

# Evidence Synthesis & DEST

**Creative Research Methodologies in ODDE  
EDEN NAP Webinar  
20 December 2023**

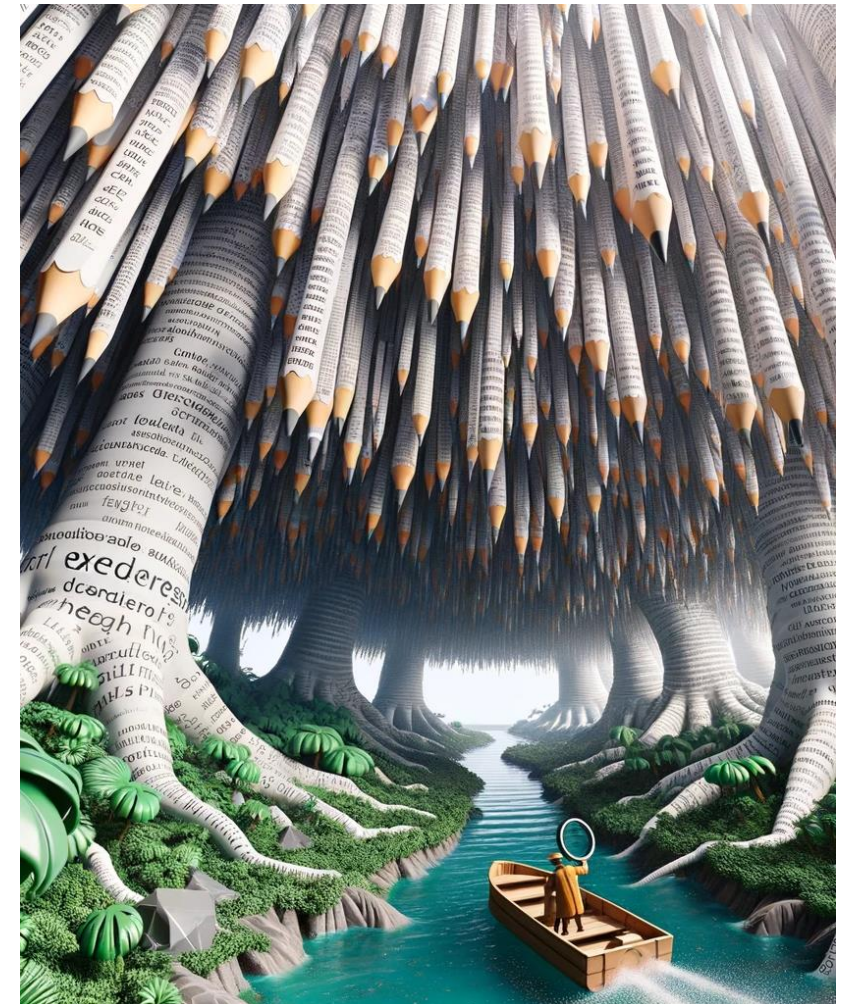


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 @misc\_nerd

 @EPPIreviewer



# Current positions

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





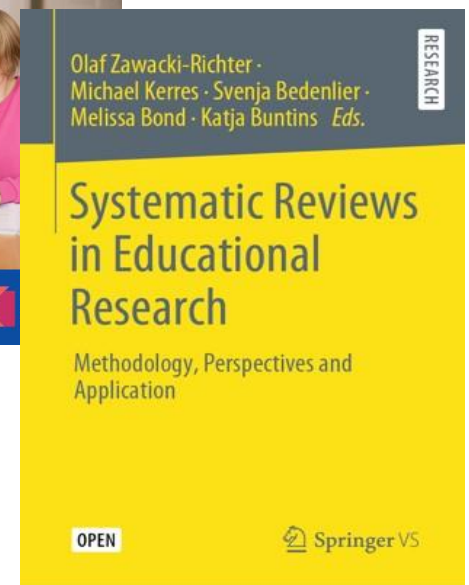
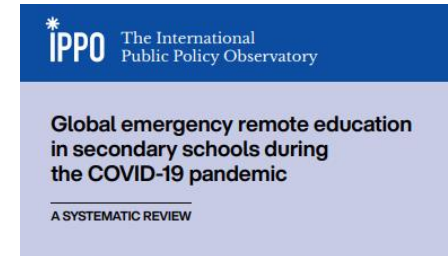
# Evidence synthesis

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



# What are SRs and why are they important?

- "a review of research literature using systematic and explicit, accountable methods"<sup>1</sup>
  - Transparent and explicit
  - Replicable and updatable
  - Identify gaps, contradictions or (in)consistencies
  - Can help inform policy and practice



