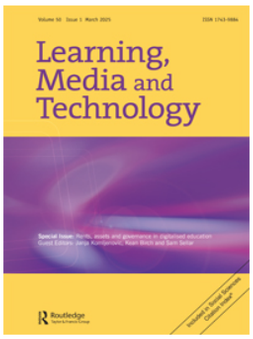

Learning, Media and Technology

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/cjem20

Who cites whom? U.S.-American authored research syntheses in the field of educational technology: a bibliometric analysis

Katja Buntins, Svenja Bedenlier & Olaf Zawacki-Richter

To cite this article: Katja Buntins, Svenja Bedenlier & Olaf Zawacki-Richter (29 Apr 2025): Who cites whom? U.S.-American authored research syntheses in the field of educational technology: a bibliometric analysis, Learning, Media and Technology, DOI: 10.1080/17439884.2025.2495602

To link to this article: https://doi.org/10.1080/17439884.2025.2495602

Published online: 29 Apr 2025.

LEARNING, MEDIA AND TECHNOLOGY
https://doi.org/10.1080/17439884.2025.2495602

Routledge
Taylor & Francis Group

Who cites whom? U.S.-American authored research syntheses in the field of educational technology: a bibliometric analysis

Katja Buntins[a], Svenja Bedenlier[b] and Olaf Zawacki-Richter[c]

[a]Department of Education, University of Duisburg-Essen, Essen, Germany; [b]Department of Education, Friedrich-Alexander-Universität Erlangen-Nürnberg, Fürth, Germany; [c]Department of Education, Carl-von-Ossietzky University Oldenburg, Oldenburg, Germany

ABSTRACT

Research syntheses are an important approach to capture and synthesize empirical studies in educational technology. However, despite their proclaimed impartial summary of available research, imbalances exist as to whose research is included due to publication language or in regard to the visibility of entire scientific communities.

Using the concepts of academic hegemony and WEIRD research, a bibliometric analysis is conducted in order to explore how research syntheses of authors located in one of the so-called academic core countries – the U.S.A. – are positioned in international comparison, and how this potentially shapes the discourse on educational technology.

For the bibliometric analysis, a corpus with $N = 446$ research syntheses is considered, comprised of 95 U.S.-authored and 351 non-U.S.-authored syntheses. Findings reveal that U.S.-authored syntheses are relatively self-referential and also draw heavily on databases of U.S.-based professional societies in their literature search. Over half of the syntheses cite other U.S.-based research, followed by Chilean, British, Canadian, Australian and German research. In contrast, U.S.-authored syntheses are cited globally, accentuating their perceived importance and influence. Findings point to the need to consider underlying influences and contextual factors for research syntheses in educational technology, reflect on citation practices and generalizability of findings from educational research.

ARTICLE HISTORY
Received 30 June 2024
Accepted 16 April 2025

KEYWORDS
Research synthesis; bibliometric analysis; academic hegemony; educational technology; generalizability

1. Introduction

> 'Explicit reference to prior literature is a substantial indication of a text's embeddedness in the issues which engage the discipline and thus a vital piece in the collaborative construction of new knowledge within a field' (Hyland 2003, 254).

Researchers communicate through publication and citation, which jointly establish academic discourse in a global and national perspective (Marginson 2022; Marín et al. 2023). However, this is not a neutral space, as globally, research published in the English-language garners substantially more interest than research available in other languages (Macgilchrist, Potter, and Williamson 2022; Marín and Zawacki-Richter 2019). Aside from linguistic questions, various analyses in educational technology research have shown the dominance of U.S.-based authors in educational technology research, the origin of most articles in the field from middle- or high-income countries

CONTACT Katja Buntins katja.buntins@uni-due.de Universitätsstraße 2, 45141 Essen, Germany

(Bardakci et al. 2022), as well as the high number of U.S.-based authored papers in instructional design research, which exceeds all other countries (Bodily, Leary, and West 2019). Authors affiliated with institutions in the U.S.A. are also contributors to the largest share of papers considered in an analysis of education research in Web of Science, and only U.S. universities constitute the top twenty productive institutions in education research (Ivanović and Ho 2019).

Therefore, Hyland's (2003) statement to embed one's own research by referencing others in the field, is undoubtedly true – but the question remains as to whose research is actually made reference to, whose knowledge is then being constructed and what this entails for the professional community in research and practice of educational technology. This is exacerbated by the steady increase of research syntheses that work towards collating a body of research addressing one specific topic or answering a specific question (Kimmons and Rosenberg 2022).

Following this situation, our study revolves around the overarching research interest of how syntheses in educational technology research are potential contributors to global imbalances in knowledge construction. To do so, we explore firstly how research syntheses of authors located in one of the so-called academic core countries – the U.S.A. – are positioned in international comparison, and secondly how this potentially shapes the international discourse on educational technology, which is defined by the Association for Educational Communications and Technology (AECT) as 'the ethical study and application of theory, research, and practices to advance knowledge, improve learning and performance, and empower learners through strategic design, management, implementation, and evaluation of learning experiences and environments using appropriate processes and resources' (AECT 2023).

We use the choice of databases in research syntheses as a proxy, complemented by citation and reference analysis to discern how U.S.-based authors and non-U.S.-based authors of research syntheses potentially differ in this regard and how their respective publications are recognized, that is cited, by others in the field.

In support of this approach, we begin with the delineation of the central ideas that motivated our research – the role of research syntheses in current educational technology research (Kimmons and Rosenberg 2022), academic and cultural hegemony (Marginson and Xu 2023) and WEIRD research (Henrich, Heine, and Norenzayan 2010). Following, we outline the steps of the bibliometric analysis of references and citations applied in the study, present our findings and then discuss them critically against the background of the entanglement of these three perspectives. In view of the ever-increasing number of research syntheses in the field of educational technology, this study is intended to uncover the structure of the scientific communication network in order to counteract potential bias in favour of research syntheses that are as neutral and evidence-based as possible.

2. Motivation for the present study

2.1. Research syntheses in educational technology research

In general terms, research syntheses aim to collate previous research within a specific field or revolving around a certain topic or question and follow explicitly stated criteria (Sutton et al. 2019); for example, in order to provide an overview of the existing body of research, point towards research gaps and corroborate or refute previous findings. Research syntheses in education research make use of more or less specified and transparently reported analytical steps (Buntins et al. 2023) to arrive at their conclusions – an unbiased summary of results from numerous studies being one of their proclaimed achievements (Newman and Gough 2020). The field of educational technology research has witnessed a rise of conducted syntheses over the past years (Kimmons and Rosenberg 2022), with the terms 'systematic review' and 'meta-analysis' being among the three most frequently mentioned methods referred to in educational technology research articles titles published in 2022 (Allman et al. 2023; with 'case studies' as a method in the second place).

One of the crucial steps in conducting research syntheses is the justified choice of which databases to use for the identification of studies for potential inclusion (Buntins et al. 2023; Newman

and Gough 2020). As Wanyama, McQuaid, and Kittler (2022) show, the databases Scopus, Web of Science and EBSCO provide different retrieval results in the searches conducted – making it indispensable to peruse more than one database, if the aim of the search is to be thorough and comprehensive (Bramer et al. 2017). Next to this operative feature and the perceived competition between the databases Web of Science and Scopus (Zhu and Liu 2020), Marginson (2022) argues further: 'Scopus and WoS have normative, practical and empirical-analytic functions. They set the boundaries of recognized global knowledge, provide the content of networked epistemic collaboration and exchange, and source the investigation of global science' (127). Therefore, structures inherent to databases, e.g., which journals or which publication languages are included, influence 'where you search determines what you find' (Wanyama, McQuaid, and Kittler 2022, 1).

