

A bibliometric mapping of shadow education research: achievements, limitations, and the future

Hajar, A. & Karakus, M.

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A Bibliometric Mapping of Shadow Education Research: Achievements, Limitations, and the Future

Abstract

This study aims to map the literature on shadow education, using metadata extracted from 488 publications indexed in the Web of Science database. It is called shadow education because much of its content mimics that in schooling. This study uses bibliometric procedures to describe and visually represent the available literature on shadow education in terms of the core sources, the key authors, institutions, and countries leading the generation and dissemination of research on shadow education. The study also elaborates on the h-classics publications to obtain a deeper understanding of the most influential scientific outputs in this domain. Key findings of the study are that research on shadow education: (a) has experienced steady growth over the last decade; (b) is disseminated in a wide range of sources, mainly in the disciplines of sociology of education, economics of education, educational psychology, and language education; (c) is published mainly by scholars working in East Asia and the United States; (d) has focused on tangible (quantifiable) benefits related to improved examination results, and (e) reveals how it specifically benefits students from high socioeconomic backgrounds, and thus it contributes to greater educational inequality. This study suggested pedagogical implications and areas for ongoing research.

Keywords: shadow education; bibliometric analysis; literature review; science mapping; VOSviewer

1. Introduction

The title of the paper refers to ‘shadow education’, widely used as a metaphor for forms of private supplementary tutoring which operates alongside regular schooling and, to some extent, copies its curriculum (Bray, 2021a). It is provided for a fee and can take various forms, including one-to-one or small-group tuition in the homes of tutors or students, or in large classes, even lecture theatres with video screens. Stevenson and Baker (1992) used the shadow education metaphor in the title of a sociological research and education policy article: *Shadow education and allocation in formal schooling: Transition to university in Japan*. They defined it as ‘a set of educational activities that occur outside formal schooling and are designed to enhance the students’ formal

school career’ (Stevenson and Baker, 1992, p. 134). More than two decades later, David Baker (2020, p. 311) reflected on this seminal paper and how he and his colleague thought it was ‘an exotic Japanese cultural oddity’ at that time, and that ‘although infrequently cited over the subsequent decade, in the new century our once obscure article began to be widely referenced, reaching over 500 citations as of early 2020’. Bray (2010, p. 4) points out that although Stevenson and Baker used the metaphor of shadow education in the title of their article about Japan in 1992, this metaphor was earlier used by Marimuthu et al. (1991) while describing PT in Malaysia. Marimuthu et al. (1991, p. vi) stated that

The study... found that a considerable percentage of youths attended private tuition [in Malaysia] in order to prepare themselves for the selective national examinations... the practice of private tuition was so prevalent that it could be considered as a ‘shadow educational system’. (Marimuthu et al., 1991, p. vi)

Bray (2010) further indicates that this metaphor was also used in Singapore by George in 1992. Elsewhere, Zhang and Bray (2020) point out that shadow education has distant origins in the mid-19th century; however, it only emerged as a specific topic in the academic literature in the 1980s and 1990s (e.g., Hemachandra, 1982; Hussein, 1987; Marimuthu *et al.*, 1991; Stevenson & Baker, 1992). Zhang and Bray (2020) further contend that these papers focused only on individual countries with some scattered national and subnational literature, but the first global comparative study of this phenomenon appeared in 1999 in Mark Bray’s book published by UNESCO: *The Shadow Education System: Private Tutoring and its Implications for Planners*.

Recently, shadow education has witnessed growing recognition from researchers, educators and policymakers owing to its influential implications for social equality, economic growth and the operation of formal education systems (Entrich, 2021). This is evidenced by its increasing presence not only in books (e.g. Bray, 2021a; Bray & Lykins 2012; Bray, Kobakhidze, & Kwo, 2020; Entrich, 2018; Kim & Jung, 2019) but also in special issues in scholarly journals, such as *Asia Pacific Education Review* (Bray & Lee, 2010), *the East China Normal University Review of Education* (Zhang & Bray, 2019), *the European Journal of Education* (Gordon Györi, 2020) and *Orbis Scholae* (Šťastný & Kobakhidze, 2020). UNESCO’s *Global Education Monitoring Report* (GEM) 2021 of non-state actors in education also recognises the focal role that shadow education can play in the education system. Nevertheless, research on shadow education has not kept pace

with its global expansion. This is primarily because it is less structured, and some tutors and tutees are reluctant to provide data considering it as an illegitimate form of education, and its prevalence is still viewed by some governments as criticism of the mainstream schooling for which the state is responsible (XXX, 2021a; Zhang & Bray, 2020). In fact, Malik (2017, p. 19) suggest that the field of shadow education ‘seems to be building more floors upwards before looking at the foundations and strengthening it’.

This paper provides a bird’s eye view of shadow education research since its emergence from a bibliometric perspective. Bibliometric overviews provide an objective and systematic approach by measuring, tracking, and analysing print-based scholarly literature in a specific field to reveal its scientific roots, identify emerging thematic areas and gaps in the literature and, ultimately, contribute to moving the field forward (Karakus *et al.*, 2021). Consequently, this study represents the first that has employed several bibliometric indicators to explore the evolution of shadow education research based on publication and citation trends and venues contributing to this research field. It also presents the most prominent authors, countries, institutions, and sources in the domain of shadow education, along with the recurring research themes explored in the literature. Hence, mapping research on shadow education is essential to identify contributions and challenges to the development of the field to allow researchers to detect areas, populations and contexts that should be further explored, which in turn, can deepen its conceptualisation and theorisation. As Bray (2021b, p. 2) aptly remarks, ‘shadow education has growing significance, and needs to be more firmly on research agendas in all branches of educational studies including comparative and international education’.

2. The present study

2.1 Study aims

Systematic literature reviews and content analysis can offer significant insights into the theoretical and methodological underpinnings of shadow education research. However, the scope of studies using these approaches is limited, and the process is time-consuming. An alternative approach is a bibliometric review of the literature, which can ‘process a considerably higher volume of studies published over a longer timespan with a lower investment of time and resources while providing

a comprehensive picture of the development and the current status of a field' (Hernández-Torrano & Ibrayeva, 2020, p. 3). As previously stated, research on shadow education has been slow to catch up with reality and perhaps viewed as the hidden secret in the education system of some parts of the world. Nevertheless, it is now established as an important subfield of educational studies. While only parts of the big picture of this phenomenon are identified and researched, this study can still help educators, researchers and policymakers to better understand the shadow education phenomenon, especially since it can exacerbate social inequalities, a major concern for the achievement of an equitable and inclusive, high-quality education. More precisely, the study describes the evolution of shadow education research, examining the publication trends and citation data. It also reveals the core sources and research areas that have contributed the most to the development of this domain, as well as the key authors, institutions and countries leading the generation and dissemination of research on shadow education. Further, the study also identifies and elaborates on the main themes, shedding light on the research gaps and the agenda ahead.

2.2 Materials and Methods

This study took a bibliometric approach to map the literature on shadow education using metadata extracted from the six indexes of the Web of Science (WoS): The Social Sciences Citation Index (SSCI), the Arts and Humanities Citation Index (AHCI), the Science Citation Index-Expanded (SCI-Expanded), the Emerging Sources Citation Index (ESCI), the Book Citation Index – Social Sciences and Humanities (BKCI-SSH), and the Book Citation Index– Science (BKCI-S). The WoS database was selected for this study because it has broad coverage in educational research and most other research disciplines (Ivanović & Ho, 2019). The WoS Core Collection covers more than 82 million records, 1.8 billion cited references (from the 1900s to the date), and 21,800 journals in the fields of art and humanities, social sciences, and science (Clarivate Analytics, 2022). WoS and Scopus are the most used databases in scientific mapping studies (Mongeon & Paul-Hus, 2016). Thousands of researchers have especially preferred to use the WoS as the main database within the last two decades (Hernández-Torrano & Ibrayeva, 2020). However, the WoS database has limitations; the main criticism is that its coverage is *particularistic*, influenced by journals' place of publication, discipline, and language (Chavarro, Rafols & Tang, 2018, p. 107). The WoS mainly covers journals on natural and engineering sciences produced in the USA, UK, Germany, and the Netherlands, and this database is biased against the items published in languages

other than English and the ones in the fields of Social Sciences, Arts, and Humanities (Mongeon & Paul-Hus, 2016). Nevertheless, Chavarro, Rafols and Tang (2018) claim that indicators obtained from WoS can provide insights into scientific publications on the phenomenon under investigation.