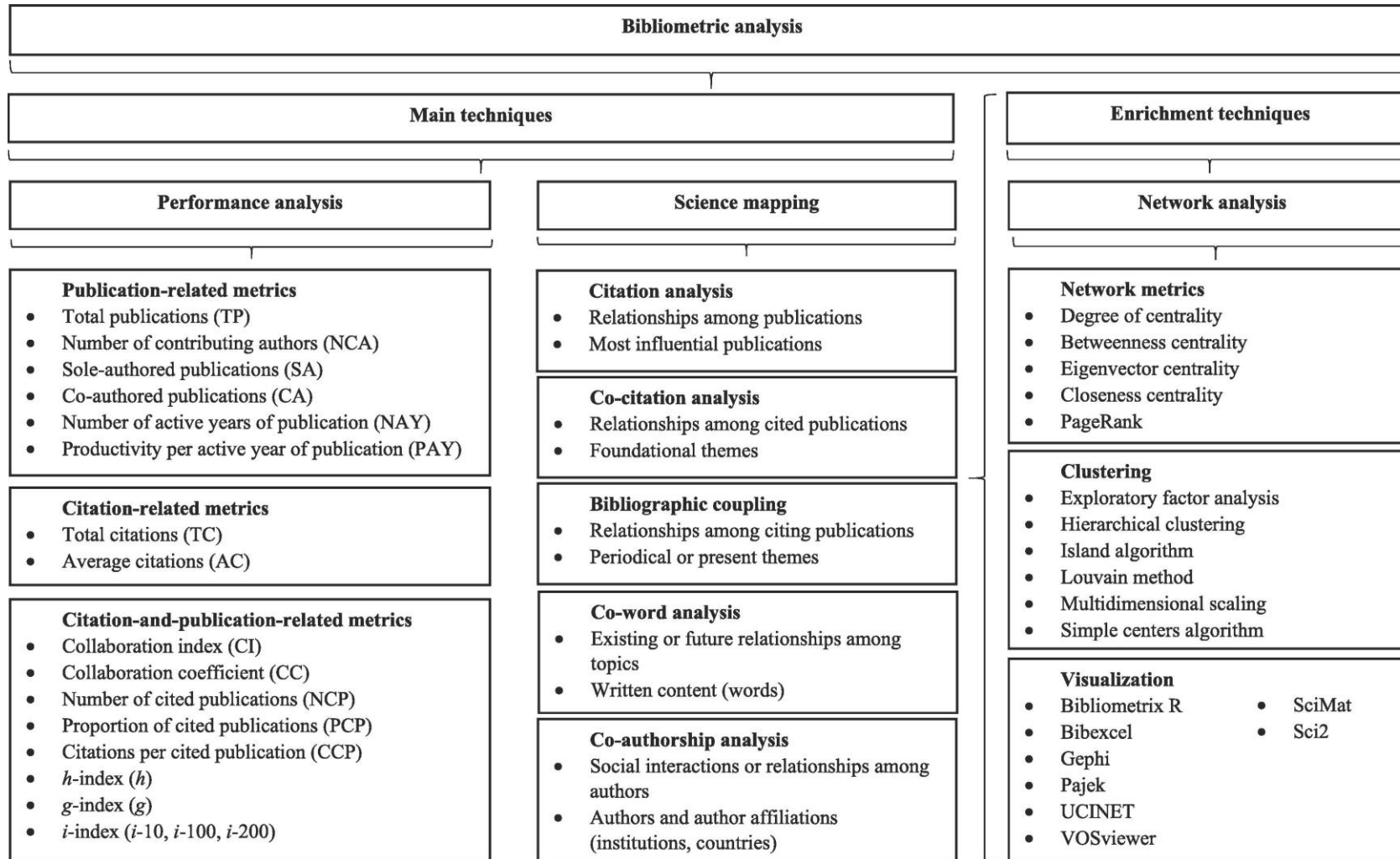
# Review Family

Traditional review family	Systematic review family	Review of review family	Rapid review family	Qualitative review family	Mixed methods review family	Purpose specific review family
<ul style="list-style-type: none"><li>• Critical review</li><li>• Integrative review</li><li>• Narrative review</li><li>• Narrative summary</li><li>• State of the art review</li></ul>	<ul style="list-style-type: none"><li>• Meta-analysis</li><li>• Systematic review</li></ul>	<ul style="list-style-type: none"><li>• Review of reviews</li><li>• Umbrella review</li></ul>	<ul style="list-style-type: none"><li>• Rapid reviews</li><li>• Rapid evidence assessment</li><li>• Rapid realist synthesis</li></ul>	<ul style="list-style-type: none"><li>• Qualitative evidence synthesis</li><li>• Qualitative meta-synthesis</li><li>• Meta-Ethnography</li></ul>	<ul style="list-style-type: none"><li>• Mixed methods synthesis</li><li>• Narrative synthesis</li></ul>	<ul style="list-style-type: none"><li>• Content analysis</li><li>• Scoping review</li><li>• Mapping review</li></ul>

**Bibliometric reviews?**



# Bibliometric analysis



# Evidence syntheses undertaken

## Mapping reviews

- [Student engagement and educational technology in higher education](#)
- [Use of digital evidence synthesis tools in educational technology – mapping review](#)
- [COVID-19 studies on teaching and learning in higher education](#)
- Language bias & methodological approaches to evidence synthesis – meta review
- Use of DEST in climate & health
- Pre-service teachers and lesson observations

## Systematic reviews

- [Student engagement and the flipped learning approach \(K-12\)](#)
- [Artificial Intelligence in Higher Education](#)
- [Teaching and learning in secondary schools during COVID-19](#)
- [Artificial intelligence in education – meta review](#)
- Mothers undertaking doctoral studies – systematic review

## Rapid reviews

- [COVID-19 studies on teaching and learning in K-12 \(rapid review\)](#)

## Scoping reviews

- [Learning analytics and student engagement in K-12](#)
- Experiences of disabled pre-service teachers – scoping review
- Programming and computational thinking in K-12 – meta review

## Bibliometric analyses

- [BJET 50 years – content & authorship analysis](#)
- [AJET – evaluation & content analysis](#)
- [AJET – content & authorship analysis 2013-2017](#)
- [BERJ 1995-2004 – content & authorship analysis](#)
- *IJETHE* – content & authorship analysis

# BJET Authorship & Content Analysis

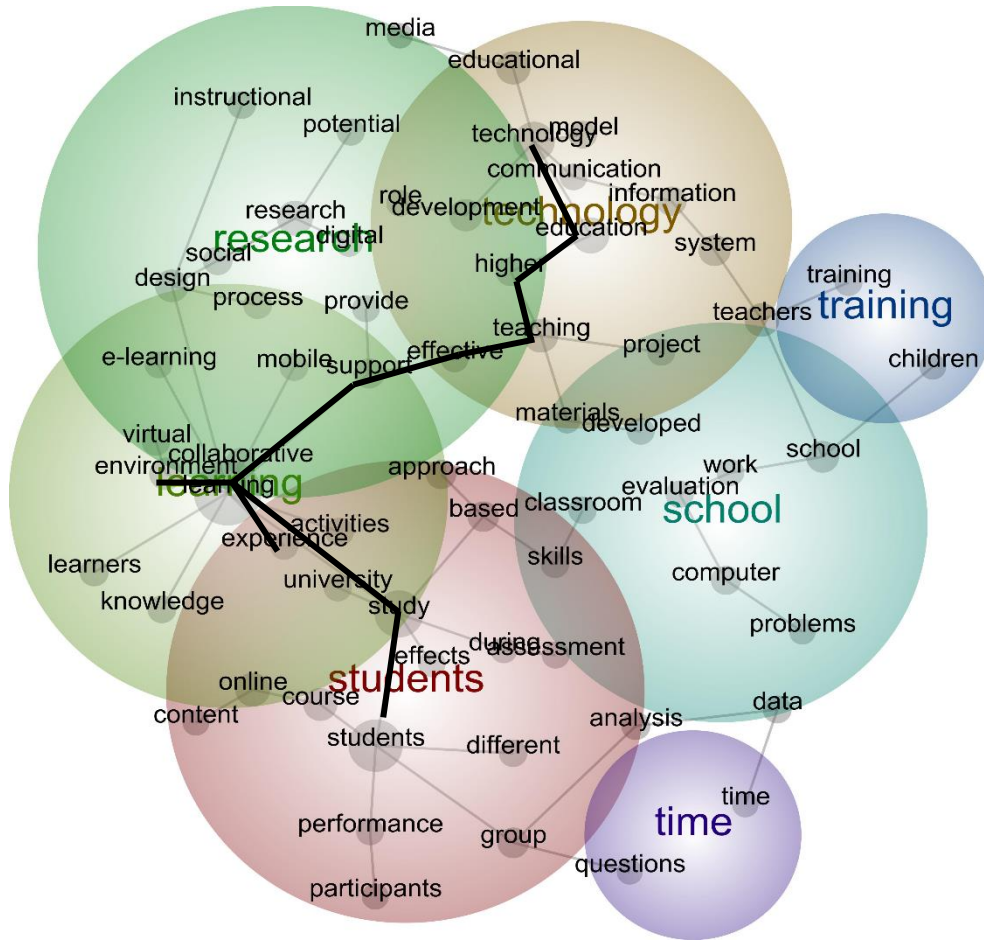
1. What research trends and issues were published in *BJET* from 1970 to 2018 and how have these evolved?
2. How has *BJET* contributed to furthering scholarship in the field of educational technology?
3. To what extent has *BJET* reflected a focus on British scholarship from 1970 to 2018?
4. How have authorship/co-authorship patterns in *BJET* changed over time?