However, the choice of database and search strategy are but one contested field. It is also other limiting choices that authors of syntheses make, for example, the restrictions on the publication language of included research (Baker et al. 2018; Bond et al. 2020). With syntheses being employed to condense and amalgamate research into one authoritative and overarching piece of research (Newman and Gough 2020), they can be understood as a bottleneck that determines which research on a given topic is worthy to be included and considered further. Narrowing this down to a review of, for example, the 'top 100 highly cited articles related to mobile learning published in Social Science Citation Index (SSCI) journals' (Lai 2020, 722), means to only consider a fraction of the research that exists on a topic. This, in turn, potentially leads to easily overlook research published in languages other than English (Marín et al. 2023) or to an overreliance of citations and scientometric approaches in determining what is considered 'important' research (Marginson 2022).

2.2. Epistemologies of databases

In the majority of research syntheses, the process of identifying relevant studies exerts a significant influence on the outcomes (Wanyama, McQuaid, and Kittler 2022). This phenomenon occurs because prior to the selection of pertinent studies by researchers, a pre-structured selection of scientific knowledge has already transpired – specifically through the utilization of databases as the source of this knowledge. Consequently, these databases assume a gatekeeper role (Gusenbauer 2024).

Databases such as Web of Science, Scopus or ERIC are not neutral tools but act as epistemic gatekeepers by determining which research is accessible and visible (Tennant 2020). The decision as to which databases are used for a research synthesis is therefore also an epistemological decision that has a direct influence on the production of scientific knowledge (Keller and Hasche 2024).

Databases determine which journals are indexed and which disciplines are preferentially covered (Gasparyan 2023; Grabowsky 2015). Web of Science and Scopus primarily index high-ranking, internationally recognized journals that undergo peer review, while regional or non-English publications frequently remain underrepresented (Asubiaro 2023).

It is noteworthy that the majority of bibliographic databases are operated by institutions situated in the Global North. Web of Science is a product of Clarivate Analytics (U.S.A.), Scopus belongs to Elsevier (Netherlands), and ERIC is funded by the U.S. Department of Education. Alternative databases such as SciELO for Latin American research or CNKI for Chinese studies are rarely considered in systematic reviews, although they could provide a broader knowledge base (Clark and Castro 2002).

2.3. WEIRD research

In their seminal article on research subjects in the behavioural sciences, Henrich, Heine, and Norenzayan (2010) argue that they are most often sourced from 'Western, Educated, Industrialized, Rich, and Democratic (WEIRD) societies' (61), more specifically from the group of undergraduate students from the U.S.A. Henrich, Heine, and Norenzayan (2010) posit two observations on

behavioural science research, the first being that the database for research in this field is narrow – with the vast majority of study samples made up of a population from primarily the U.S. and other countries labelled 'Western'. The second observation pertains to the fact that research conducted on this population largely claims to make generalizable statements about human perceptions, behaviour or traits – seemingly without reflection on whether results obtained from a narrow population allow for such generalized conclusions.

However, education research and practice are closely related to context (Berliner 2002), and are not transferable without context-sensitive adaptation. Mirroring WEIRD samples and generalizations, results from educational technology syntheses often proclaim to apply to different contexts alike – without reflection of their actual situatedness. Out of 446 research syntheses in educational technology, only 12% have included a reflection, justification or acknowledged limitation of their results in regard to geographic location or education system (Bedenlier et al. 2025).

Other research in educational technology has additionally pointed to the fact that highly cited articles in the field oftentimes originate from male authors affiliated with institutions in Western countries and use quantitative methodologies (Mertala, Moens, and Teräs 2024).

2.4. Academic and cultural hegemony

WEIRD research is then closely entangled with questions pertaining to the idea of global academic hegemony (Marginson 2022; Marginson and Xu 2023). While national science is shaped by the respective government and the specific structure of the higher education system and its funding and regulation mechanisms, global science is primarily constituted through individual researchers' quest for a discipline-based community, revolving around the creation and construction of knowledge. Historically, research from the U.S.A but also from other Anglo-Saxon countries, has been perceived as standard, setting linguistic parameters and the modus of how research is conducted (Marginson and Xu 2023). This inequality is captured as 'the exclusion of knowledge in languages other than English, and expectations that universal global knowledge is framed by Anglo-European and primarily Anglo-American norms' (Marginson and Xu 2023, n.p.). Despite changes in global science in regard to country-based publication volume, WEIRD research continues to play an important role.

3. Method and materials

3.1. Research questions

In line with the above-cited findings from other bibliometric studies suggesting a distinct role of U.S.-based (education and educational technology) research in a global perspective, we are interested in investigation of how this plays out in the context of research syntheses. We assume that syntheses with U.S.-based authorship predominantly focus on U.S.-based studies, and thus tend to search for literature in U.S.-based journals and refer to U.S.-based authors. However, following the idea of a global science system (Marginson 2022), those studies are then not only read and cited by U.S.-based authors but also form the basis for international research. This leads to the following research questions:

- RQ 1a: Which databases do U.S.-based authors use to find studies for inclusion in their research syntheses?
- RQ 1b: How does their database choice differ from non-U.S.-based authors?
- RQ 2a: With which countries are the authors referred to in the U.S.-based research syntheses affiliated?
- RQ 2b: With which countries are the authors who cite the U.S.-based research syntheses affiliated?

3.2. Sample preparation and description

In order to answer the research questions, four different data sets were created (see Figure 1). The starting point of the study was the meta-study by Buntins et al. (2023), which analysed the replicability of three distinct types of synthesis, that is meta-analysis, systematic and narrative review. Drawing on a sample size of $N = 446$ research syntheses (Buntins et al. 2023), the data set was divided into two groups: the first encompassing $n = 95$ syntheses with U.S.-based authorship, and the second with $n = 351$ syntheses with non-U.S.-based authorship. All studies in which at least one U.S.-based author was involved – institutional affiliation was taken as a proxy – are defined as studies with U.S. participation. Departing from this allocation, the four datasets were generated.

In order to generate the data sets with which questions 2a and b were to be answered, the approach described in Baker et al. (2018) was applied to the existing data subset of $N = 95$ (see Figure 2).

Therefore, the metadata of 95 U.S.-based studies found in the Web of Science and Scopus databases were extracted. Scopus and Web of Science were used because these databases are very compatible in the provision of metadata. Articles that could not be found in Web of Science or Scopus were excluded from the analysis. The extracted metadata included references and citations of each identified article. In order to prepare the data sets, we conducted an analysis of references and citations. The reference analysis covered 75 articles (78.9%), while the citation analysis covered 78 articles (82.1%). A total of 7,514 articles (an average of 96.3 per article) were extracted from the citations and 5,853 articles (an average of 75.0 per article) from the references.

3.3. Data analysis

In order to answer the question on database choice of U.S.-based and non-U.S.-based research synthesis authors (RQ 1a and 1b), the data from the reviews of the meta-study were coded manually. This coding was carried out using the digital review tool EPPI-Reviewer (Thomas et al. 2023) and conducted by five researchers who regularly discussed uncertainties and unclear items (Buntins et al. 2023). Further details of the exact procedure, the search string and the search are provided in Buntins et al. (2023).