2.3 Search strategy

The metaphor *shadow education*, like many other metaphors, is imperfect mainly because students may have fee-paying private tutoring (PT) before rather than after their classes in mainstream schooling (Bray, Kwo & Jokić, 2016). Also, it does not always precisely imitate the curriculum of mainstream schooling since some private tutors go beyond the activities included in school textbooks (Bray, 2021c). This paper uses the terms PT and shadow education interchangeably, although sometimes, as Bray (2021b, p. 2) suggests, individuals use ‘private’ to refer to ‘activities conducted privately, i.e. outside the public education space but possibly without financial remuneration’. In this paper, the focus is on only fee-charging tutoring. Kobakhidze and Suter (2020) point out that *shadow education* is an umbrella term for several activities, so the comprehensive list of terms given by Kobakhidze and Suter (2020, p. 316) was used to search for key terms used in the literature. That is, the topic search field contained the key English terms in the literature to find matches in author keywords, keywords plus, abstracts, and document titles. These terms are *shadow education*, *private tutoring*, *private tuition*, *private supplementary tutoring*, *private supplementary tuition*, *cram school*, and *supplementary tutoring*. Other key terms associated with shadow education used in certain countries, namely, *juku* (Japan), *hagwon* (South Korea), *buxiban* (Taiwan), *parapedia* (Greece), and *repetitorstvo* (Russia) (Kobakhidze & Suter, 2020, p. 316) were added. Proceedings, editorial materials, book reviews, news items, and notes were excluded from the search. All the searches were conducted in the last week of December 2021. Each item was examined, so only the most relevant were included in the analysis. The study authors found 670 documents in the first search but left 488 items after the irrelevant items were excluded. The key terms (*juku*, *hagwon*, *buxiban*, *parapedia*, and *repetitorstvo*) used in certain countries to refer to shadow education accounted for 39 publications in the final corpus. According to the document types, there were 481 articles, 64 book chapters, and 4 books. The books were: Bray, Mazawi and Sultana (2013), Kim and Jung (2019), Kobakhidze (2018) and Park (2013). However, the present authors found out that several books in the domain of shadow education were not included in the WoS database (e.g. Bray, 1999; 2003, 2009, 2011; Entrich, 2018; Kim, 2016).

Also, most of those book chapters are repetitively included in the articles category of WoS. The distribution of the selected items by database was as follows, the number of items indicated in parenthesis: SSCI (333), ESCI (83), AHCI (17), SCI-Expanded (9), BKCI-SSH (68), and BKCI-S (1). The items indexed in BKCI-SSH are repetitively indexed in SSCI and AHCI indexes. As Leydesdorff and Felt (2012) pointed out, many books and book chapters in the BKCI database are also labelled as articles or reviews by the WoS and repetitively appear in the other relevant databases, which sometimes confuse the readers.

We did not exclude any language in our literature search. However, the following distribution, with the number of publications indicated in parenthesis, shows that most of the items in the corpus were published in English: English (468), German (9), Spanish (3), Turkish (3), Russian (2), French (1), Japanese (1), and Portuguese (1). Hence, one of the limitations of the WoS database is that the publications in other languages such as Arabic, Chinese and Italian were not included, and hence the terms associated with shadow education used in certain countries (e.g. *durus khususiyya* in Arabic, 影子教育 in Chinese, *lezioni private* in Italian and *privat* or *lezzjonijiet talprivat* in Maltese) could not be identified. The distribution of items according to year of publication, with the number of publications in parentheses was: 1977 (1), 1992 (5), 1993 (1), 1994 (1), 1997 (1), 1998 (1), 1999 (2), 2000 (1), 2001 (2), 2002 (1), 2003 (3), 2004 (4), 2005 (2), 2006 (5), 2007 (1), 2008 (8), 2009 (8), 2010 (24), 2011 (10), 2012 (17), 2013 (40), 2014 (26), 2015 (28), 2016 (31), 2017 (35), 2018 (46), 2019 (62), 2020 (70), 2021 (51), 2022 (1).

Chronologically, the first publication in the corpus (1977) was about Japan's private preparatory schools (*juku*) that attracted 60% of Japan's junior high students at that time (DeVault, & Kato, 1977). Then, after a long period, five studies appeared in WoS in 1992 related to shadow education and private tutoring. One of them is Stevenson and Baker's (1992) seminal work in which they coined the shadow education metaphor. The other four studies were all related to students' test anxiety in Japanese "juku" environments and appeared in a special issue of *Anxiety, Stress, and Coping Journal* (Hawkins & Tanaka, 1992; O'Neil, Baker & Matsuura, 1992; O'Neil & Fukumura, 1992; O'Neil & Abedi, 1992). One article appeared in WoS in each 1993 and 1994, again focusing on the Japanese *juku* environments (Fujii, 1993; Harnisch, 1994). The distribution shows that there were sporadic publications each year until the last decade, when the number of publications

increased each year significantly, revealing researchers' growing interest in the domain of shadow education in recent years.

2.4 Data analysis procedures

Bibliometric analysis and bibliometric visualisation methods were used to map the relevant literature. The researchers used VOSviewer software as a bibliometric analysis and visualisation tool in the current study (Eck, Waltman, & Glanzel, 2017), and evaluative measures and in-depth analyses to map out the existing body of research outputs based on bibliographic data (Karakus *et al.*, 2021). Bibliographic coupling analyses were performed to present the most prominent authors, countries, institutions, and sources in the domain of shadow education. Co-authorship analyses revealed the scientific collaboration patterns between authors. Co-citation analysis of sources provided evidence about the scientific disciplines underlying the research in shadow education. Finally, the bibliographic coupling of the author's keywords presents the topical focuses of the research in this area.

There are links between any pair of items in each stage of our analyses. The strength of a link denotes the number of publications in which two terms occur together (in the bibliographic coupling of the keywords), the number of publications two researchers have co-authored (in the co-authorship analysis), and the number of cited references two items (authors, countries, institutions, and sources) have in common (in the bibliographic coupling analyses) (Eck & Waltman, 2019).

Bibliographic coupling links between countries are calculated according to the authors' affiliations (institutions) as they appear in the publications and the countries in which those institutions are based. For multi-authored articles, multiple links are calculated between countries, based on the affiliations of the authors that appear on the publication. In the bibliographic coupling of the keywords, the VOSviewer uses the keywords provided by the authors. If there appears no keyword in a publication, the software does not take that one into account while calculating the co-occurrence links. Besides, such keywords may not be always done well or consistently with other articles and sometimes even the countries on which articles focus are not included in the keywords. All these issues are among the limitations that may pose biases in the results.

The authors used varying levels of thresholds for the minimum number of citations or publications in creating the figures at different stages of the analyses. Bibliometric visualisation gives researchers the flexibility to identify those threshold levels unless they wish to display all publications, which would cause visual clarity issues when the number of included publications is large (Linnenluecke, Marrone, & Singh, 2020).

In addition to overall citation counts and document numbers, the authors also used the average number of citations to compare the impact of the sources, authors, institutions and countries. The overall citation count of a unit (source, author, institution or country) is divided by that unit's number of publications to find an average number of citations (Eck & Waltman, 2019). The average number of citations approach is based on the assumption that citation count is an important indicator of the impact of publications. However, some of those papers might have received high citation counts because of reasons other than their academic merit. In this case, average values can favour less significant units, which would make those results biased. Notwithstanding all those limitations, if a unit (source, author, institution or country) has a high citation count with a low number of publications, it implies the relatively high impact of this unit in the literature with a high average citation value. But it does not mean that this unit is the most prolific one (total number of relevant publications) or has the highest overall impact in the literature (overall citation count of the relevant publications). Therefore, those average values should be interpreted with caution and be evaluated together with the overall number of publications and citation counts.

In addition to the bibliometric analyses, the researchers retrieved and reviewed the h-classics to get a clearer picture of the most cited works and most popular topics in the shadow education literature. H-classics are the most cited publications in specific literature that received $\geq h$ citations (Martinez et al., 2015). H refers to the *h-index*, the number of publications with citation numbers $\geq h$ (Cancino *et al.*, 2017). H-classics means the corpus of the highest quality publications in a specific area (Cobo *et al.*, 2014). In the current study, the h-index was 36, i.e. the h-classics in this area comprised 36 highly cited publications with 36 or more citations. Notably, the authors of this paper were aware that the number of citations does not necessarily reflect the quality of publications for several reasons. First, some publications may be cited to show the data they presented were insufficiently precise. Second, citations can have a 'herd effect': publications that are cited frequently may appear more strongly in the vision of new authors and therefore are likely

to be cited even more frequently. Moreover, the large number of citations may also depend on the timing. For example, one of the reasons that made Stevenson and Baker's (1992) article have received so many citations might be that it was the earliest paper that used the metaphor of shadow education in its title.

3. Results

3.1 Leading authors and their collaborative networks

The bibliographic coupling of authors (Figure 1) shows the most prominent researchers in the domain of shadow education. Of 705 authors, 15 met the threshold of having a minimum of three publications and fifty citations. Bray, M. has been the most productive researcher in the field of shadow education with the highest number of publications (32), citation count (579), and total link strength (9440). The other prominent researchers in this area are as follows, with the number of publications, citation counts, and total link strengths indicated consecutively in brackets: Zhang, W. (13, 187, 5137), Liu, Junyan (7, 79, 2330), Kwo, O. (4, 155, 2275), Wang, D. (4, 118, 2171), Park, H. (6, 279, 1833), Yung, K.W. (6, 75, 1809), Zhan, S. (3, 105, 1743), Kobakhidze, M.N. (8, 98, 1736), Byun, S. (7, 342, 1659), Buchman, C. (4, 247, 1352), Matsuoka, R. (5, 70, 969), Kuan, P. (3, 53, 635), Hamid, M.O. (3, 98, 632), Haag, I. (3, 65, 7). Zhang, W. has the second-highest number of publications (13) and total link strength (5137) and Byun, S. has the second-highest citation count (342). In Figure 1, the nodes are weighted by the authors' overall citations and the scores are weighted by their average number of citations (an author's total citation count is divided by the same author's number of publications). Bigger nodes show higher overall citation counts while the yellowish nodes show the highest averages. Buchman, C. (61.75), Byun, S. (48.86), and Park, H. (46.5) have the highest averages, among the most prominent authors, meaning that their papers received a comparatively higher number of citations than the others regarding these authors' numbers of publications.