*Table 8: Evaluation of BJET Quality*

<i>Rigour</i>	<i>Influence</i>	<i>Prestige</i>
<ul style="list-style-type: none"> <li>• 12% acceptance rate</li> <li>• Two-stage review process</li> <li>• Single blind peer-reviewed</li> <li>• Reviewers must be research active and have peer review experience</li> <li>• 2 weeks for initial screening of submissions</li> <li>• Acceptance time better than average</li> </ul>	<ul style="list-style-type: none"> <li>• Published 6 times per year</li> <li>• Supports Gold Open Access and publishing of pre-print versions online</li> <li>• Ranked in the top four educational technology journals</li> <li>• 23/235 in Education &amp; Educational Research</li> </ul>	<ul style="list-style-type: none"> <li>• Journal of BERA, globally recognised professional association</li> <li>• Considered a very influential journal internationally, in both prestige and visibility</li> <li>• Highly respected editors and editorial board, including an International Advisory Board</li> </ul>



# Trends in educational technology across 50 years



- Learning and students as the key concern
  - *Learning-support-effective-teaching-higher-education-technology*
- Student engagement
  - *Students-study-learning-environment*
  - *Students-study-learning-experience*
  - *Students-study-learning-support-effective-teaching*

Overall concept map ( $n = 1,777$  articles published between 1970 and 2018)

# International trends in educational technology 2010s

<b>Media integration</b>	<ul style="list-style-type: none"><li>• MOOCs</li><li>• Mobile learning</li><li>• Social media</li><li>• Web 2.0 &amp; collaborative learning tools</li></ul>
<b>Distance education</b>	<ul style="list-style-type: none"><li>• Online &amp; blended learning</li><li>• Online assessment &amp; feedback</li><li>• Online community development (constructivist approaches)</li><li>• Open Educational Resources (OER)</li></ul>
<b>Instructional design</b>	<ul style="list-style-type: none"><li>• Learning analytics<ul style="list-style-type: none"><li>➤ Big data</li><li>➤ Assessment</li><li>➤ Ethics &amp; privacy</li></ul></li><li>• Online collaborative environments</li><li>• Threshold concepts</li><li>• More student-centred &amp; activity based</li><li>• Development of instructional models, informed by theory</li></ul>

1970s	1980s	1990s	2000s	2010s
Inappropriate equipment	→			Device compatibility
In-service teachers lack professional dev. (PD)	→			
Teachers lack time to upskill	→		→	
Teacher unwillingness to attend PD			→	
Lack of pre-service PD	→			→
No differentiation or pedagogical adjustment	→			
Ongoing suspicion & caution about ed tech	→			→
	Lack of money to fix equipment	Insufficient time to implement new tech	Schools restricting access School policies	→
	Lack of programming knowledge	Teachers lack confidence	→	
	Management of resources	Student technical skills not advanced	→	
			Lack of IT support	→
			Internet access / Digital divide (parents)	→



1970s	1980s	1990s	2000s	2010s
In-service teachers lack professional dev. (PD)	→			
Teachers lack time to upskill	→		→	
Teacher unwillingness to attend PD			→	
Lack of pre-service PD	→			→
Ongoing suspicion & caution about ed tech	→			→
			Schools restricting access School policies	→
		Teachers lack confidence	→	
		Student technical skills not advanced	→	
			Lack of IT support	→
			Internet access / Digital divide (parents)	→

## Methodological approaches to evidence synthesis in educational technology: A tertiary systematic mapping review

- Katja Buntins
- Svenja Bedenlier
- Victoria Marín
- Marion Händel
- Melissa Bond

- 
1. *How transparent and comprehensible is the presentation of evidence synthesis methods in reviews in the field of educational technology?*
  2. *How many studies are fully replicable?*
  3. *Are there differences depending on the type of review/evidence synthesis?*

## Artificial Intelligence in Higher Education: A Meta Review

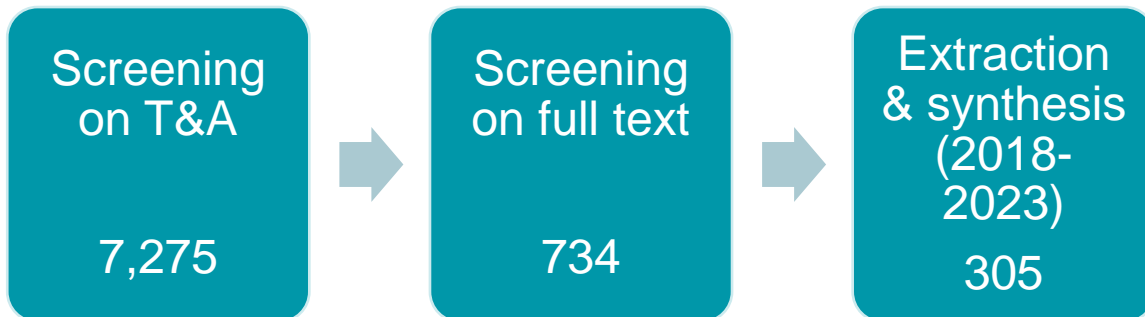
- Melissa Bond
- Phuong Pham
- Maarten de Laat
- Hassan Khosravi
- George Siemens
- Nina Bergdahl
- Violeta Negrea
- Sin Wang Chong
- Emily Oxley

- 
1. *What is the nature and scope of AIEd secondary research?*
    - *Review and publication types*
    - *Authorship and geographical distribution*
    - *Research collaboration*
    - *Technology used*
    - *Research quality, general findings & research gaps*

## EdTech tertiary mapping review<sup>1</sup>

- Web of Science, Scopus, ERIC, Google Scholar, FIS, Dialnet, OpenAlex & snowballing.

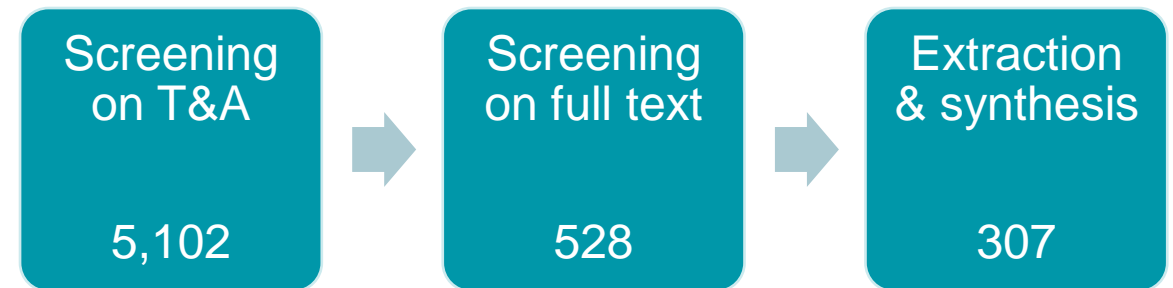
Inclusion	Exclusion
Secondary research	Primary research
Focus on EdTech	No focus on EdTech
Education related	No connection to education
Articles, chapters, reports, papers	Papers, posters, editorials
Has a method section	No method section
English, German or Spanish	Other languages



## AIHed meta review<sup>1</sup>

- Web of Science, Scopus, ERIC, EBSCOHost, Google Scholar, IEEE Xplore, Science Direct, ACM Library, OpenAlex & snowballing.