The absolute frequencies of the databases mentioned were converted into relative frequencies. The citations of the databases were related to the total number of studies in the respective

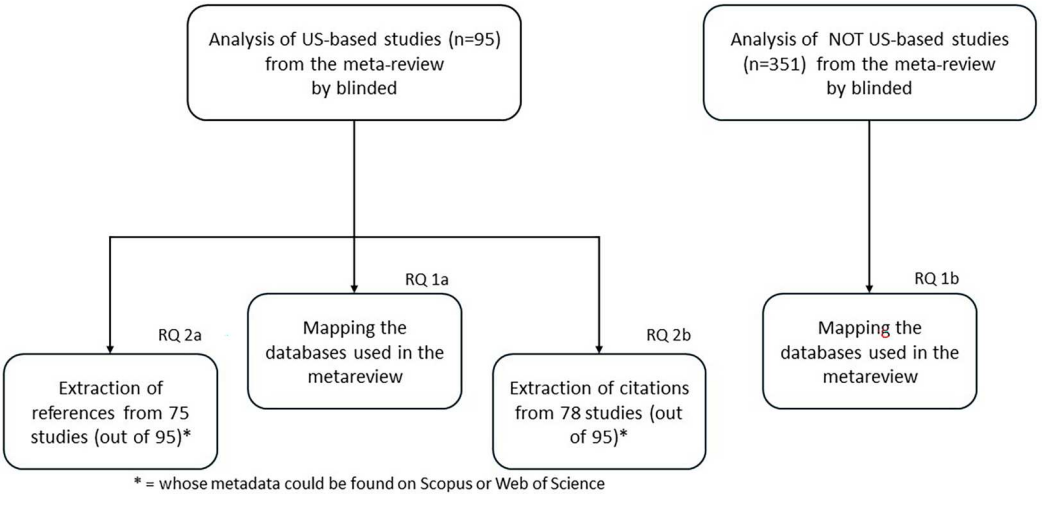

Figure 1. Presentation of the origin of the four data sets.

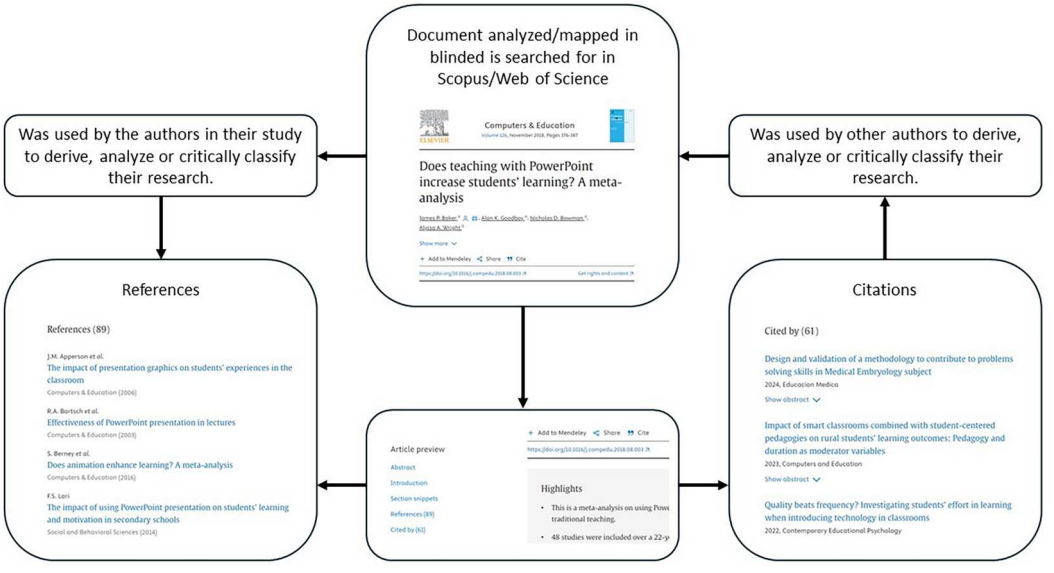

Figure 2. Extraction process of metadata of references and citations in Scopus as outlined in Baker et al. (2018).

subsamples (U.S. vs. non-U.S.-based authorship). The absolute frequencies of the databases were first counted and then compared with each other by calculating the differences between the two data sets. For each of these groups, the relative share of the respective database in the total number of articles in the respective sample is indicated, as well as the respective rank. In addition, a comparative value is indicated, which results from the difference between the two groups. A negative value indicates that the value of the U.S.-based group is higher than that of the non-U.S.-based group. This means that U.S.-based groups use a specific database proportionally more often.

In addition, the databases were categorized according to their geographical location – country – based on the main locations of the publishers or professional associations. This categorization serves to classify and interpret the data. However, it should be noted that this categorization is not always meaningful and must be interpreted qualitatively in each individual case. Specifically, for example, the fact that Scopus is based in the Netherlands does not mean that Elsevier is tied to the specific disciplinary or professional organization there. Nor does the location of Google Scholar mean that it is an U.S.-based tool, but rather that Google is explicitly trying to exert global influence (Goldenfein and Griffin 2022).

To answer the research question on referencing and citation behaviour (RQ 2a and 2b), we conducted a bibliometric analysis using the Bibliometrix package in R (Aria and Cuccurullo 2017). This analysis included the extraction of metadata in and relative frequencies from the origin of the authors. These values are given directly by the package. A difference between the frequencies is also calculated. For the minus, the value for references is higher than for citations. In addition, the same software was used to create a collaboration network on the origin of the authors, which was analysed statistically. These metrics provided comprehensive insights into the structure and networking of the authors in the studies examined and enabled a detailed analysis of international collaboration.

3.4. Results

3.4.1. RQ 1a and 1b: database usage by U.S.-based and non-U.S.-based research synthesis researchers

As depicted in Table 1, the analysis of database usage by U.S.-based authors indicates clear preferences and differences compared to non-U.S.-based authors. It is particularly striking that U.S.-based

authors also heavily rely on U.S.-based databases for their search of studies, while non-U.S.-based authors tend to prefer databases located in different countries.

The database *Educational Resources Information Center* (ERIC) is ranked the most frequently used database among U.S. authors with a relative frequency of 69%. ERIC is provided with funds from the Institute of Education Sciences within the U.S. Department of Education (ERIC n.d.). In contrast, the relative use of ERIC among non-U.S.-based authors is only 44%, ranking it as the second most used database after Web of Science. The difference of −25 percentage points is remarkable and underscores the heavy reliance of U.S.-based researchers on this database. Databases such as PsycINFO and EBSCO are used significantly more often by U.S.-based authors (PsycINFO: 48%, rank 2; EBSCO: 44%, rank 3) than by non-U.S.-based authors (PsycINFO: 17%, rank 8; EBSCO: 20%, rank 6). The differences of −31 and −24 percentage points, respectively, illustrate a strong focus on databases developed in the U.S.A. or popular databases affiliated with specific disciplinary or professional associations.

Global databases such as Web of Science and Scopus are used less frequently by U.S.-based authors (Web of Science: 21%, rank 6; Scopus: 12%, rank 9), while they are used more frequently by non-U.S.-based authors (Web of Science: 50%, rank 1; Scopus: 42%, rank 3). The differences of +29 and +30 percentage points, respectively, are remarkable and suggest that U.S.-based authors make less use of international database resources, which could potentially limit the opportunities for a global perspective in their research. One exception is Google Scholar, which is used comparatively often by both U.S.-based authors (26%, rank 5) and non-U.S.-based authors (31%, rank 4) alike, with a difference of only +5 percentage points.