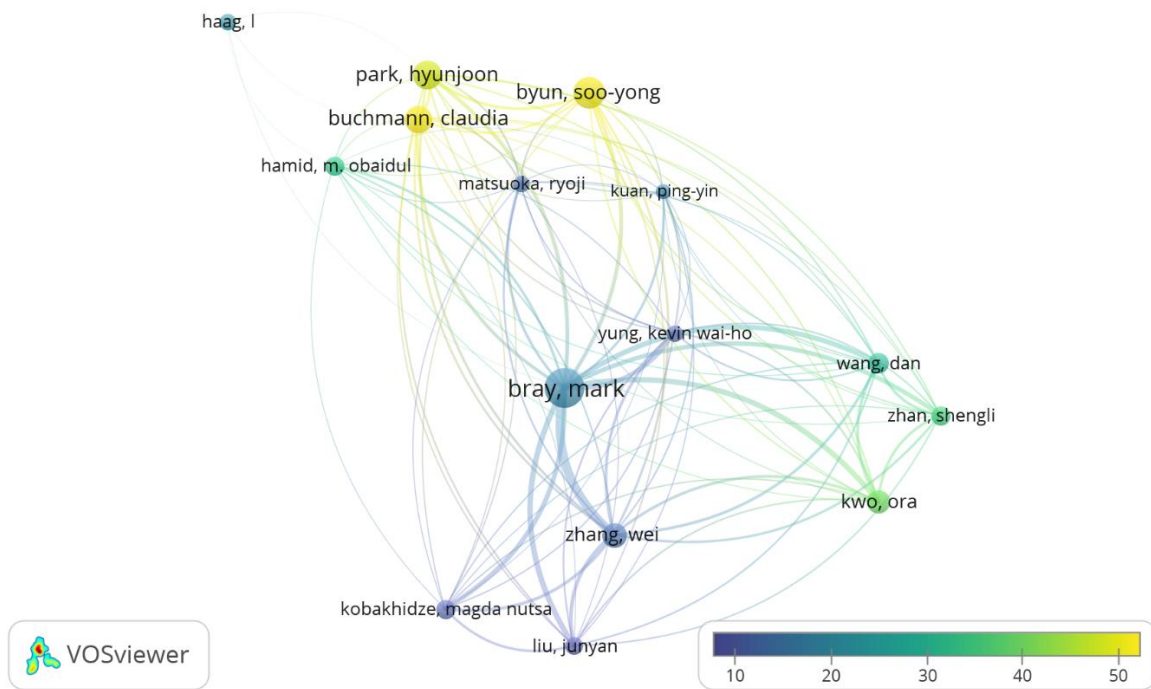


Figure 1. Bibliographic coupling of authors

Note. Minimum number of publications: 3; minimum number of citations: 50.

The co-authorship analysis of authors (Figure 2) shows the patterns in the scientific collaboration between the leading researchers in this area and revealed three active research groups. Different colours in the network visualisation show the clusters of authors collaborating with each other and the thickness of the lines show the frequency of co-authorship. The first group mostly comprises researchers from the University of Hong Kong (HKU) and East China Normal University (ECNU) led by Bray, M. (HKU – ECNU) and his colleagues (Zhang, W. [HKU – ECNU]; Kobakhidze, M. [HKU]; Liu, J. [HKU – ECNU]; Wang, D. [HKU]; Kwo, O. [HKU]; Zhan, S. [HKU]; Yung, K.W.H. [HKU – Education University of Hong Kong]; and Mahmud, R. [HKU – Bangladesh Open University]. Bray, M. is in the centre of the co-authorship links between this group of authors. Different colours within this group show different authors and small groups of authors who frequently collaborated with each other in Bray's leadership. Blue nodes show the two prominent authors' (Yung KW and Mahmud R) individual collaborations with Bray while the

yellow and green nodes reveal the prominent names of two groups of researchers who frequently collaborated with each other in Bray's leadership. All these authors also have other co-authors together with Bray, but the others did not meet the threshold values and thus, could not be included in that visualisation.

The second group is from the USA but mostly worked on samples from East Asia, especially from South Korea and led by Park, H. (University of Pennsylvania) and his colleagues (Byun, S. [University of North Carolina], Buchman, C. [Ohio State University], and Baker, D.P. [Penn State University]). The third one, “de Castro, B.V. and de Guzman, A.B.”, is a pair in the same institution [University of Santo Tomas] in the Philippines. They focused on issues in shadow education in the Philippines in their four articles.

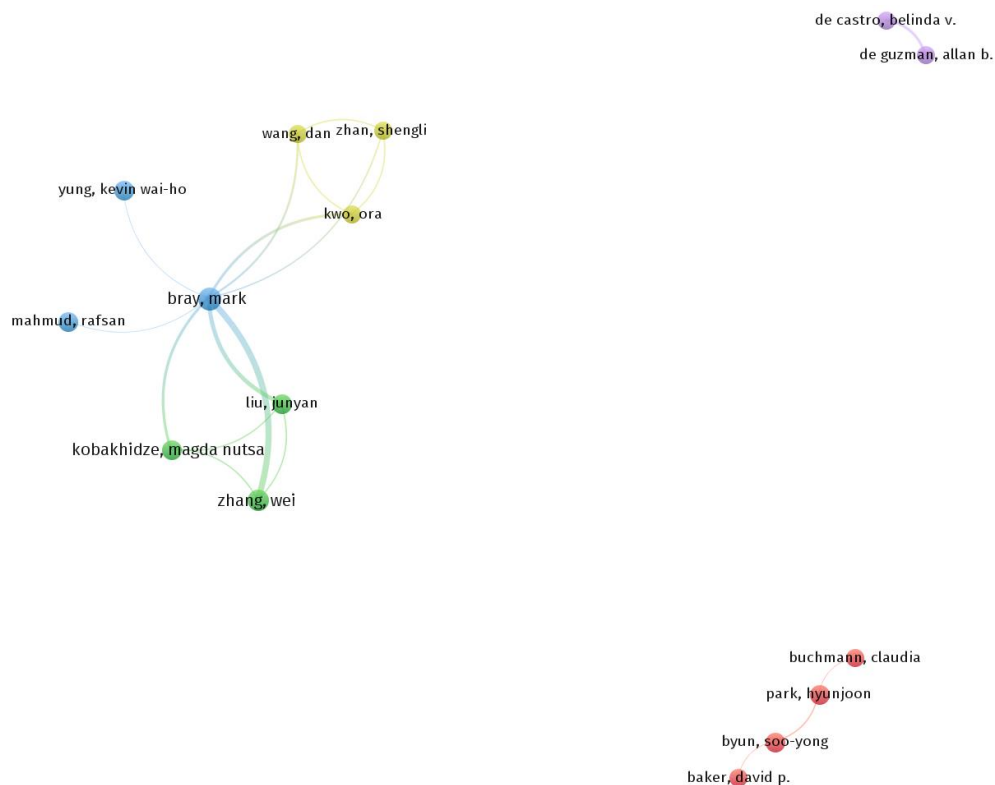


Figure 2. Co-authorship analysis of the authors

Note. Minimum number of publications: 3, minimum number of citations: 30.

3.2 Leading countries and their collaborative networks

The bibliographic coupling of countries (Figure 3) reveals that the USA, People's Republic of China (PRC), and South Korea have been most prominent in the domain of shadow education, followed by Germany, Japan, England, Taiwan, and Australia. Hong Kong, which has the leading institutions and authors in this area, is included in the PRC according to the records of WoS. The order of the countries is as follows: their number of publications, citation counts, and total link strengths given in brackets: PRC (90, 1131, 42636), USA (97, 2060, 34506), South Korea (65, 871, 30580), Germany (32, 232, 10944), Japan (31, 136, 10517), England (26, 232, 9991), Taiwan (22, 305, 9571), Australia (20, 219, 9303), Bangladesh (10, 70, 6525), Malaysia (10, 47, 5945), France (11, 131, 5647), Czech Republic (9, 32, 5152), Turkey (13, 32, 4753), Canada (10, 187, 4225), Netherlands (5, 34, 4136), Philippines (5, 44, 3905), Spain (7, 44, 3438), Scotland (3, 38, 2357), Singapore (7, 43, 1810), Ireland (5, 122, 1410), Greece (5, 83, 1147), and Portugal (5, 46, 805). These results show that the USA has the highest number of publications (97) and citation count (2060), while PRC has the highest total link strength (42644). South Korea falls in third place from these indicators. In Figure 3, the nodes are weighted by countries' overall citation counts while the scores are weighted by each country's average number of citations (overall citation count of a country is divided by that country's number of publications). Bigger nodes show higher overall citations while different colours denote different values of average citations. The yellowish nodes reveal that Ireland (24.4), the USA (21.24) and Canada (18.7) have the highest average citations, followed by (greenish nodes) Taiwan (13.86), South Korea (13.4), Scotland (12.67), PRC (12.56), and France (11.91).