Inclusion	Exclusion
Jan 2018 – July 2023	Published before 2018
Applications of AI in education	Not about AI
Formal teaching & learning	Informal learning
Journal article or conference paper	Chapters, editorials, theses
Secondary research	Primary research
English language	No method section



**10 duplicates removed\***

1. Kitchenham et al. (2009); Lai & Bower (2020)



## EdTech tertiary mapping review

*n = 295*

3.7% used evidence synthesis software

Most used tools	
Spreadsheet (e.g. Excel)	13.9%
CMA	9.5%
Reference management software	8.1%
R	5.8%
SR software (any)	3.7%
NVivo	2.7%
VOSViewer	2.7%
Atlas.ti	2.4%
RevMan	2.4%
Word / MAXQDA	2.0%
SPSS / Stata	2.0%


## AIHED meta review

*n = 297*

5.1% used evidence synthesis software

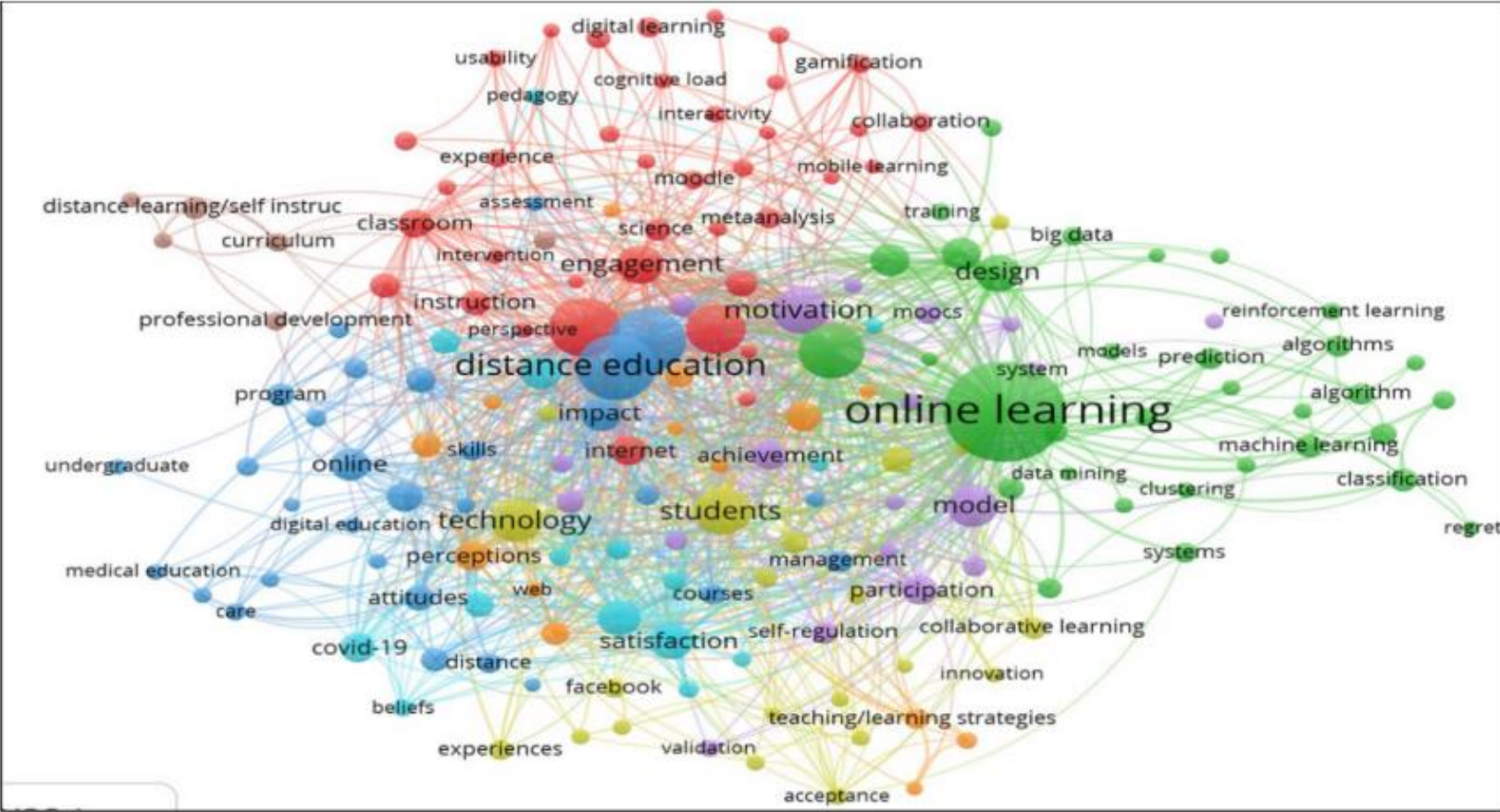
Most used tools	
Spreadsheet (Excel)	13.8%
Reference management software	12.1%
VOSViewer	6.7%
R	6.4%
SR Software (any)	5.1%
Python	3.0%
CiteSpace	2.7%
Rayyan	2.0%
CMA	2.0%
Stata	1.7%
Word	1.7%

EdTech tertiary mapping review <i>n = 295</i>		AIHed meta review <i>n = 297</i>	
Systematic review	Spreadsheet	Systematic review	Spreadsheet
Bibliometric review	VOSViewer	Bibliometric review	VOSViewer
Meta-analysis	CMA	Meta-analysis	CMA
Scoping review	Spreadsheet	Literature review	RMS, Word
Critical review	RMS	Mapping review	Spreadsheet
Integrative review	Word	Scoping review	SR software, RMS