Databases such as Emerald Insight and Cochrane Library are hardly used by U.S.-based authors (Emerald Insight: 1%, rank 25; Cochrane Library: 1%, rank 25), in contrast to non-U.S.-based authors, who use them somewhat more frequently (Emerald Insight: 5%, rank 15; Cochrane

Table 1. Relative frequencies and rankings of database usage by U.S.-based and non-U.S.-based authors.

		U.S.-based		Non-U.S.-based		
Database	Country	Rel. Freq. (n)	Rank	Rel. Freq. (n)	Rank	Difference
ERIC	U.S.A.	0.69 (66)	1	0.44 (189)	2	−0.25
Web of Science	U.K.	0.21 (20)	6	0.50 (213)	1	0.29
Scopus	Netherlands	0.12 (11)	9	0.42 (177)	3	0.3
Google Scholar	U.S.A.	0.26 (25)	5	0.31 (133)	4	0.05
Science Direct	Netherlands	0.18 (17)	7	0.27 (113)	5	0.09
EBSCO	U.S.A.	0.44 (42)	3	0.20 (87)	6	−0.24
PsycINFO	U.S.A.	0.48 (46)	2	0.17 (73)	8	−0.31
ProQuest	U.S.A.	0.34 (32)	4	0.15 (64)	10	−0.19
IEEE Explore	U.S.A.	0.11 (10)	10	0.20 (85)	6	0.09
SpringerLink	Germany	0.11 (10)	10	0.16 (68)	9	0.05
ACM Digital Library	U.S.A.	0.11 (10)	10	0.15 (63)	10	0.04
Wiley Online Library	U.S.A.	0.11 (10)	10	0.09 (37)	12	−0.02
PubMed	U.S.A.	0.06 (6)	18	0.08 (32)	13	0.01
JSTOR	U.S.A.	0.13 (12)	8	0.05 (21)	15	−0.08
Medline	U.S.A.	0.05 (5)	20	0.06 (26)	14	0.01
CINAHL	U.S.A.	0.05 (5)	20	0.05 (23)	15	0
Academic Search Complete	U.S.A.	0.08 (8)	15	0.04 (19)	19	−0.04
Education Research Complete	U.S.A.	0.09 (9)	14	0.04 (15)	19	−0.06
EMBASE	Netherlands	0.01 (1)	25	0.05 (22)	15	0.04
Sage	U.S.A.	0.06 (6)	18	0.04 (15)	19	−0.03
Emerald Insight	U.K.	0.01 (1)	25	0.05 (20)	15	0.04
Research Gate.	Germany	0.02 (2)	24	0.04 (15)	19	0.01
Google	U.S.A.	0.07 (7)	16	0.02 (9)	26	−0.05
Scielo	Brazil	0.00 (0)	28	0.04 (16)	19	0.04
Cochrane Library	U.K.	0.01 (1)	25	0.03 (14)	25	0.02
Dialnet	Spanish	0.00 (0)	29	0.04 (15)	19	0.04
DOAJ	Sweden	0.05 (5)	20	0.02 (9)	26	−0.03
Academic Premier	U.S.A.	0.07 (7)	16	0.01 (5)	29	−0.06
LearnTechLib	U.S.A.	0.03 (3)	23	0.02 (9)	26	−0.01

Library: 3%, rank 25). The differences of +4 and +2 percentage points show a low use of international sources.

3.4.2. RQ 2a und 2b: reference and citation patterns

Findings from the collaboration network analysis of the author's geographical location in references and citations point to considerable differences and interesting trends in the international reception of scientific work. The relative frequencies can be interpreted as follows: The percentage of countries indicates how many articles have co-authors from that country. The number given here is not exhaustive but reflects the leading 25 countries from both data sources (citations and references). As a reminder, a negative value means that the percentage of references is higher than the percentage of citations (Table 2).

Studies with U.S.-based authorship dominate in references as well as in citations, for example, 52.0% of the analysed references show U.S.-based authorship. This is indicative of the fact that U.S.-based authors of research syntheses focus on nationally published studies for inclusion. A similar situation is identified when the frequency of citation, that is the academic reception and recognition, of a synthesis is considered: With 30.0%, syntheses with U.S.-based authorship are cited most often, albeit this number is lower by 22.0% compared to the included references. Therefore, out of all studies in which a synthesis is cited, about one-third stems from U.S.-based authorship.

In contrast, the share of China-based authors in the citations is remarkably high. Whilst only 1.0% of references used in the syntheses stem from China-based authorship, the percentage

Table 2. Distribution of author origin in references and citations.

	Relative frequencies		
	References	Citations	Differences
U.S.A.	0.52	0.30	−0.22
Chile	0.07	0.01	−0.06
United Kingdom	0.07	0.04	−0.03
Canada	0.05	0.04	−0.02
Israel	0.01	0.01	0.00
Georgia	0.00	0.00	0.00
New Zealand	0.01	0.00	0.00
Japan	0.01	0.00	0.00
Singapore	0.01	0.z1	0.00
Brazil	0.01	0.01	0.00
Portugal	0.00	0.01	0.00
Belgium	0.01	0.01	0.00
Switzerland	0.01	0.01	0.00
Austria	0.00	0.01	0.00
Sweden	0.01	0.01	0.00
Greece	0.01	0.01	0.00
France	0.01	0.01	0.00
Turkey	0.02	0.02	0.00
Thailand	0.00	0.01	0.01
Hong Kong	0.01	0.02	0.01
Iran	0.01	0.01	0.01
Saudi Arabia	0.00	0.01	0.01
Australia	0.03	0.03	0.01
Korea	0.01	0.02	0.01
Finland	0.01	0.01	0.01
Norway	0.00	0.01	0.01
Netherlands	0.02	0.03	0.01
India	0.00	0.01	0.01
Italy	0.00	0.02	0.01
Indonesia	0.00	0.02	0.01
Malaysia	0.00	0.02	0.02
Germany	0.03	0.05	0.02
Spain	0.02	0.04	0.02
China	0.01	0.11	0.10

encompasses 11.0% in the citations. The difference of 10 percentage points evidences a strong influence of U.S.-based educational technology research in the China-based academic discussion.

Authors affiliated with institutions in the United Kingdom and Canada contribute 7.0% to the referenced studies. However, authors from these two countries cite the respective research syntheses with a slight decline of 3 percentage points. This shows that authors from the United Kingdom and Canada provide primary research studies considered relevant for inclusion in research syntheses – but authors do not necessarily focus on U.S.-based educational technology research outputs. Chile is another illustrative example, with a difference of 6.0% between citations and references being even more pronounced.

Other countries, such as Germany, Malaysia and Spain, show positive differences between references and citations. The +2 percentage points suggest an orientation towards the U.S.-American research context. Slightly positive differences also apply to Australia, the Netherlands and Italy, which indicates a stable or increased reception and recognition through citation of their scientific research output in the field of educational technology. These findings lead to the conclusion that U.S.-based educational technology research syntheses play a dominant role in international academic discourse in the field, although its studies largely refer to themselves.

An examination of the collaboration networks underlines these results. Figure 3 shows the social network of references, which represents the geographical origin of the authors whose work is cited in the research syntheses. It can be seen that the U.S.A. occupies a very strong and central position and dominates the cooperation as a central player. In addition, there are some other influential countries, such as the United Kingdom, which enter into important international collaborations.