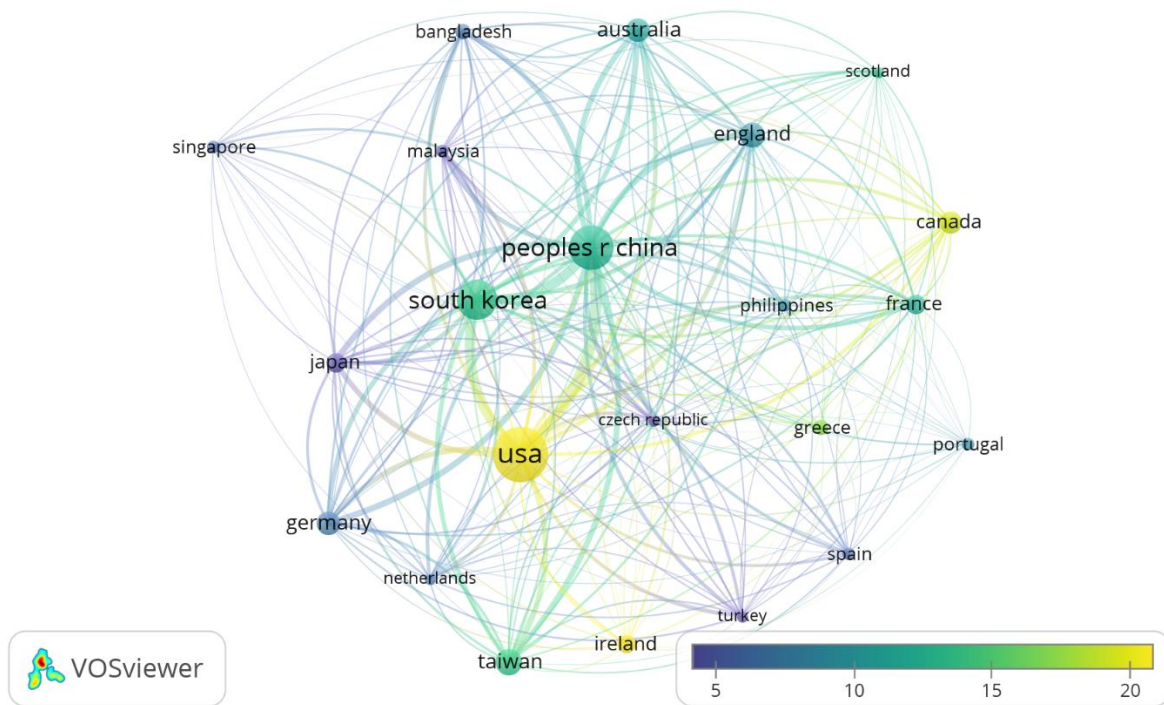


Figure 3. Bibliographic coupling of countries

Note. Minimum number of publications: 3, minimum number of citations: 30.

The co-authorship analysis regarding the countries authors are based (Figure 4) shows the scientific collaboration patterns between the countries with which the most prolific authors are affiliated. In this overlay visualisation, the scores are weighted by the total link strengths. Bigger nodes show higher total link strengths while different colours denote different values of average citations. A thicker line also denotes a more frequent collaboration pattern between a pair of countries. Corroborating the bibliographic coupling results, this analysis reveals that the three most prolific countries, the USA, PRC, and South Korea, are at the centre of the scientific collaboration patterns of researchers in shadow education all around the world. These countries are followed by England, Australia, France, and Japan.

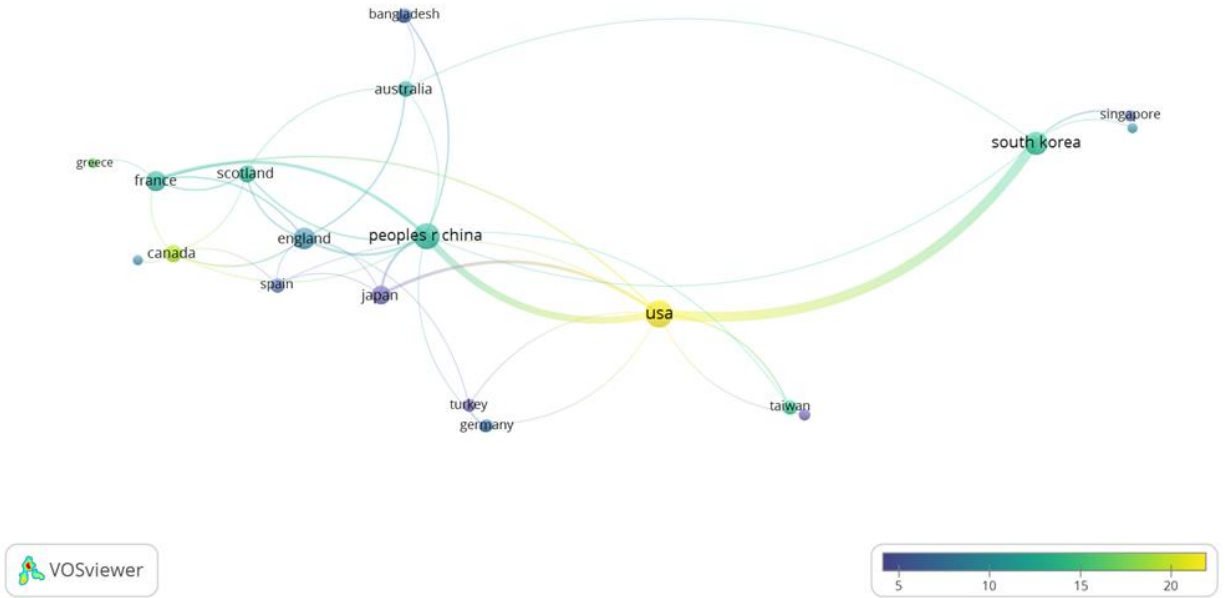


Figure 4. Co-authorship analysis regarding the countries authors are based

Note. Minimum number of publications: 3, minimum number of citations: 30.

3.3 Leading institutions

The bibliographic coupling of institutions (Figure 5) shows the leading institutions in the domain of shadow education. The University of Hong Kong has been the most prominent institution in this area, followed by Seoul National University, Penn State University, University of Pennsylvania, and Sungkyunkwan University. The order of institutions follows, with the number of publications, citation counts, and total link strengths in brackets: University of Hong Kong (46, 861, 10557 [Hong Kong – PRC]), Penn State University (13, 448, 3694 [USA]), University of Pennsylvania (6, 279, 2968 [USA]), Seoul National University (16, 183, 2790 [South Korea]), Education University of Hong Kong (10, 53, 2324 [Hong Kong – PRC]), Beijing Normal University (8, 33, 2313 [Beijing – PRC]), Sungkyunkwan University (8, 110, 2285 [South Korea]), Ohio State University (4, 247, 2230 [USA]), Waseda University (7, 65, 1648 [Japan]), Academia Sinica (4, 33, 1468 [Taiwan]), University of London (6, 127, 1466 [England]), University of Santo

Tomas (4, 33, 1465 [Philippines]), World Bank (5, 138, 1371), University of North Carolina (3, 212, 1208 [USA]), Korea University (5, 191, 1194 [South Korea]), University of British Columbia (4, 38, 1133 [Canada]), UNESCO (3, 38, 1113), University of Queensland (5, 99, 1078 [Australia]), Lehigh Univ (4, 76, 1074 [USA]), National Chengchi University (3, 53, 891 [Taiwan]), Dankook University (3, 45, 819 [South Korea]), University of Maryland (5, 47, 790 [USA]), McMaster University (3, 92, 770 [Canada]), Hong Kong Institute of Education (3, 171, 729 [Hong Kong – PRC]), University of Cambridge (5, 50, 675 [England]), Yonsei University (4, 50, 664 [South Korea]), Chung Ang University [South Korea], and University of Aveiro (4, 46, 397 [Portugal]). Hong Kong Institute of Education is the former name of the Education University of Hong Kong but the publications affiliated with the former name of this university make it appear as a separate entity in WoS. When we count these two entries as one entity, three universities from PRC (two of them are from Hong Kong), six each from the USA and South Korea, two each from England, Canada, and Taiwan, one each from Japan, Australia, Portugal, and the Philippines are among the most prominent institutions. The presence of the World Bank and UNESCO in this list shows the worldwide importance of shadow education for education policy. In Figure 5, the nodes are weighted by the total citation counts of institutions and the scores are weighted by their average citations (overall citation count is divided by the number of publications for each institution). Bigger nodes show higher citation counts while the colours of the nodes denote different average values. The yellowish nodes reveal that the publications affiliated with the University of North Carolina (70.67), Ohio State University (61.75), Hong Kong Institute of Education [previous name of the Education University of Hong Kong] (57), and University of Pennsylvania (46.5) have the highest average citations.