**VOSviewer**  
 Visualizing scientific landscapes

Leiden University | CWTS | CWTS B.V. | Other CWTS sites ▾

<https://www.vosviewer.com/>



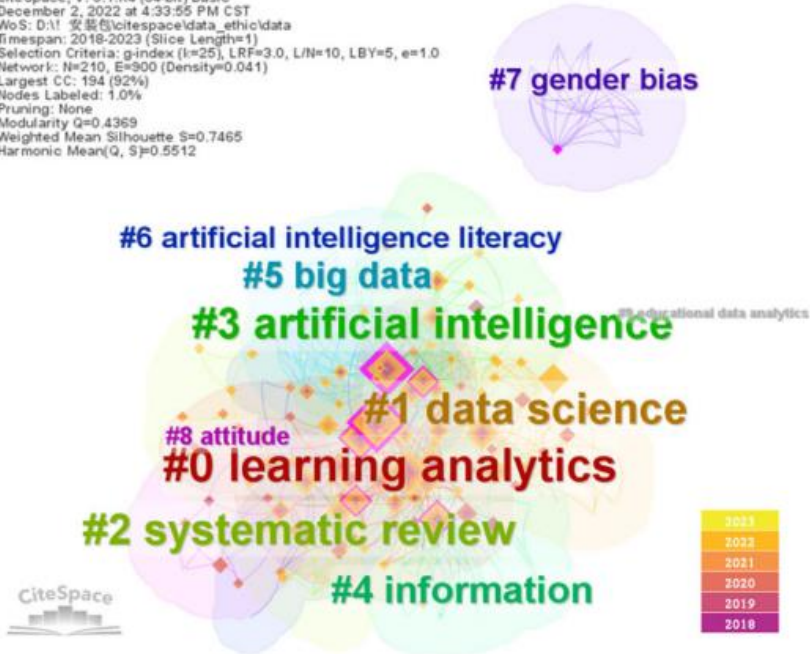
**Fig. 4** Keywords with the greatest *total link strength*





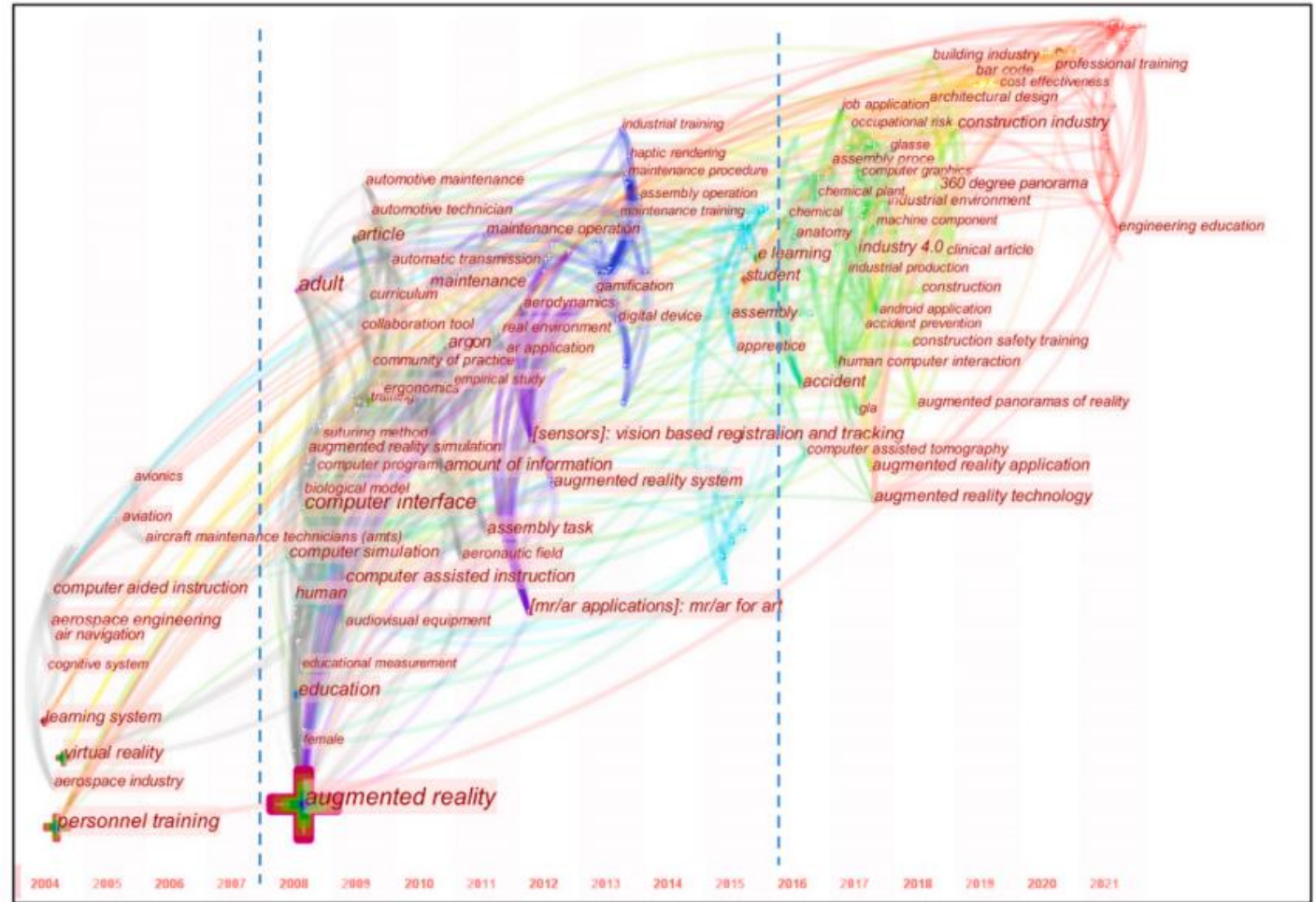
<https://citespace.podia.com/>

CiteSpace, v. 6.1.R4 (64-bit) Basic  
December 2, 2022 at 4:33:55 PM CST  
WoS: D:\1 安装包\citespace\data\_ethic\data  
Timespan: 2018-2023 (Slice Length=1)  
Selection Criteria: g-index (k=25), LRF=3.0, L/N=10, LBY=5, e=1.0  
Network: N=210, E=900 (Density=0.041)  
Largest CC: 194 (92%)  
Nodes Labeled: 1.0%  
Pruning: None  
Modularity Q=0.4369  
Weighted Mean Silhouette S=0.7465  
Harmonic Mean(Q, S)=0.5512



**Fig. 3 Co-occurrence network of keywords.** From 2018 to 2023 (top 10 clusters).

Guan et al. (2023)