The network analysis reveals some key statistics that describe its structure (see Table 3):

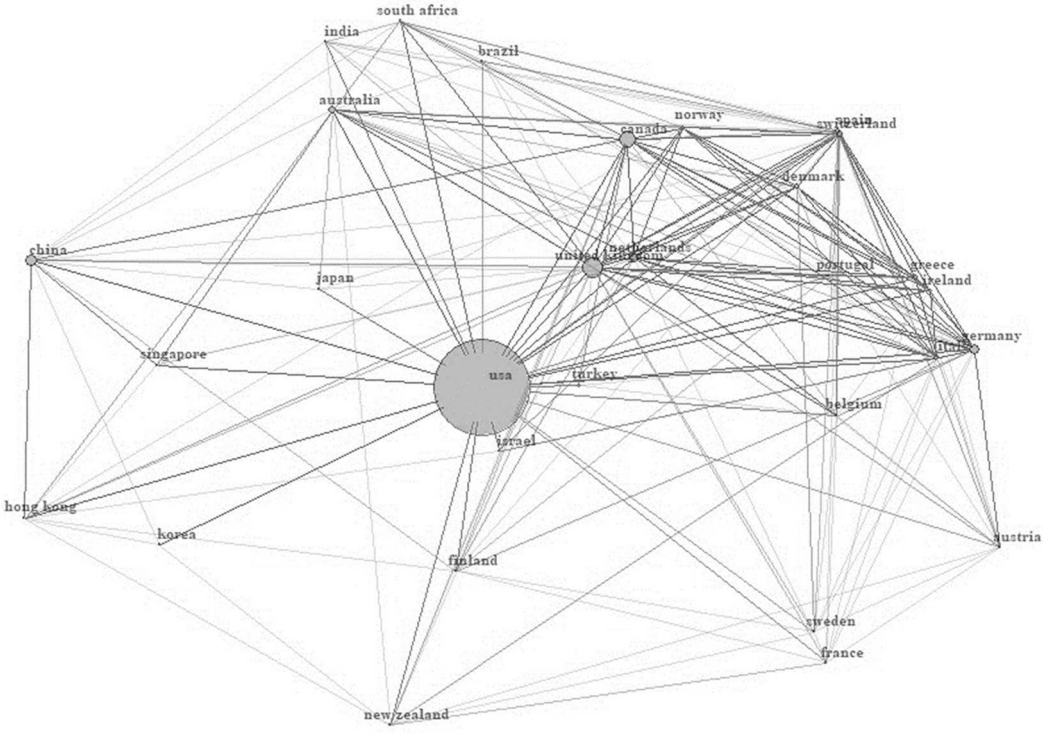

Figure 3. Collaborative network of references regarding the geographical affiliation of the authors.

- **Size of the network:** the network consists of 86 nodes, reflecting the diversity of the countries involved. This value is very small, especially in comparison to the citation statistics.
- **Density:** The density of the network is 0.111, which indicates a relatively low interconnectedness of the nodes. The low density suggests limited direct citation between authors from different countries.
- **Transitivity:** The transitivity value of 0.424 shows a moderate probability that connected nodes are also connected to each other.
- **Diameter:** The diameter of the network is 4, which means that the longest shortest path between two nodes is 4 steps. This measure indicates that the distance between the nodes furthest apart is relatively small at 4 steps.
- **Degree of centralization:** The degree of centralization is 0.607, which indicates a relatively centralized network in which some countries play a much more central role in the citation structure than others.
- **Mean path length:** The mean path length is 2.071 steps, indicating that each country is on average about two steps away from every other country in the citation network. This value shows that most actors are relatively closely connected.

The analysis points to the dominant role of the U.S.A. as the significant pattern in the collaboration network.

Figure 4 shows the social network of citations, which represents the origin of the authors who cite the systematic reviews in their work. The network is already visually clearly centralized. There is a close proximity to the U.S.A. and other actors such as authors from China, New Zealand, Great Britain, Australia and Canada. The network has a larger size with 123 nodes, which indicates broader international citation relationships compared to the reference network. The statistical analysis of this network is shown in Table 3 and can be interpreted as follows:

- **Network size:** This network comprises 123 nodes, indicating a broader international citation base in comparison.
- **Density:** The density of the network is 0.146, which is higher than that of the reference network, but still low. This indicates a more strongly networked citation landscape, although the level could still be increased.
- **Transitivity:** The value of 0.533 indicates a higher probability of interconnectivity of the nodes. This indicates more strongly connected clusters in the citation behaviour. As described above, a stronger interconnectedness of the clusters can thus be determined. From the figure, different proximity values can be identified.
- **Diameter:** The diameter remains at 4, indicating a similar maximum separation as in the reference network. There is no difference to the first network here.
- **Degree of centralization:** The degree centralization drops to 0.46, which reflects a less centralized but more widely distributed citation pattern compared to the reference network.
- **Mean path length:** The average path length of 2.066 is similar to that of the reference network, which indicates a comparably close-meshed international citation pattern.

Table 3. Statistical key figures of the two collaborative networks.

	References	Citations
Size	86	123
Density	0.111	0.146
Transitivity	0.424	0.533
Diameter	4	4
Degree centralization	0.607	0.46
Average path length	2.071	2.066

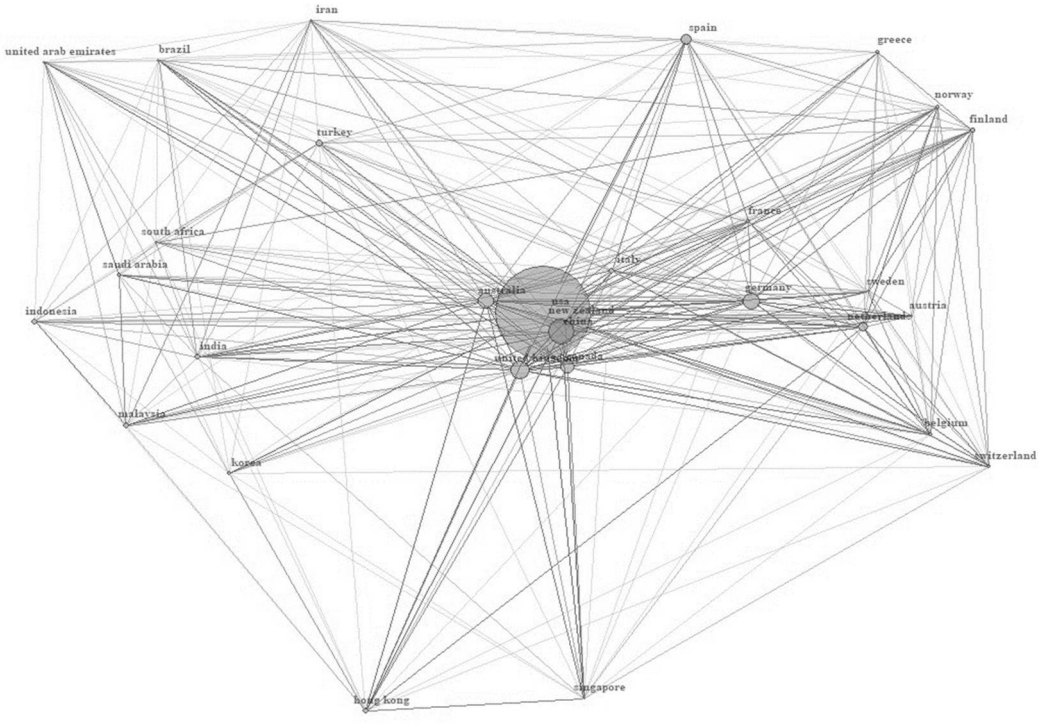

Figure 4. Collaborative network of citations regarding the origin of the authors.