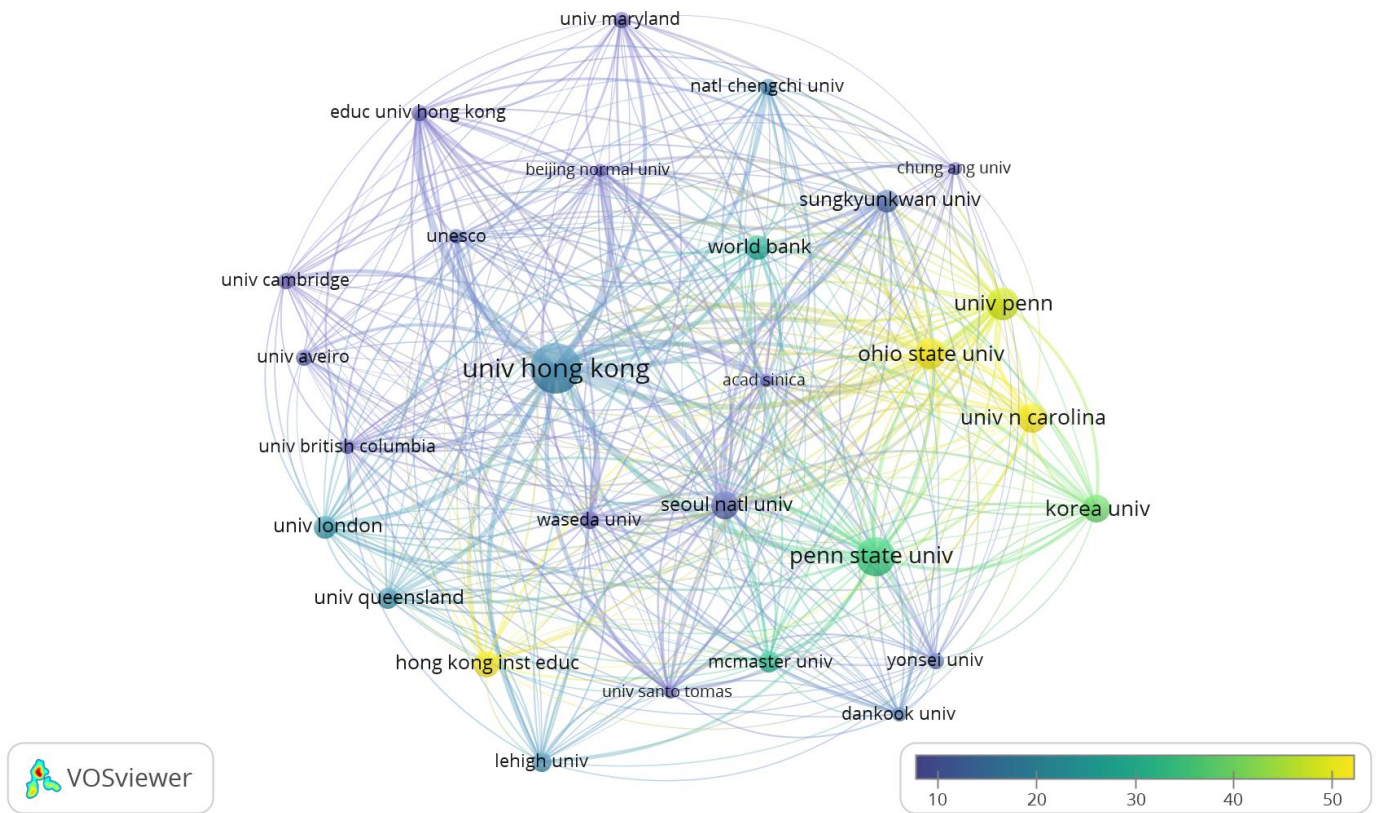


Figure 5. Bibliographic coupling of institutions

Note. Minimum number of publications: 3, minimum number of citations: 30.

3.4 The scientific venues and foundations of shadow education research

The bibliographic coupling of sources (Figure 6) shows the most prominent places of publication on shadow education. The order of the journals (and a book) follows, with publication numbers (chapter numbers for the book), citations counts, and total link strengths in brackets: *Asia Pacific Education Review* (29, 634, 5265), *International Journal of Educational Development* (27, 365, 4920), *Asia Pacific Journal of Education* (14, 155, 3845), *Comparative Education Review* (10, 170, 3166), *KEDI Journal of Educational Policy* (15, 83, 2550), *Compare: A Journal of Comparative and International Education* (8, 114, 1946), *Private Tutoring Across the Mediterranean: Power Dynamics and Implications for Learning and Equity* [book] (13 [chapters],

89, 1855), *Journal of Curriculum Studies* (5, 68, 1535), *Sociology of Education* (7, 441, 1427), *Oxford Review of Education* (6, 127, 1412), *Economics of Education Review* (5, 319, 1219), *British Journal of Sociology of Education* (5, 115, 859), *Discourse: Studies in the Cultural Politics of Education* (6, 71, 846), *Educational Studies* (6, 59, 788), *Journal of Education Policy* (3, 55, 701), and *Social Forces* (4, 177, 600).

The Asia Pacific Education Review has the highest number of publications (29), citation count (634), and total link strength (5265), followed by the *International Journal of Educational Development* with the second-highest number of publications and third-highest citation count. In Figure 6, the nodes are weighted by the number of publications and the scores are weighted by average citations (overall citation count is divided by the number of publications for each source) to reveal the scientific venues of the most impactful publications in this area. The yellowish and greenish nodes show that *Economics of Education Review* (63.80), *Sociology of Education* (63), *Social Forces* (44.25), and *British Journal of Sociology of Education* (23) have the highest average values. This finding gives an indication of the strong sociological and economic foundations of shadow education research.

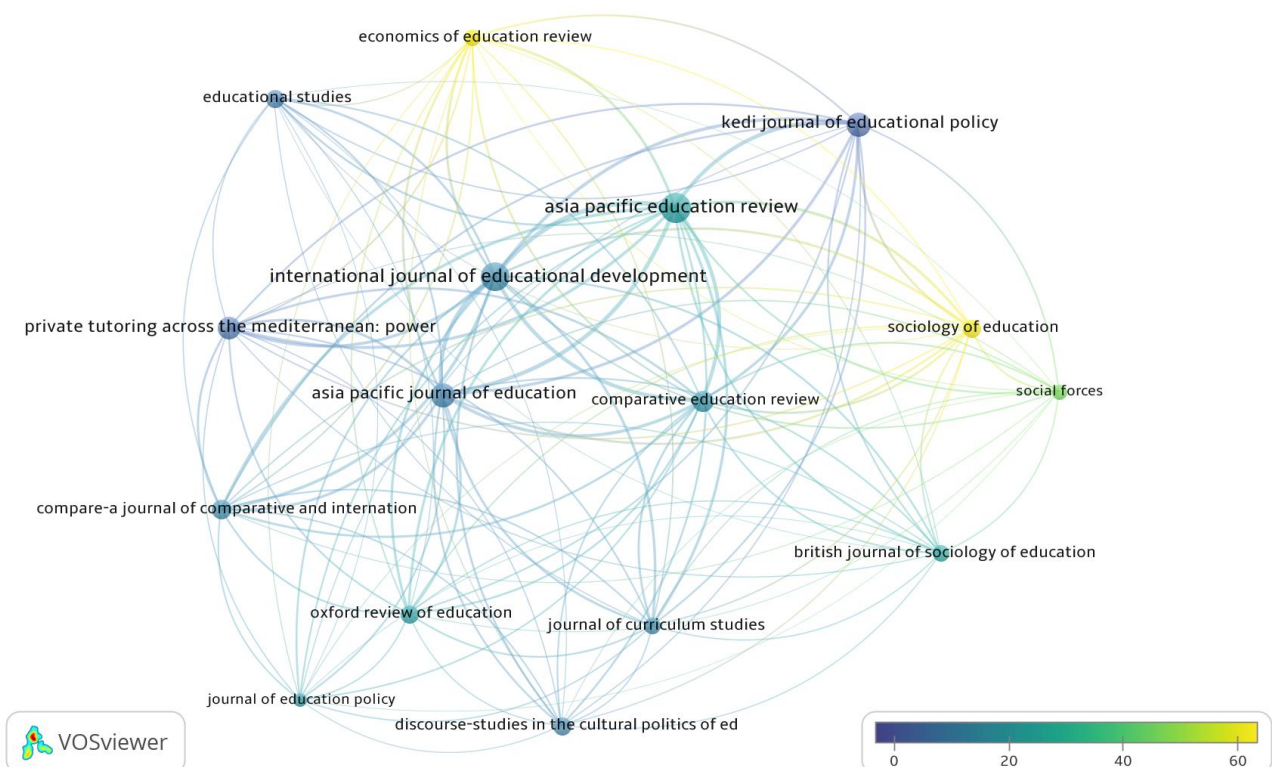


Figure 6. Bibliographic coupling of sources

Note. Minimum number of publications: 3; minimum number of citations: 50.

The co-citation analysis of sources provided further evidence of the disciplines underlying shadow education research. The sources with stronger co-citation links, assumed to be semantically related to each other, were grouped into the same cluster, represented by the same colour in Figure 7. The blue cluster comprises education sources from various disciplines, such as those with a broader scope and other journals related to comparative education, sociology of education, and TESOL. The green cluster mainly comprises sociology sources. In the red cluster, most sources are related to educational economics, but there are also a few items related to educational psychology, educational policy, and general educational research. These findings highlight the sociological and economic foundations of shadow education research as well as its relationship to a wide range of disciplines within educational sciences (see Bray, 2021b).

