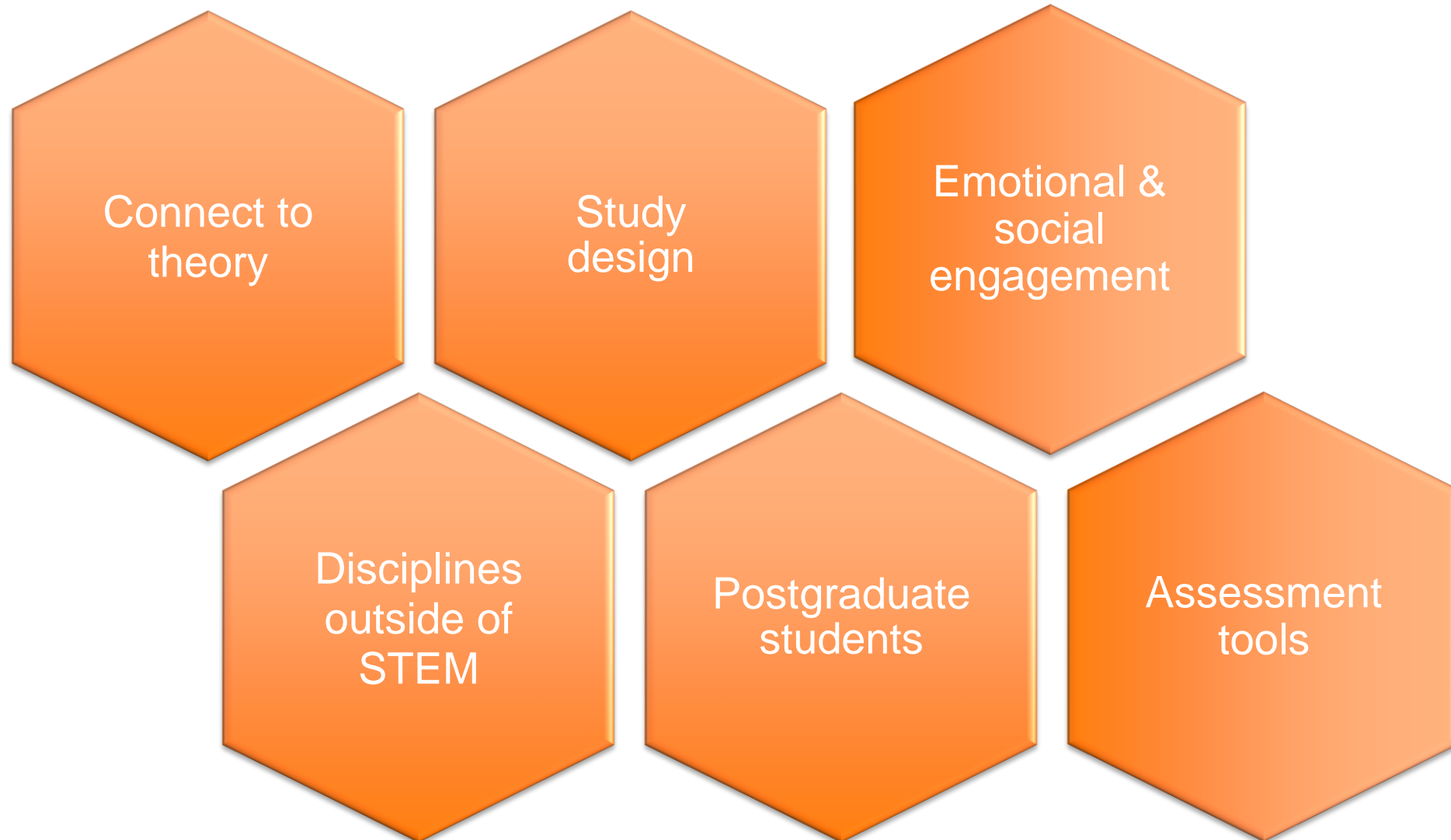
- Explicit instruction needed
- Co-create resources
- Peer assessment

Implications for practice

- Explicit guidance
- Induction period
- Scaffold routine
- Self-assessment



Research implications



Questions to ponder

1. What were the most influential factors on student engagement during the pandemic for your students?
2. What changes did you make in response, if any?
3. Have there been any differences in engagement since the move to the 'new normal'?
4. How would you use this framework and the engagement/disengagement indicators, to inform your teaching and/or research?
5. What effect do you think large language models like ChatGPT will have on student engagement?

Contact Information

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LinkedIn: <https://www.linkedin.com/in/bondmelissa/>

YouTube: <https://www.youtube.com/user/EPPIReviewer4>

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