The analysis of the citation network shows a denser international interaction than the collaboration network of references, which indicates that the citations are more widely distributed across different countries and thus there is a large influence of international collaborations that receive U.S.-based research syntheses. This in turn indicates a stronger integration of different international perspectives in the cited literature, reflecting the broad impact and recognition of the analysed research syntheses.

The results show remarkable differences in the structure and centralization of the social networks of references and citations. The reference network shows a higher centralization and a less dense structure, indicating the U.S. as a key player in academic referencing. In contrast, the citation network, which is less centralized and denser, indicates a broader and more integrated pattern of international citations, reflecting greater and more diverse academic discourse participation outside the U.S.A. Of particular interest is the position of China, which is also very centralized and close to the U.S.A., indicating an increased intensity of discussion.

4. Discussion

Applying the concept of academic hegemony (Marginson 2022; Marginson and Xu 2023) in conjunction with characteristics of WEIRD research (Henrich, Heine, and Norenzayan 2010), the presented bibliometric analysis revolved around the questions of which databases are being used by authors located in the U.S.A. and in countries other than the U.S.A., as well as the analysis of references in published syntheses and studies citing syntheses, respectively.

Overall, the analysis demonstrates that published research conducted by authors in the U.S.A. plays a dominating role in the international discourse on educational technology research – although this research is largely self-referential, concerning both choices of databases as well as

references to U.S.-based research, which could make the integration of international findings and knowledge sharing more difficult.

In reference to research question one, our results show that U.S.-based authors of research syntheses also strongly prefer U.S.-based infrastructure such as ERIC, PsycINFO and EBSCO, while non-U.S.-based authors tend to use global resources such as Web of Science and Scopus. Overall, this also suggests different research orientations, for example, the heavy reliance on domestic databases by U.S.-based authors potentially indicates a limited perspective in research with less inclusion of international literature. This interpretation is reiterated by the lower use of global databases such as Web of Science and Scopus.

In contrast, non-U.S.-based authors show a wider use of global databases, indicating a more open and diversified research base. Database choice for research syntheses may be understood as a reflection of broader cultural and institutional differences in research practice. However, the reliance on English-language databases like Web of Science and Scopus by non-U.S. researchers may create several unintended issues, such as the (1) narrowed research perspectives by the underrepresentation of non-English research and reduced visibility of locally relevant studies, leading to a Western-centric research base, (2) a bias in academic evaluation as researchers are often based on publications in these databases, disadvantaging non-native English speakers and leading to inequities in academic recognition and (3) the homogenization of research standards and methods in general. Solutions may include promoting regional databases, encouraging multilingual publishing, and redefining evaluation metrics to value diverse journals and languages. Supporting open-access, local journals, and advocating for broader inclusion of non-English research in major databases would also foster a more inclusive global research landscape.

Overall, the findings emphasize the need to consider the underlying influences of database selection on research outcomes (Wanyama, McQuaid, and Kittler 2022). As demonstrated in our analysis, this specifically concerns broader questions about internationality and diversity in scientific research practice (Macgilchrist, Potter, and Williamson 2022), particularly in research syntheses (see also Bedenlier et al. 2025).

In reference to research question two, our investigation of the geographical affiliation of the authors in the references and citations mirrors the current structure of international scientific reception. It confirms the dominant role of U.S.-based research in the global scientific discourse as an example of academic hegemony (Jandrić and Hayes 2019; Marginson 2022; Marginson and Xu 2023). With 52.0% of references and 30.0% of citations, U.S.-based studies are strongly represented in the research syntheses, echoing findings from Ivanović and Ho (2019) for education research. This result reflects the strong focus of U.S. science on national literature and the national science system (Marginson 2022). It also constitutes a potential limitation of the diversity and breadth (Macgilchrist, Potter, and Williamson 2022), as well as the generalizability of the peer-reviewed research in educational technology (Berliner 2002).

A remarkable phenomenon is the high proportion of China-based authors in the citations (11.0%) compared to their low proportion in the references (1.0%). The difference of 10 percentage reflects a strongly one-sided orientation of Chinese academics towards the U.S.-driven discourse in educational technology research. Similar trends at a lower level are also evident for other countries, such as Thailand, Hong Kong, Iran, Saudi Arabia, Australia, South Korea, Finland, Norway, the Netherlands, India, Italy, Indonesia, Malaysia, Germany and Spain. Previous analysis showed, that on the linguistic level, research published in the English-language is more widely received in the Spanish-speaking educational technology scientific community than vice versa (Marín and Zawacki-Richter 2019).

The case of China-based research is interesting, as the discrepancy between references and citations may indicate that Chinese studies are increasingly seen as relevant and worthy of citation – although they have been less represented in peer-reviewed research syntheses. This trend underlines the growing importance of China as a player in the global research environment in general terms (Marginson 2022; Oldac 2022, 2023), and could lead to a long-term shift in academic attention

towards more China-based research in the field. Previous research syntheses in educational technology have already shown that primary research frequently originates from China (Bond et al. 2020). On the country level, the United Kingdom, Canada and Chile also constitute interesting cases as they are the only countries in our sample that show a higher proportion of references than they themselves cite U.S. studies. Therefore, authors from these three countries seem to form an important basis for the authors of the statement studies, and thus have a relevant influence on U.S. research.

As for the social network analysis of citations and references, results show both similarities and differences in the structure and interconnectedness of these networks, which point to different dynamics in academic communication and cooperation.

The high degree of centralization in the reference network suggests that U.S.-based research plays a central role for educational technology, leading to the conclusion that scientific work from the U.S.A. acts as the main node and U.S.-based research constitutes a major source of knowledge for the field.

In contrast, the citation network shows less centralization and a higher density, which indicates broader and more diverse international recognition. This implies that academic work from the U.S.A. and focussing on U.S.-based references is received internationally. The increased transitivity in the citation network leads to the conclusion that the countries citing the research syntheses often also cooperate and collaborate with each other.

For methodological consideration in educational research syntheses our findings prove valuable in different regards: First, at present, research syntheses in the field can indeed be conceived of as bottlenecks that determine which research is included and therefore seen as contributing to a certain topic or question. The fact that U.S.-based research is internationally received but at the same comparatively references less international research contributes to said bottleneck in terms of diversity in perspectives and educational contexts. WEIRD research (Henrich, Heine, and Norenzayan 2010) is a useful lens to apply for further analysis of primary research samples, to prove or refute the assumption that according to our findings, U.S.-based samples are also overrepresented in (international) research syntheses. Second, the choice and usage of databases influence the direction and content of research synthesis (Wanyama, McQuaid, and Kittler 2022), even before author-conscious decisions on included publication languages and/or geographical focus are made (Bedenlier et al. 2025). Finally, the current hegemony in global science is mirrored in our findings per dominance of U.S.-based research, albeit the projected long-term role of China-based research in the field of educational technology. For research syntheses, this reiterates the importance to closely consider the educational context from which results of synthesized research are obtained (Berliner 2002).