The distribution of the current corpus according to the Web of Science categories gives further clues about the wide range of disciplines underlying shadow education research. The number of documents is in brackets for each discipline: *Education: Educational Research* (352), *Sociology* (50), *Economics of Education* (44), *Linguistics* (18), *Area Studies* (17), *Development Studies* (12), *Educational Psychology* (11), *Social Sciences Interdisciplinary* (9), *Asian Studies* (8), *Education Scientific Disciplines* (6), *Public Environmental Occupational Health* (5), *Anthropology* (4), *Urban Studies* (4), *Psychology Multidisciplinary* (3), *Business Finance* (2), *Psychiatry* (2), *Cultural Studies* (2), *Education Special* (2), *Management* (2), *International Relations* (2), *Political Sciences* (2), *Psychology Social* (2), *Women Studies* (2), *Business* (1), *Ethics* (1), *History* (1), and *Philosophy* (1). Most papers are categorised under educational research, with a wide range of sub-disciplines underlying shadow education research, especially the sociology of education, the economics of education, educational psychology, and language education.

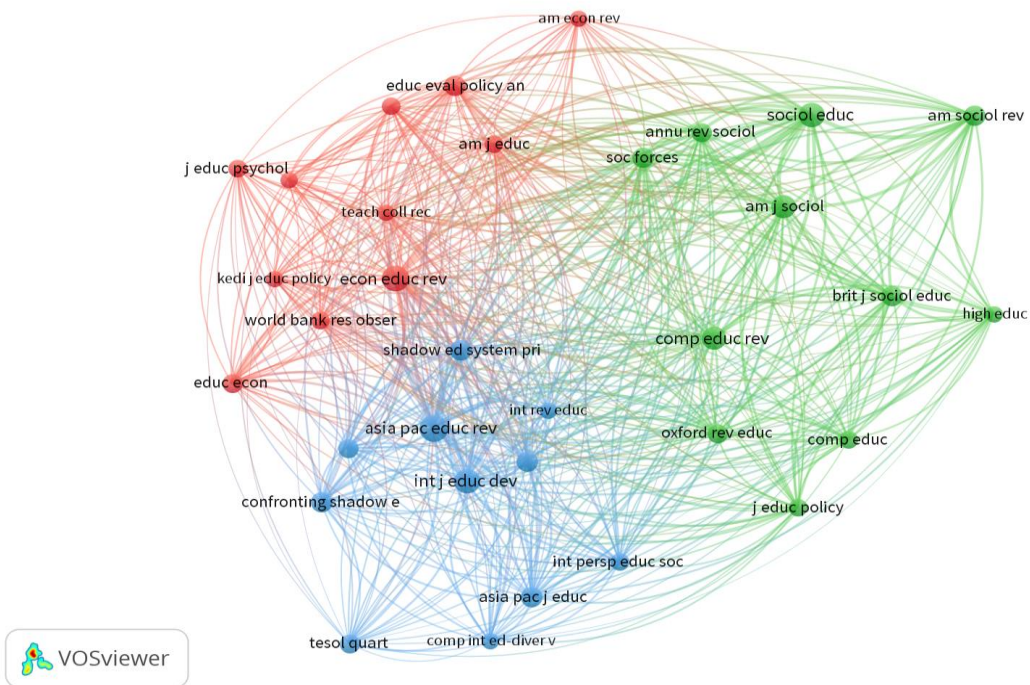


Figure 7. Co-citation analysis of sources

Note. Minimum citation count: 50.

3.5 Topical foci of the research in shadow education

The mapping of the co-occurrence links of author keywords revealed the topic focus of shadow education research. The network visualisation shows the topics of research in this area, with keywords grouped in different clusters, represented by different colours (Figure 8). *Private tutoring* and *shadow education* are the most frequently co-occurring keywords in the selected studies. The most frequently co-occurring keywords were grouped together and denote the broad research topics in this area. First, academic performance was frequently studied with after-school programs, cultural capital, human capital, credentialism, educational inequality, educational stratification, and parenting (red cluster). This cluster gives cues about the sociological foundations of shadow education. Second, the educational demand concept was frequently studied with PT expenditures and privatisation (green cluster). This cluster is relevant to the economic foundations of shadow education. Third, high-stakes testing, school choice, time use, and tracking frequently

co-occurred in the context of social inequality (blue cluster). Fourth, investment in shadow education, test preparation, and teacher identity keywords frequently co-occurred (yellow cluster). Fifth, the role of socioeconomic status and curriculum in students' academic achievement is frequently studied in rural educational contexts (purple cluster). Sixth, the importance of instructional quality and self-regulated learning in mathematics achievement was frequently studied in private tutoring contexts (turquoise cluster). Seventh, the role of educational policies and educational reforms in enhancing student achievement has attracted the attention of shadow education researchers (orange cluster). Eighth, the relationship between parental involvement and the perceptions of students was frequently studied (brown cluster). Ninth, the importance of student motivation in the effectiveness of shadow education was also studied frequently by the researchers (pink cluster).

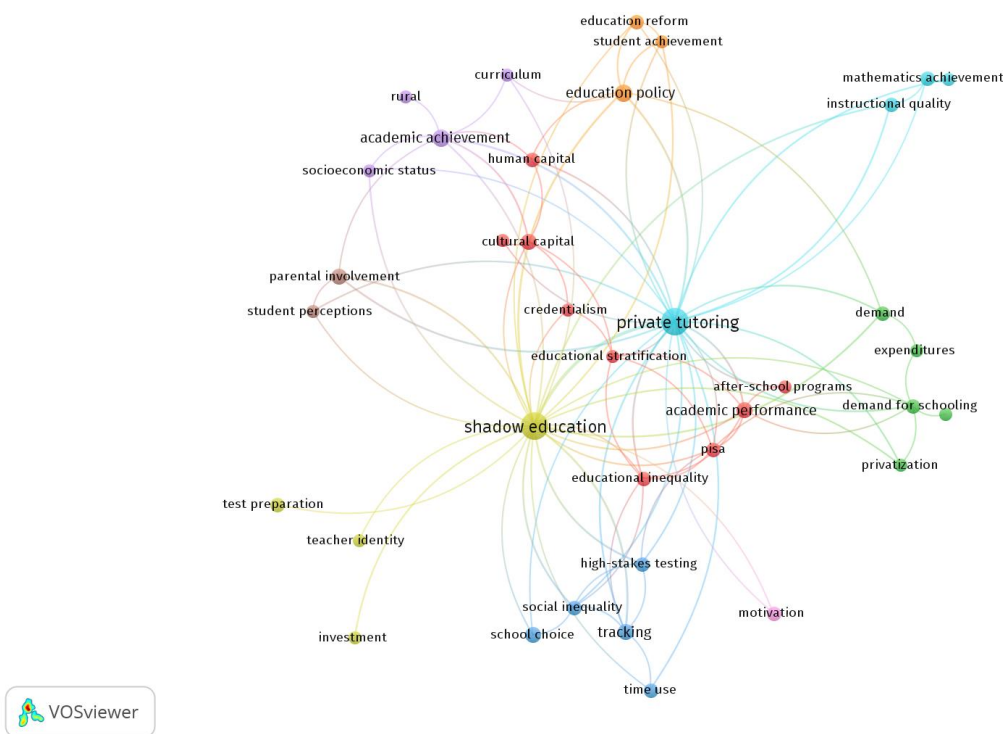


Figure 8. Topic focus of research into shadow education

Note. Minimum number of occurrences: 3.

3.6 Review of h-classics

Citation analysis was performed for a total of 490 publications in the corpus. Up to December 23, 2021, all these publications had received 5357 citations (2501 citations without self-citations) by the publications indexed in WoS, the average citation count per item being 10.93. The h-index was 36, which means that 36 publications in the corpus received 36 or more citations. These 36 publications, which are the h-classics of shadow education, were reviewed by the authors of this paper to throw light on the most popular research themes and the most influential research outputs in this area. The samples, methodologies, countries of origin, and the number of citations of the 36 h-classics publications are presented in Table 1 (see Appendix A).

20 out of 36 h-classics papers were quantitative studies, 10 were literature reviews, 3 qualitative studies, and 3 adopted a mixed-methods approach. Several themes had evolved from 26 empirical studies conducted in South Korea (7), USA (3), Hong Kong (3), Taiwan (3), Japan (2), Bangladesh (2), Canada (1), Greece (1), Germany (1), Australia (1), Ireland (1), and China (1). In two papers, large-scale international data collected from many countries in different parts of the world were used in the analyses. Key findings of the h-classics were classified according to the geographical distribution of shadow education as described in the following sub-sections.

H-classics articles in East Asia (China, Hong Kong, Japan, South Korea and Taiwan)

16 of 26 empirical studies were conducted in East Asia, stressing the notion that the phenomenon of shadow education has been principally prevalent in East Asian societies, deeply rooted in Confucian culture, which values education and diligence for social mobility, including notions of elitism (Yung & Bray, 2017, p. 99). Stevenson and Baker's (1992) quantitative study is the most cited paper among these studies. It was conducted in Japan to examine 7,240 senior secondary students' perceptions of shadow education. The authors found that most participants had sought shadow education as an enrichment strategy to obtain higher scores in high-stakes examinations and secure a place at a prestigious university. Related to this, the authors questioned the issue of equity of access to universities in Japan since some students from disadvantaged households did not enjoy the privilege of shadow education. This finding was replicated in Yamamoto and Brinton's (2010) quantitative study in Japan. The authors used data from the 1995 Social Stratification, and Mobility survey (SSM) collected from 1,578 (724 male and 854 female)

individuals aged between 37 and 50. Yamamoto and Brinton (2010) found that 40% of respondents participated in shadow education during elementary or middle school, and students from higher socio-economic backgrounds had received more shadow education than others.