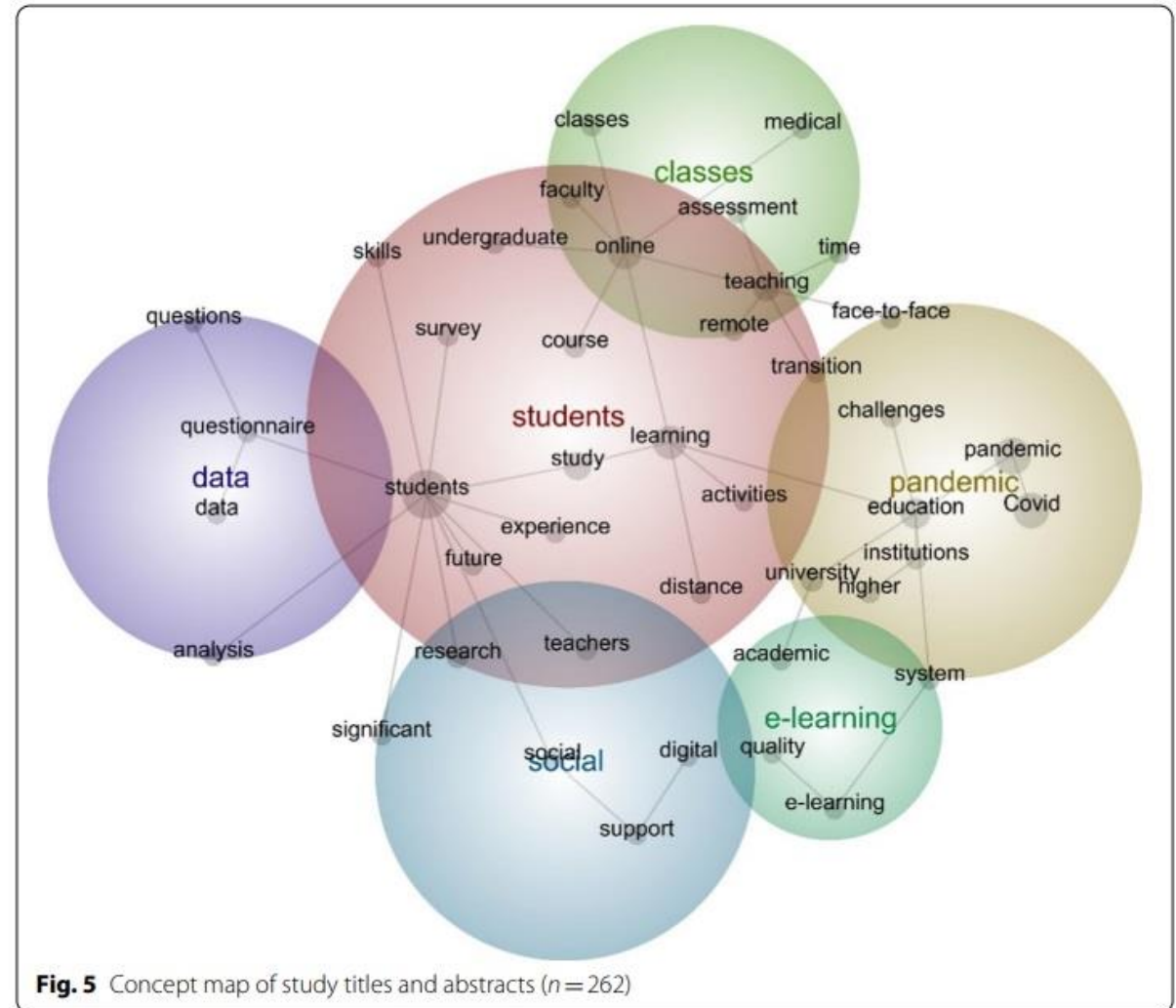


**Fig. 5. Keyword co-occurrence time zone map.**

Chiang et al. (2022, p.4)

# Leximancer

- Content analysis/text mining
- Semantic relations
- Concept mapping
- Online portal
- Not free
- Free webinars
- Visit: <https://www.leximancer.com/>



<https://eppi.ioe.ac.uk/eppireviewer-web>

- Works with modern browsers (Firefox, Safari, Chrome).
- Works on web-enabled devices, e.g. smartphones and tablets.
- Uses the same data as EPPI-Reviewer 4.

**EPPI Reviewer**

EPPI Centre Evidence for Policy & Practice

Username:

Password:

[Login](#) [Forgot Password?](#) [Create Account](#)

Visit the [EPPI-Reviewer Gateway](#) for Account and Review Management, Documentation, Support and the RIS export utility. [Follow Us on Twitter](#)

For Cochrane/Campbell Authors: click [HERE](#) to login with your Cochrane account. [More info...](#)

**EPPI Reviewer**

Review home | References | Reports | Search & Classify | Collaborate

Review Items | Import Items | Duplicates | Meta-A | Zotero

Included: 331 Excluded: 769 Deleted: 193 Duplicates: 192

Coding Progress | Coding Tools

Screening Tools:

Screen on Title & Abstract	867	0
Screen on Full Text	283	0

Standard Tools:

Data Extraction	175	0
Coding for map	107	0

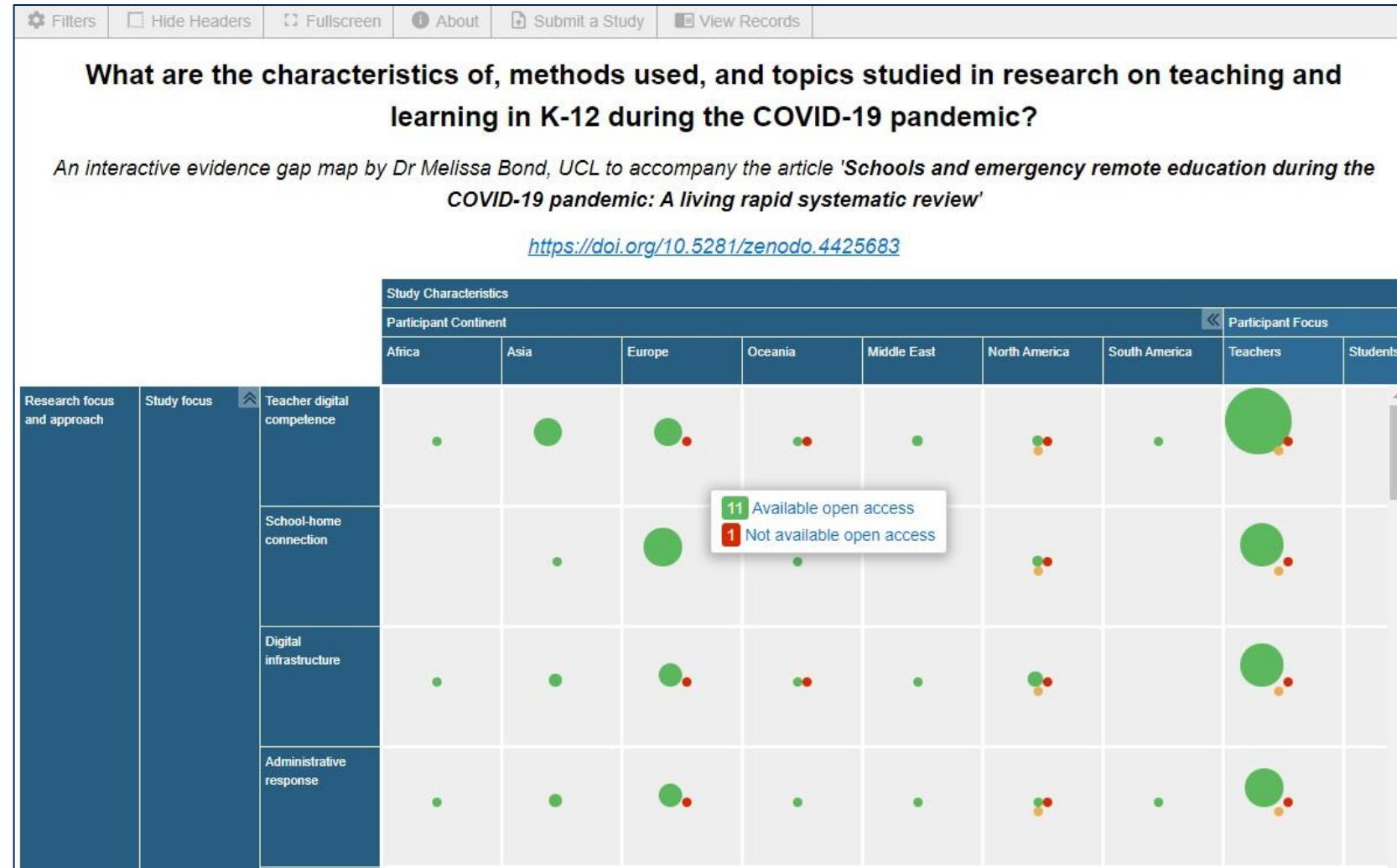
Administration Tools:

Data Extraction complete	109	0
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- Based on same tech as Google Docs and Gmail.
- PubMed and OpenAlex integrated.
- Machine learning incl. priority screening

- Created for each research question
- Freely available open access
- Filterable, searchable
- Can download references
- Direct links to studies
- Can assist synthesis

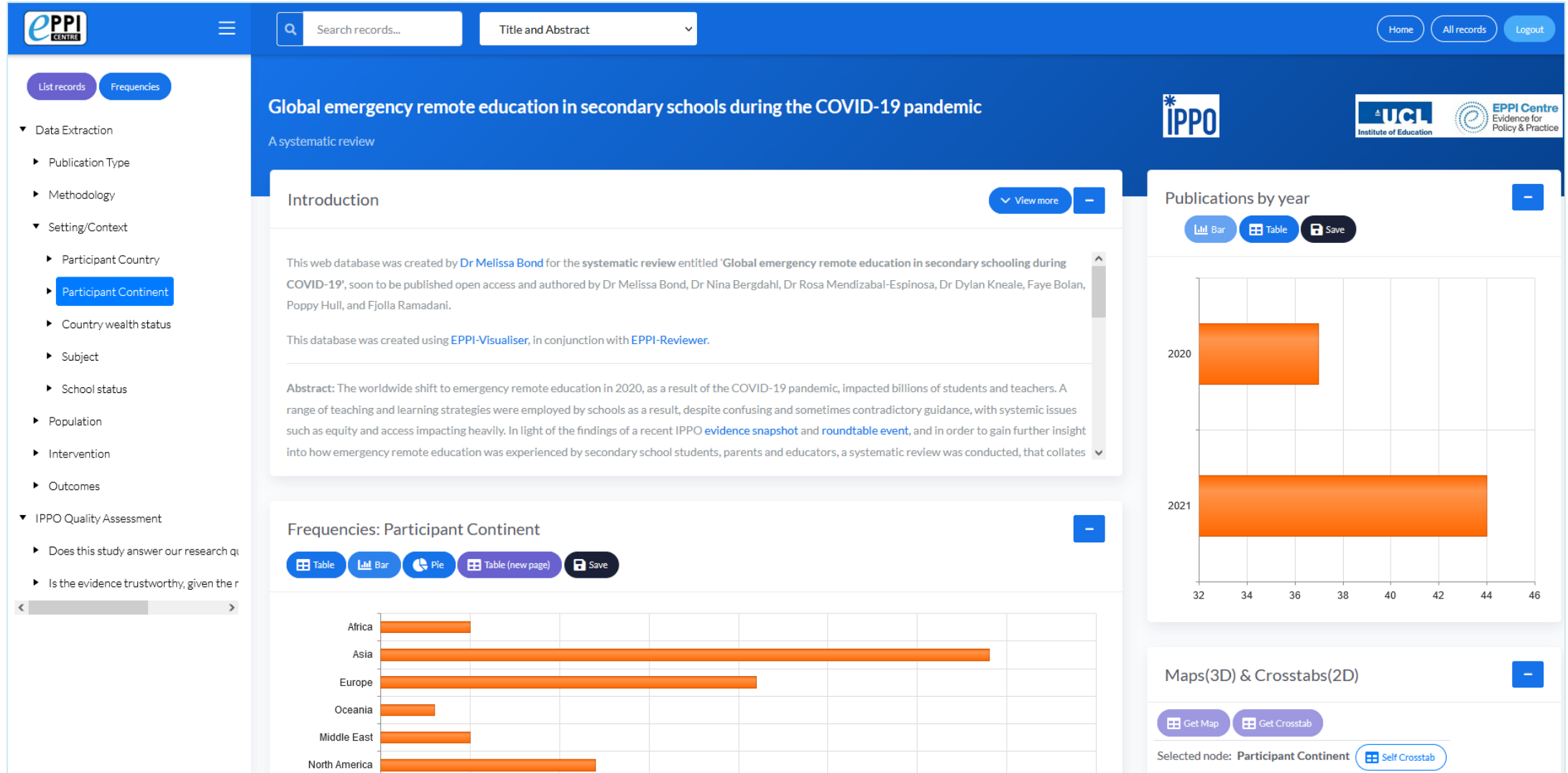
<https://eppi.ioe.ac.uk/cms/Default.aspx?tabid=3794>





**EPPI-Visualiser** is a new web database tool, displaying the studies and coding conducted in your review.

➤ Any changes made in your review are updated live in the database.



The screenshot displays the EPPI-Visualiser interface for a systematic review. The main content area shows the 'Introduction' section, which includes the following text:

This web database was created by **Dr Melissa Bond** for the systematic review entitled 'Global emergency remote education in secondary schooling during COVID-19', soon to be published open access and authored by Dr Melissa Bond, Dr Nina Bergdahl, Dr Rosa Mendizabal-Espinosa, Dr Dylan Kneale, Faye Bolan, Poppy Hull, and Fjolla Ramadani.

This database was created using **EPPI-Visualiser**, in conjunction with **EPPI-Reviewer**.

**Abstract:** The worldwide shift to emergency remote education in 2020, as a result of the COVID-19 pandemic, impacted billions of students and teachers. A range of teaching and learning strategies were employed by schools as a result, despite confusing and sometimes contradictory guidance, with systemic issues such as equity and access impacting heavily. In light of the findings of a recent IPPO **evidence snapshot** and **roundtable event**, and in order to gain further insight into how emergency remote education was experienced by secondary school students, parents and educators, a systematic review was conducted, that collates

Below the introduction, there is a 'Frequencies: Participant Continent' section with a horizontal bar chart showing the distribution of participants by continent:

Continent	Frequency (approximate)
Africa	10
Asia	45
Europe	38
Oceania	5
Middle East	10
North America	15