4.1. Limitations and conclusion

Results from our analysis are to be reflected in the context of certain limitations. Firstly, we need to reflect on the quality of the data. With a selection of relatively few studies chosen at random, they may nevertheless be subject to distortions due to said sample size. This raises the question of representativeness for the self-referencing effect found for U.S.-based research. Furthermore, the databases for manually coded data may contain errors. In addition, the designation of non-U.S. participation is not a homogeneous unit of measurement. Here, influences can overlap and lead to false effects. As this study is not hypothesis-testing, the categorization serves as an exploratory analysis. Thus, we suggest to carry out more analyses in this line to support or critique the present findings.

We also only categorized and described the databases very roughly. This knowledge is not based on large-scale studies, but rather on research into their origins and empirical knowledge. It is recommended that readers engage in critical reflection on this categorization in U.S.-based databases. This categorization was exploratory and should be subjected to further analysis in a subsequent

article. The objective was to ascertain whether the publication structure of these databases does, in fact, predominantly include U.S. authors.

A further limitation arises from the fact that we did not consider any temporal components. Due to the design of our study, temporal differences are inherent. In order to analyse long-term effects, it would be necessary to identify identical pairs of references and citations and compare them with each other.

The value of research syntheses and bibliometric analyses is contingent upon the quality of the underlying search. When selecting search terms and compiling the sample (Buntins et al. 2023), an effort was made to capture a representative picture of broad EdTech research. However, it is possible that some blind spots may have been introduced in this process.

Finally, we side with Marginson (2022) who voices critique on the value and meaningfulness of scientometric approaches, as results from numerical analysis, such as the present one, can only 'provide partial glimpses of aspects of global science' (129). Already Pinski and Narin (1976) noted that the application of citation analysis is a matter of controversy: 'Extreme positions extend from those who would employ a citation measure in the granting of tenure to an individual faculty member to those who deny the validity of any application of citation data beyond the use in literature search' (297). In fact, there are many reasons for citing articles, e.g., not just for the communication of prior published research but also for purposes such as homage to pioneers, unreasonably citing one's own work, correcting or criticizing another' work, or not citing an article, such as the literature is not perceived as relevant, the author might not be aware of prior research or it is simply not obtainable (Rice et al. 1989). However, we think that citation data provides a suitable and appropriate objective measure describing the relationships between journals, authors, and the flow of information in a research discipline.

In this line of thought, we conceive of our results as an explorative starting point that subsequently calls for multiple research approaches to examine the observed phenomenon further. We employed citation analysis in this study, focusing exclusively on the frequency with which a synthesis in our sample was cited in other studies. We did not take into account the motivations underlying the citation (Tahamtan and Bornmann 2019). Therefore, research approaches that collect rich, qualitative data – such as interviews on awareness of personal bias in research reviews and syntheses, or critical discourse analysis of scientific and public documents in the field – seem promising to extend the existing analysis.

Returning to initially cited argument by Hyland (2003), the embeddedness of research is undisputable but on the applied levels merits closer attention – who makes reference to whom and where do the references originate? If the citing practices are political (Macgilchrist, Potter, and Williamson 2022), then also research syntheses in educational technology are. Therefore, we advocate more closely considering contextual factors of research included for synthesis, addressing issues such as choice of database, sample sources used to develop generalizations from syntheses and sensitizing review teams for the intricacies of the field.

Acknowledgements

We thank our colleagues Melissa Bond, Victoria Marín and Marion Händel with whom we jointly conducted the data extraction in the research synthesis published in (Buntins et al. 2023). Section 2.2 of the article was developed, written and grounded in literature by the authors using ideas generated by ChatGPT (4.o), in order to explore and establish the connection of the article to the scope of the special issue. This section, as well as the section on methods and materials, and parts of the results and discussion sections, were translated and revised using DeepL.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Allman, Bohdana, Royce Kimmons, Joshua Rosenberg, and Monalisa Dash. 2023. "Trends and Topics in Educational Technology, 2023 Edition." *TechTrends* 67 (3): 583–591. https://doi.org/10.1007/s11528-023-00840-2.

Aria, Massimo, and Corrado Cuccurullo. 2017. "bibliometrix: An R-Tool for Comprehensive Science Mapping Analysis." *Journal of Informetrics* 11 (4): 959–975. https://doi.org/10.1016/j.joi.2017.08.007.

Association for Educational Communications and Technology. 2023. "AECT Definition for Educational Technology". https://www.aect.org/aect/about/aect-definition.

Asubiaro, Toluwase Victor. 2023. "(Under)Representation of Research Journals from Africa in Web of Science, and Scopus." *Information Matters* 2 (3): 1–3. https://doi.org/10.2139/ssrn.4417249.

Baker, James P., Alan K. Goodboy, Nicholas D. Bowman, and Alyssa A. Wright. 2018. "Does Teaching with PowerPoint Increase Students' Learning? A Meta-Analysis." *Computers & Education* 126:376–387. https://doi.org/10.1016/j.compedu.2018.08.003.

Bardakci, Salih, Meryem Yılmaz Soylu, Buket Akkoyunlu, and Deniz Deryakulu. 2022. "Collaborations, Concepts, and Citations in Educational Technology: A Trend Study via Bibliographic Mapping." *Education and Information Technologies* 27 (3): 4321–4346. https://doi.org/10.1007/s10639-021-10785-9.

Bedenlier, Svenja, Katja Buntins, Melissa Bond, Marion Händel, and Victoria I. Marín. 2025. "Evidence Syntheses in Educational Technology Research: What is not Published in English is not Visible? A Tertiary Mapping Review." *Review of Education* 13 (1): 1–31, e70022. https://doi.org/10.1002/rev3.70022.

Berliner, David C. 2002. "Comment: Educational Research: The Hardest Science of All." *Educational Researcher* 31 (8): 18–20. https://doi.org/10.3102/0013189X031008018. http://www.jstor.org/stable/3594389.

Bodily, Robert, Heather Leary, and Richard E. West. 2019. "Research Trends in Instructional Design and Technology Journals." *British Journal of Educational Technology* 50 (1): 64–79. https://doi.org/10.1111/bjet.12712.

Bond, Melissa, Katja Buntins, Svenja Bedenlier, Olaf Zawacki-Richter, and Michael Kerres. 2020. "Mapping Research in Student Engagement and Educational Technology in Higher Education: A Systematic Evidence Map." *International Journal of Educational Technology in Higher Education* 17 (1): 1–30. https://doi.org/10.1186/s41239-019-0176-8.

Bramer, Wichor M., Melissa L. Rethlefsen, Jos Kleijnen, and Oscar H. Franco. 2017. "Optimal Database Combinations for Literature Searches in Systematic Reviews: A Prospective Exploratory Study"." *Systematic Reviews* 6 (1): 1–12. https://doi.org/10.1186/s13643-017-0644-y.

Buntins, Katja, Svenja Bedenlier, Victoria Marín, Marion Händel, and Melissa Bond. 2023. "Methodische Ansätze zu Evidenzsynthesen in der Bildungstechnologie: Eine tertiäre Übersichtsarbeit." *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung* 54 (Dezember): 167–191. https://doi.org/10.21240/mpaed/54/2023.12.20.X.

Clark, Otavio Augusto Camara, and Aldemar Araujo Castro. 2002. "Searching the Literatura Latino Americana e do Caribe em Ciências da Saúde (LILACS) Database Improves Systematic Reviews." *International Journal of Epidemiology* 31 (1): 112–114. https://doi.org/10.1093/ije/31.1.112.

Education Resources Information Center (ERIC). n.d. "What is ERIC?" https://eric.ed.gov/?faq.

Gasparyan, Armen Yuri. 2023. "Bibliographic Databases: Some Critical Points." *Journal of Korean Medical Science* 28 (6): 799–800. https://doi.org/10.3346/jkms.2013.28.6.799.