Bray and Kwok's (2003) mixed-methods study is the fourth most cited paper of the 26 empirical studies. The quantitative data were collected from 630 secondary pupils in six schools in Hong Kong during the 1998/1999 academic year. Semi-structured interviews were also conducted with 47 teachers, 42 tutors, 34 members of the general public, 31 parents, 28 secondary school students, 12 principals or vice principals, and three school inspectors. The study found that 70.3% of Secondary year 6–7 students received fee-charging PT, and most attended large-scale examination-oriented mass tutoring classes rather than individual or small-group sessions, especially in mathematics and English. Exam preparation and meeting parents' expectations were the main reasons for having PT for most students. The qualitative data showed that low-income households had lower participation rates in PT than their more affluent counterparts. For the lower-income group, 16.2% in Secondary Year 6–7 attended PT, whereas the percentage was 19.3% for the higher income group. Bray and Kwok (2003) also found a positive correlation between participants' PT participation and parents' education level, since lower-educated parents probably earned less than higher-educated parents. Zhan *et al.*'s (2013) mixed-methods study and Bray *et al.*'s (2014) quantitative study with Grade 9 and Grade 12 students in Hong Kong found findings similar to those of Bray and Kwok (2003). Zhan *et al.* (2013) reported 61.1 % had received PT during the previous 12 months, mainly in English and mathematics, to improve school subject learning and examination scores. Also, Bray *et al.* (2014) found that 53.8 % of Grade 9 students and 71.8% of Grade 12 students had had PT during the previous 12 months, mainly to prepare for examinations and, to a lesser extent, increase their knowledge of school subjects. Like Bray and Kwok (2003), Bray *et al.* (2014) found a positive correlation between family income and having PT.

Kim and Lee's (2010) quantitative study of South Korea is the fifth most cited paper of the 26 studies. This study uses two data sets. The Survey on Private Tutoring (SOPT) by the Korea Institute for Consumer Protection in 1997 surveyed households with at least one child who was an elementary school or secondary school student. The second data set was the 1998 Urban Household Expenditure Survey (UHES) by the National Statistical Office of Korea. The UHES

provided information regarding the income and expenditure patterns of households. Kim and Lee (2010) found that students with higher academic ability, higher family income, and whose parents were highly educated spent more on PT. Park, Byun and Kim's (2011) quantitative study with 6,430 Grade 7 students in South Korea revealed similar findings to those of Kim and Lee (2010). Park, Byun and Kim (2011) found that parents with higher education were more involved in their children's education and PT-related activities. Also, students had PT mainly to improve their exam scores in mathematics and English.

Liu's (2012) quantitative study specifically focused on cram schools that provided examination drilling and excluded individual and small group tutoring in Taiwan. The author used information from the 2001 Taiwan Education Panel Survey when the students were in Grade 7. Liu (2012) found significant, positive effects of cram school attendance on analytical ability and mathematics performance, but the positive effects decreased as tuition hours increased. Liu (2012) also noted that the children of highly educated parents were less likely to attend cram schools, perhaps because these parents had invested in one-to-one or small group tutoring, which was excluded from the analysis. Tsai and Kuo's (2008) qualitative study also focused on 45 14-year-old school students' experiences of attending cram schools. The authors reported that cram schools helped students develop certain conceptions of learning; they used a surface approach to learning, and their learning motivation was driven by external factors, like examination marks. Zhang (2013) quantitatively examined the effect of PT on students' achievement in China's National College Entrance Exam (NCEE) and found that the average effect of PT was not significant, but it had a somewhat positive effect on urban students with lower achievement or in schools with a certain quality.

H-classics articles in South Asia (Bangladesh)

The h-classics of shadow education included two empirical studies conducted in Bangladesh. Nath's (2008) quantitative study used five large scale data sets of primary and secondary education in Bangladesh. Nath (2008) found that 31% received PT in 2005. The study also reported that households with educated parents were economically better-off and were more likely to live in urban areas. Hence, students of educated and well-off families were more likely to receive PT. Hamid, Sussex and Khan (2009), in turn, conducted a mixed-methods study to investigate the

nature and practice of PT in English in a disadvantaged rural area of Bangladesh. The quantitative data were collected from 228 Grade 10 students, followed by interviews with 14 students. The study found that over 75% of participants took English PT. It also reported that students who had access to PT-E were 2.8 times more likely to secure higher grades in the English test than those who did not have access to PT-E. The qualitative data showed that all participants had a positive attitude to PT in English, believing it was imperative to gain high examination marks. This was particularly so with students from well-off families who could afford year-round PT.

H-classics articles in Australia, Canada and the United States

One of the Australian h-classics is an empirical qualitative study by Sriprakash, Proctor and Hu (2016), who explored six Chinese-Australian parents' use of PT services for their primary school children in Sydney. The interview data found all the parents expressed their satisfaction with their children's schooling, especially its emphasis on 'creativity' and the breadth of an integrated curriculum. The authors found that fee-charging PT was not just a widespread cultural practice among migrant communities but a contemporary pedagogic strategy to obtain an educational advantage. These parents were particularly concerned about 'a lack of rigour, homework and examination practice' (Sriprakash, Proctor & Hu, 2016, p. 433) in state schools. As regards Canada, Aurini and Davies (2004) carried out twenty-one interviews with representatives of tutoring businesses in 2001. They indicated that their learning centres were 'promoted less by short-term promises of improved school grades, and more by diffuse goals such as building a student's self-esteem, developing their talents, and closing skill gaps'. In order to achieve long-term goals, some interviewees mentioned that learning centers intended to develop their own lessons, workbooks and diagnostic tests.

Buchmann, Condrón and Roscigno's (2010) quantitative study in the United States is the third most cited paper of the 26 studies. Using data from the National Education Longitudinal Study (NELS), Buchmann and her colleagues selected 8,820 respondents in their senior year of high school to examine the association between receiving shadow education and passing the SAT test. This study found that students from the most advantaged families were significantly more likely to enroll in PT for SAT test preparation, which implies educational inequality associated with a family socio-economic background in the context of U.S. education. Similarly, Byun and Park

(2012) employed the NELS to explore possible differences in the effect of PT according to race and ethnicity. The authors found that East Asian American students were much more likely to take a commercial SAT test preparation course than any other racial/ethnic group of students, including other Asian American students. Therefore, they benefited most from this particular form of SAT coaching. A comparative study by Lee (2007) used the 1995 Third International Mathematics and Science Study (TIMSS) eighth-grade student and teacher survey databases to obtain information on participation in mathematics PT from 41 countries, including Korea and the United States. Lee (2007) sought to uncover the PT motivation differences between Korea and the United States. The author found that PT in Korea served already high-achieving students for enrichment or college preparation, whereas PT in the United States was to help low achievers for remedial purposes. Commenting on the use of large-scale international surveys such as TIMSS and PISA in the domain of shadow education, Bray and Kobakhidze (2014) point out that although these surveys have secured very strong visibility and respect among academics and policy makers, they produced ambiguous findings in this domain. They have encountered difficulties of adaptation and translation of questions, and ‘some analyses have presented conclusions that are misleading’ (Bray & Kobakhidze, 2014, p. 591). For example, 1995 TIMSS asked about time usually spent on extra lessons school ‘during the week’, but it did not specify what sort of week. This information is essential because students often have more PT when the exams are approaching. Also, problems in authors’ misinterpretations emerged when the data sets of these large-scale international surveys appear to provide precise measures but in reality do not; the authors reported what they would have liked the questions to have asked rather than what the questions actually did ask (Bray & Kobakhidze, 2014). Elsewhere, Bray, Kobakhidze and Suter (2020) pointed out that there were two main weaknesses in the data of PISA related to PT: first, they did not clearly differentiate between fee-free and fee-charging PT and second ambiguities were compromised in translations. Therefore, Bray and Kobakhidze (2014) undermined Southgate’s (2009, p. 40) claim that PISA ‘provides a precise measure of...tutoring and outside-school classes’. Also, they called the TIMSS authorities to improve the questions related to PT rather than to drop them altogether as they did after 2003.

H-classics articles in Greece, Germany and Ireland

In Greece, a 2000 survey of 3441 students enrolled in the eight major universities found that over 80% had attended group (cram) preparatory schools, half had received individual PT, and one third had received both group and PT (Psacharopoulos & Papakonstantinou, 2005, p. 105). In Germany, Mischo and Haag (2002) evaluated the effectiveness of PT using a pre- and post-control group design. The study involved 122 students in a PT group and the same number in a control group. Both groups' school marks in English, French, Latin, and mathematics in the pretest and the posttest were recorded and compared. T-tests showed that the posttest scores of the PT group in all four subject areas were significantly higher than their pre-test scores. In Ireland, Smyth (2009) quantitatively examined the characteristics of students taking PT and its impact on academic outcomes. The author employed the School Leavers' Survey of 2004 (1,496 respondents), and the Schools Database of 1994 (4,813 respondents). She found that 45% of students took PT during their last year at school; however, PT yielded no apparent advantages in terms of upper secondary examination performance.