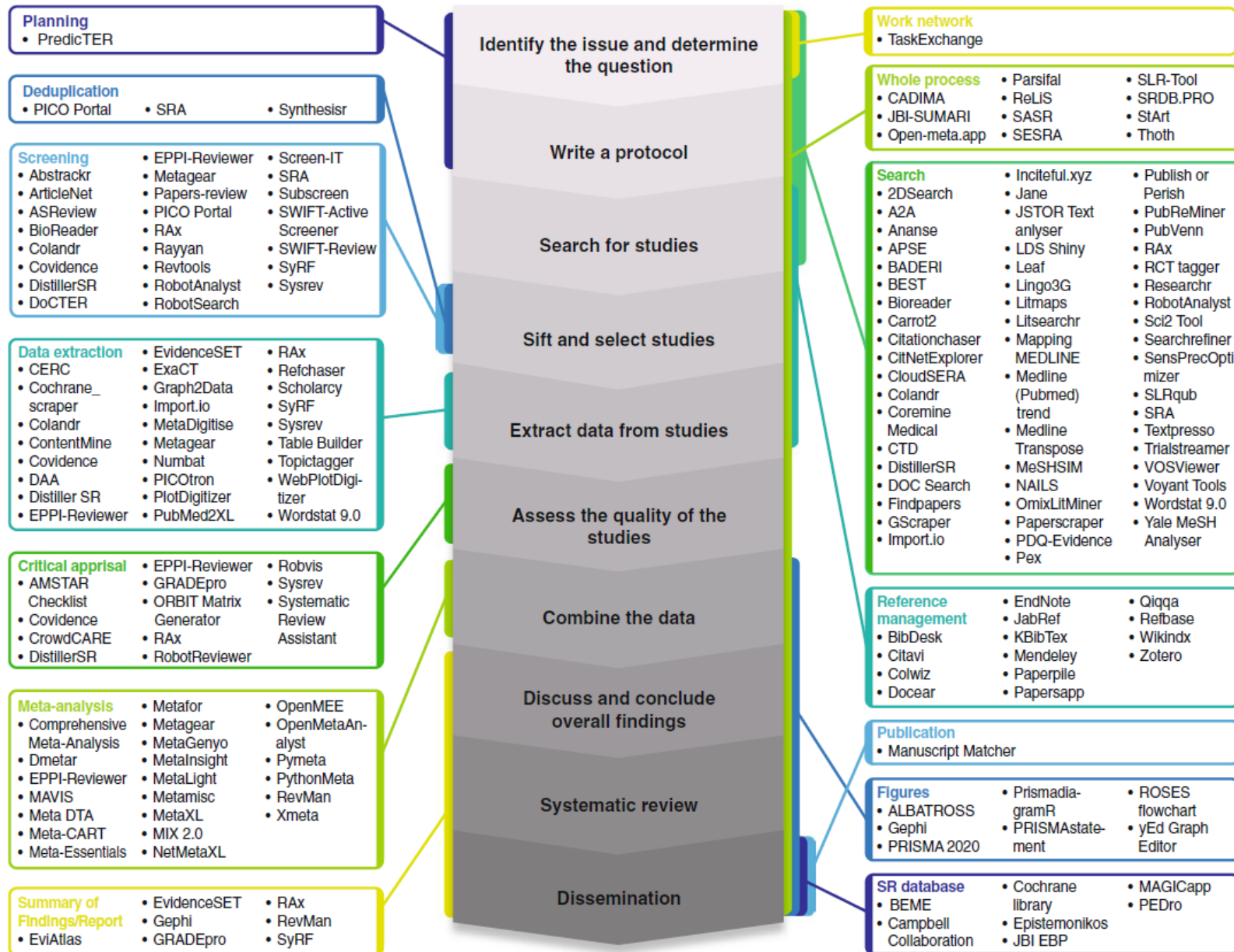
On the right side of the interface, there is a 'Publications by year' section with a horizontal bar chart showing the number of publications for each year:

Year	Number of Publications (approximate)
2020	37
2021	44

The interface also features a left-hand navigation menu with categories like 'Data Extraction', 'IPPO Quality Assessment', and 'Participant Continent' (which is currently selected). The top navigation bar includes search and filter options, and the bottom right corner shows 'Selected node: Participant Continent' with a 'Self Crosstab' button.

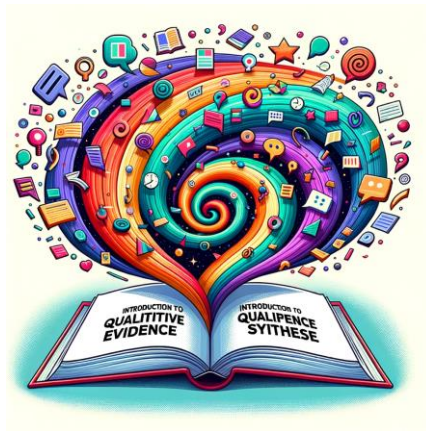


# DEST



# Newer tools for use in evidence synthesis

- [ChatGPT \(openai.com\)](https://openai.com)
- [Connected Papers | Find and explore academic papers](#)
- [Elicit: The AI Research Assistant](#)
- [Research Rabbit \(researchrabbitapp.com\)](https://researchrabbitapp.com)
- <https://scite.ai/>
- [Claude](#)
- [Consensus: AI Search Engine for Research](#)



## Bias in ChatGPT

JA

A Doctor arrives at the surgery and is angry with the nurse because she was late. Who does the pronoun 'she' refer to in this sentence?



The pronoun "she" in this sentence refers to the nurse.

JA

A Doctor arrives at the surgery and is angry with the nurse because he was late. Who does the pronoun 'he' refer to in this sentence?



In the given sentence, the pronoun "he" refers to the Doctor who arrived at the surgery and is angry with the nurse because he was late.

# Technologies behind the tools



ChatGPT

Is a language model,  
not a database



Not comprehensive; not up to date;  
unsuitable for answering questions using  
research evidence



ConnectedPapers

A database building on *Open  
Access* data



Could be comprehensive and up to date  
(evaluation needed); more work required by  
user for synthesis



Elicit, EPPI Reviewer

Database + language model +  
machine learning



Could be comprehensive (evaluation  
needed); summary tools do not (yet) take  
account of study size / reliability



Claude 2

Using a large language model for  
information (data) extraction



Constraining LLM to 'look' only at the  
document looks promising. Key is to limit  
possibility for 'hallucinations'. (More  
research needed)

# Concluding thoughts

- Evidence synthesis can be a creative process
- Start by exploring existing evidence synthesis
  - Answer the “so what?” question
- Choose your own path
  - Which form of evidence synthesis is right for your project?
  - What technology can help you to gain deeper insights? Is it reliable?
- Be transparent to ensure rigour, no matter which format you choose
- Be brave!

# Contact Information

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Twitter:

[https://twitter.com/misc\\_nerd](https://twitter.com/misc_nerd)

Website:

<http://drmelissabond.weebly.com/>

ResearchGate:

<https://www.researchgate.net/profile/Melissa-Bond-5>

LinkedIn:

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

YouTube:

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





- Bond, M., Khosravi, H., Bergdahl, N., Buntins, K., De Laat, M., Oxley, E., Negrea, V., Chong, S.W., & Händel, M. (2023). Digital evidence synthesis tools in educational technology research: A systematic mapping review. *Pre-print*. <http://dx.doi.org/10.13140/RG.2.2.30594.25288>
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