Goldenfein, Jake, and Daniel S. Griffin. 2022. "Google Scholar – Platforming the Scholarly Economy." *Internet Policy Review* 11 (3): 1–34. https://doi.org/10.14763/2022.3.1671.

Grabowsky, Adelia. 2015. "Library Instruction in Communication Disorders: Which Databases Should Be Prioritized?" *Issues in Science and Technology Librarianship* (79), https://doi.org/10.29173/istl1627.

Gusenbauer, Michael. 2024. "Searchsmart.org: Guiding Researchers to the Best Databases and Search Systems for Systematic Reviews and Beyond." *Research Synthesis Methods* 15 (6): 1200–1213. https://doi.org/10.1002/jrsm.1746.

Henrich, Joseph, Steven J. Heine, and Ara Norenzayan. 2010. "Most People are Not WEIRD"." *Nature* 466 (7302): 29–29. https://doi.org/10.1038/466029a.

Hyland, Ken. 2003. "Self-Citation and Self-Reference: Credibility and Promotion in Academic Publication"." *Journal of the American Society for Information Science and Technology* 54 (3): 251–259. https://doi.org/10.1002/asi.10204.

Ivanović, Lidija, and Yuh-Shan Ho. 2019. "Highly Cited Articles in the Education and Educational Research Category in the Social Science Citation Index: A Bibliometric Analysis"." *Educational Review* 71 (3): 277–286. https://doi.org/10.1080/00131911.2017.1415297.

Jandrić, Petar, and Sarah Hayes. 2019. "The Postdigital Challenge of Redefining Academic Publishing from the Margins." *Learning, Media and Technology* 44 (3): 381–393. https://doi.org/10.1080/17439884.2019.1585874.

Keller, Carolin, and Nick Gerrit Hasche. 2024. "Forschungsdaten für Forschungssynthesen am Beispiel des Metavorhabens digi-ebf." *Information–Wissenschaft & Praxis* 75 (1): 34–37. https://doi.org/10.1515/iwp-2023-2050.

Kimmons, Royce, and Joshua M. Rosenberg. 2022. "Trends and Topics in Educational Technology, 2022 Edition." *TechTrends* 66 (2): 134–140. https://doi.org/10.1007/s11528-022-00713-0.

Lai, Chiu-Lin. 2020. "Trends of Mobile Learning: A Review of the Top 100 Highly Cited Papers." *British Journal of Educational Technology* 51 (3): 721–742. https://doi.org/10.1111/bjet.12884.

Macgilchrist, Felicitas, John Potter, and Ben Williamson. 2022. "Reading Internationally: If Citing is a Political Practice, Who are we Reading and Who are we Citing?" *Learning, Media and Technology* 47 (4): 407–412. https://doi.org/10.1080/17439884.2022.2140673.

Marginson, Simon. 2022. "Global Science and National Comparisons: Beyond Bibliometrics and Scientometrics"." *Comparative Education* 58 (2): 125–146. https://doi.org/10.1080/03050068.2021.1981725.

Marginson, Simon, and Xin Xu. 2023. "Hegemony and Inequality in Global Science: Problems of the Center-Periphery Model." *Comparative Education Review* 67 (1): 31–52. https://doi.org/10.1086/722760.

Marín, Victoria I., Katja Buntins, Svenja Bedenlier, and Melissa Bond. 2023. "Invisible Borders in Educational Technology Research? A Comparative Analysis." *Educational Technology Research and Development* 71:1349–1370. https://doi.org/10.1007/s11423-023-10195-3.

Marín, Victoria, and Olaf Zawacki-Richter. 2019. "Scientific Communication Between Spanish and English Educational Technology Journals. A Citation Analysis of Eight Journals." *Journal of New Approaches in Educational Research* 8 (2): 96–111. https://doi.org/10.7821/naer.2019.7.393.

Mertala, Pekka, Eleni Moens, and Marko Teräs. 2024. "Highly Cited Educational Technology Journal Articles: A Descriptive and Critical Analysis." *Learning, Media and Technology* 49 (2): 216–229. https://doi.org/10.1080/17439884.2022.2141253.

Newman, Mark, and David Gough. 2020. "Systematic Reviews in Educational Research: Methodology, Perspectives and Application." In *Systematic Reviews in Educational Research*, edited by Olaf Zawacki-Richter, Michael Kerres, Svenja Bedenlier, Melissa Bond, and Katja Buntins, 3–22. Wiesbaden: Springer. https://doi.org/10.1007/978-3-658-27602-7_1.

Oldac, Yusuf Iqbal. 2022. "Global Science and the Muslim World: Overview of the Contributions of Muslim-Majority Countries to Global Science." *Scientometrics* 127 (11): 6231–6255. https://doi.org/10.1007/s11192-022-04517-0.

Oldac, Yusuf Iqbal. 2023. "Tectonic Shifts in Global Science: US-China Scientific Competition and Muslim Majority Science Systems in Multipolar Science." *Higher Education* 87(3):637–659. https://doi.org/10.1007/s10734-023-01028-6.

Pinski, Gabriel, and Francis Narin. 1976. "Citation Influence for Journal Aggregates of Scientific Publications: Theory, with Application to the Literature of Physics." *Information Processing & Management* 12 (5): 297–312. https://doi.org/10.1016/0306-4573(76)90048-0.

Rice, R. E., Christine L. Borgman, Diane Bednarski, and P. J. Hart. 1989. "Journal-to-journal Citation Data: Issues of Validity and Reliability." *Scientometrics* 15 (3-4): 257–282. https://doi.org/10.1007/BF02017202.

Sutton, Anthea, Mark Clowes, Louise Preston, and Andrew Booth. 2019. "Meeting the Review Family: Exploring Review Types and Associated Information Retrieval Requirements." *Health Information & Libraries Journal* 36 (3): 202–222. https://doi.org/10.1111/hir.12276.

Tahamtan, Iman, and Lutz Bornmann. 2019. "What Do Citation Counts Measure? An Updated Review of Studies on Citations in Scientific Documents Published Between 2006 and 2018." *Scientometrics* 121 (3): 1635–1684. https://doi.org/10.1007/s11192-019-03243-4.

Tennant, Jonathan P. 2020. "Web of Science and Scopus are not Global Databases of Knowledge." *European Science Editing* 46:e51987. https://doi.org/10.3897/ese.2020.e51987

Thomas, James, Sergio Graziosi, S. Jeff Brunton, Z. Zac Ghouze, P. Patrick O'Driscoll, M. Melissa Bond, and Anastasia Koryakina. 2023. "EPPI Reviewer: Advanced Software for Systematic Reviews, Maps and Evidence Synthesis". EPPI Centre Software. UCL Social Research Institute. London. https://eppi.ioe.ac.uk/cms/De-fault.aspx?alias=eppi.ioe.ac.uk/cms/er4.

Wanyama, Seperia B., Ronald W. McQuaid, and Markus Kittler. 2022. "Where You Search Determines What You Find: The Effects of Bibliographic Databases on Systematic Reviews"." *International Journal of Social Research Methodology* 25 (3): 409–422. https://doi.org/10.1080/13645579.2021.1892378.

Zhu, Junwen, and Weishu Liu. 2020. "A Tale of Two Databases: The Use of Web of Science and Scopus in Academic Papers"." *Scientometrics* 123 (1): 321–335. https://doi.org/10.1007/s11192-020-03387-8.