4. Discussion and Implications

This study provides a comprehensive overview of the research on shadow education using bibliometric indicators. It is based on the data available in the WoS database. Bibliographic coupling analyses of authors, countries, institutions, sources, and author keywords, co-authorship analyses of authors and countries, and co-citation analysis of sources revealed the prominent figures, collaboration patterns and the evolution of shadow education research. In addition, h-classics publications were extracted and reviewed to give a clear overview of the most influential scientific outputs in this area.

As identified in the previous section, Bray, M. (HKU – ECNU) and Park, H. (University of Pennsylvania) are the most prolific and influential authors in the domain of shadow education. Bray, M. has been leading the most productive research team, comprised of authors from HKU (Hong Kong – PRC) and ECNU (Shanghai – PRC). Park, H. and his co-authors have been working in the USA but frequently selected their samples from East Asia, especially South Korea. These authors have played a pivotal role in making the phenomenon of shadow education in East and South-East Asia, in particular, more documented than in other parts of the world, highlighting its scale, nature, and policy implications. Bibliographic coupling and co-authorship analysis of the

countries revealed that PRC, USA, and South Korea are the leading countries with established scientific records, at the centre of scientific collaboration patterns worldwide. Nevertheless, Bray and associates, in collaboration with UNESCO, offer a broader range of geographical coverage on the domain of shadow education by producing several books, including Bray (2021a) about Africa, Bray (2011) about Europe, Bray, Mazawi and Sultana (2013) about the Mediterranean region and Silova, Būdienė and Bray (2006) about the Post-Soviet States. In this regard, Bray (2021d, p. 460) associates researching shadow education with the ‘assembly of a jigsaw puzzle’ with many pieces ‘missing; but many more pieces exist than in earlier decades, and there are ways to secure additional pieces for the picture’. Therefore, it is hoped that more empirical studies are conducted to add other pieces to that jigsaw puzzle, especially since there is still little research into the nature of shadow education in other parts of the world, such as the Middle East and Latin America (e.g. Mandikiana, 2021; Ventura & Gomes, 2013).

Following journals stand out as core journals on shadow education research: *Asia Pacific Education Review*, *International Journal of Educational Development*, *Sociology of Education*, *Economics of Education Review*, *Journal of Education Policy*, *Discourse: Studies in the Cultural Politics of Education*, and *British Journal of Sociology of Education*. The semantically related clusters appeared in the network and co-citation analyses as well as the distribution of the publications according to the WoS categories, emphasising the sociological, economic, linguistic, political, and psychological dimensions of shadow education research, along with its close relationship to the broader area of educational sciences. Recognising the importance of shadow education from different aspects, Bray (2021b, p. 5), in his recent publication, employed ‘the lenses of physical, political, economic, cultural, and pedagogical geography’ to provide a different but contemporary understanding of this phenomenon. Regarding physical geography, Bray (2021b) points out that shadow education is not considered a human right, and hence its provision is principally influenced by market forces and the decisions of entrepreneurs. For instance, private entrepreneurs tend to have little interest in providing PT services to small populations with modest incomes. The political geography includes policymakers’ responses to the growing spread of shadow education (Bray, 2021b). For example, while some governments (e.g. Cambodia, Myanmar) have adopted an extreme approach to the growing prevalence of shadow education by prohibiting it, other governments (e.g. China and UAE) have attempted to regulate it (see Zhang,

2019). Meanwhile, other governments (e.g., Jordan, United Kingdom) take a laissez-faire approach, whereby education outside mainstream school hours is not within the government's purview. Bray (2021b, p. 7) points out that even in unregulated settings, shadow education is influenced by political geography since 'it mimics mainstream schooling that is shaped by political geography'.

Shadow education can also be a form of education business (Bray, 2021b). In Georgia, for instance, Kobakhidze (2018, p. 206) reported some teachers in her study acted like 'business owners' using effective creative marketing strategies to promote their services, such as buy one get one free, bonus tutoring. Likewise, Yung and Yuan (2020) analysed the biographies of 41 private tutors on the websites of six leading tutorial companies in Hong Kong. They found that tutors were depicted in advertising material and tutorial websites as experts or even 'gods' and 'kings' who know the 'best' way to teach. Concerning the cultural dimension of shadow education, Bray (2021b) asserts that shadow education has long been particularly prominent in East Asian societies because they are deeply rooted in the Confucian traditions of learning beyond formal settings and the practice of examination systems. This notion is clearly echoed in the bibliometric indicators of this study. Bray (2021b) also notes how the influence of Confucian-heritage cultures was revealed in immigrants living in Western countries. This point was illustrated in the findings of some of the h-classics articles described above. In the United States, for instance, Byun and Park (2012) revealed that American East Asian students received SAT test preparation courses and other types of PT more than any other racial/ethnic groups of students including other Asian American students. Concerning economic geography, Bray (2021b) points out that the Covid-19 pandemic has disrupted the normal functioning of various activities across the world, including education. The unprecedented outbreak dramatically shifted the predominance of face-to-face teaching to emergency online learning in 2020, and hence online tutoring also intensified (Bray, 2021b). The issue of the effectiveness and intensity of online PT during the transition to emergency online learning deserves further research, especially since the governments of some countries banned all types of face-to-face PT as part of the efforts to curb the spread of Covid-19. The United Arab Emirates, for instance, warned that anyone giving face-to-face PT in public or private places would be fined AED30,000, and host venues also fined AED20,000 (Arabian Business, 2020). Consequently, Šťastný and Kobakhidze (2020, p. 10-11) stress that 'attention must also be given

to emerging new forms of tutoring such as “education pods”, “Zutors” (i.e. Zoom tutors) and “micro schools”, which have been pushed by parents’ initiatives worldwide as a result of the pandemic’.

The evolution of the research and topic focuses on shadow education was revealed through the bibliographic coupling of author keywords. The study found that academic achievement was frequently studied with cultural capital, human capital, education policy and school choice. More specifically, almost all h-classics studies have largely linked the effectiveness of shadow education to its tangible benefits in terms of measurable educational outcomes for students. More precisely, the benefits of shadow education were associated with keeping up with the school curriculum, improving students’ scores in mainstream schools or/and passing high-stakes exams to secure a place at a selective school or institution. Bray and Kwo (2014, p. ix) point out that shadow education tends to ‘reinforce only one dimension of education: learning to know’ more than the other pillars proposed by *UNESCO’s* Delors Report (1996) - learning to do, learning to be, and learning to live together. Bray and Kwo (2014) have attributed this to the overemphasis on high-stakes examinations as the principal gate-keeping mechanism. Nevertheless, an h-classics study by Aurini and Davies (2004) in 2001 with representatives of tutoring businesses refers to the ‘soft benefits’ of shadow education in terms of increasing students’ self-awareness and confidence, along with their attitude to learning. However, these benefits were articulated by entrepreneurs rather than students themselves. Therefore, more research into the impact of the intangible, soft benefits of shadow education on students’ overall achievement from students’ perspectives needs to be conducted (see XXX, 2020, 2021b).

Bibliographic coupling of author keywords also revealed that social inequality was frequently studied through tracking and tutoring concepts. Several h-classics articles found that private tutors were largely employed by educated and well-off families for their children as a tool to provide additional training in the key university admission subjects. As a result, students from disadvantaged households often find themselves in a less favourable position because they can afford little or no PT sessions, adding to their social disadvantage. As Bray (2021a, p. xi) notes, shadow education can be ‘a major vehicle for maintaining and exacerbating social inequalities’, which raises concerns about how to achieve ‘equitable and inclusive quality education’. Consequently, some governments have attempted to regulate the shadow education market by

introducing codes of practice (see Bray & Kwo, 2014; Zhang & Bray, 2020). In China, for instance, one regulatory PT mechanism states that tutorial companies are prohibited from covering the official school curriculum in advance, to protect schools and take the pressure off students from a disadvantaged background who cannot seek PT to catch up with their classmates (Zhang & Bray, 2020). Nevertheless, much work still needs to be done in this area.

5. Conclusion and Limitations of the study

This study provides an overview of the evolution and current state of research into shadow education based on the data available in the WoS database. It shows that the scientific output in this emerging area is interdisciplinary in nature, and scholars from different perspectives and disciplines continue its development, whose progress has been primarily because a small group of scholars working in Asian countries, in particular, have built strong collaborative connections nationally and with nearby countries but to a lesser extent with other countries. However, contributions in the scientific literature from researchers in countries of the Middle East, Africa, and the CIS region are considerably limited. The prominent scholars in the domain of shadow education could widen their scientific collaborative networks to include researchers from regions underrepresented in this specific literature. The editors of core journals could also make special calls to encourage more contributions from underrepresented regions and scholars with alternative perspectives, approaches, and conceptions of this area. However, this study has methodological limitations which should be acknowledged. Specifically, it only used the WoS Core Collection and did not include the proceedings, theses, or grey literature. These publications may have many further citations in proceedings, theses, and all other publications that are not indexed in WoS. Therefore, it could be fruitful if other researchers use other databases (e.g., Scopus, ProQuest, ERIC, PubMed, PsycInfo) and other publication types to extract a more comprehensive overview of the shadow education literature. Further, WoS tends to mainly cover journals in English and produced in the UK, the Netherlands, and the USA, although an increasing number of studies of shadow education has been recently published in Chinese, in particular, as Zhang and Bray (2020) point out. Despite all the current limitations, this study provides insightful findings and comments about the current situation and development of this emerging area.

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