# An Inevitable Phenomenon: A Bibliometric Analysis of Shadow Education Research (1982–2022)

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**Abstract**

This study systematically maps the research trends in the field of shadow education over the last 40 years using metadata extracted from the SCOPUS database. The results reveal that the outputs of shadow education research have grown exponentially within the last decade. Bray, M. and his colleagues from the University of Hong Kong, East China Normal University, and the Education University of Hong Kong have been the most prolific and influential research team. They are followed by Park, H. and Byun, S.Y. from the USA, who have mostly worked on East Asian contexts. The USA, Hong Kong, South Korea, and the Republic of China, have been the main sources of contributions and the University of Hong Kong has been the leading university in this field. Educational studies, economics, psychology, linguistics, and sociology have been the main disciplines researched within shadow education. Shadow education studies have revealed how shadow education can be a major instrument for maintaining and exacerbating social inequalities. They have also largely focused on the tangible (quantifiable) benefits related to improving students' examination results. This study's results stress the importance of regulating the private tutoring market, suggesting areas for ongoing research.

*Keywords*: Shadow education; private tutoring; bibliometric analysis; literature review; science mapping

**Introduction**

A steadily growing body of education literature has been systematically focusing on schools and schooling. However, this focus seems to downplay the widespread phenomenon of 'shadow education', which is '*inevitable, universal, and will likely continue to intensify into the foreseeable future*' (Baker, 2020: 311, italics *in original*). Shadow education is a metaphor for fee-charging private tutoring in core subject areas such as languages, mathematics, and science, and much of its content mimics that in schooling: as the curricula change in schools, so they do in shadow education (Bray, 2021a). It does not include fee-free tutoring, or musical or sporting skills that are studied for leisure and personal development (Bray, 2021a). Shadow education can be one-to-one, in small groups, in full class sizes and online. Internet-based shadow education has expanded during the suspension of formal school classes due to the COVID-19 pandemic (Hajar & Manan, 2022). As Zhang (2021: 49) points out, 'COVID-19 increased the power of technology and capital in digital learning, and online tutoring greatly expanded the shadow space'. Similarly, Rowe (2021) indicates that with the global outbreak of COVID-19 at the beginning of 2020, online tutoring has expanded, leading to the rise of 'Zutors – Zoom tutors' (Rowe, 2021). More innovative modes of shadow education have been recently witnessed. Zhang (2021: 10), for example, described a hybrid tutoring mode where the lead tutor is usually a popular 'star tutor' delivering the sessions online in conjunction with a novice tutor or a schoolteacher helping students do the homework and classroom management in face-to-face settings.

Historically, shadow education is not a new phenomenon. It has been documented in various countries since at least the 19th century. In Japan, Sato (2012) recorded the development of *jukus* (academic tutoring enterprises); the first *juku* was opened in 1911 by a teacher in Tokyo who was asked by the parents of his former students to give paid tutoring to their children to assist their promotion to lower secondary schools (cited in Zhang, 2021: 37). In Russia, Mikhaylova (2019) identified newspaper advertisements by private tutors in the mid-19th century (cited in Zhang & Bray, 2020: 322). However, it only emerged as a specific topic in the academic literature in the 1980s and 1990s (e.g., Matthews, 1982; Hussein, 1987; Rohlen, 1980; Marimuthu et al., 1991; Stevenson & Baker, 1992). The shadow education metaphor was first used by Marimuthu et al. (1991) to describe private tutoring in Malaysia:

a considerable percentage of youths attended private tuition 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: vi).

This metaphor was also used in Singapore by George in 1992. Commenting on early publications concerning shadow education, Zhang and Bray (2020) pointed out that these publications focused only on individual countries, 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.*

Shadow education has primarily been prominent in East Asian societies such as Japan, the Republic of Korea, Hong Kong and Mainland China, because they highly value formal certificated accreditation, which implies diligence, passing high-stakes examinations and involves family support and obligation (Zhang & Yamato, 2018). Since the new millennium, shadow education has become endemic worldwide on a significant scale. The Trends in International Mathematics and Science Study (TIMSS) provide some indication of overall enrolment rates, combining fee-charging and fee-free private tutoring. It gives statistics for the private tutoring received by Grade 8 students in mathematics in 2019 and reported that in 13 out of 64 countries (e.g., Cyprus, Egypt, Japan, Kuwait, Malaysia, Romania, Singapore, South Korea, and Turkey), more than 50% of students received private tutoring. Addressing the TIMSS 2019 findings, Bray (2021a: 2) suggested that since the statistics only covered Grade 8, enrolment rates were likely to be higher in the upper grades as students approached the end-of-secondary-school high-stakes examination. UNESCO's (2019: 6) Concept Note for the 2021 Global Education Monitoring Report highlighted the importance of understanding the nature of shadow education, especially since this phenomenon 'is often overlooked in analyses of non-state activity in education'.

Rather than regarding shadow education as merely an 'invader', Chang (2019: 462) pointed out that shadow education has now expanded to reach almost all corners of the globe and 'operates as an assemblage in which society, culture, education and business are entangled and interact with each other'. That is, the influence of shadow education has implications for the nurturing of new generations, economic growth, the operation of formal education systems, and cultural and social development (Hajar, Sagintayeva & Izekenova 2021). Although research on shadow education has been slow to catch up with reality, the complex influences emanating from shadow education have

been increasingly revealed by a growing body of empirical studies as well as in several books (e.g., Bray, 2021a; Bray & Hajar, 2022; Bray, Kobakhidze & Kwo, 2020; Bray, Kwo & Jokić, 2016; Entrich, 2018; Kim, 2016; Kim & Jung, 2019, 2022; Kobakhidze, 2018).

No study has, as yet systematically reviewed shadow education literature from a bibliometric perspective employing 'a set of quantitative methods used to measure, track, and analyze print-based scholarly literature' (Roemer & Borchardt, 2015: 28). Therefore, this is the first study to use several bibliometric indicators to map the research literature on shadow education using metadata extracted from the SCOPUS database by Clarivate, based on publication and citation trends, the authors and venues contributing to this research field. By doing this, the contributions and challenges to the development of this research field can be identified. As Bray (2021c: 2) points out, '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'.

**The Present Study**

*Study aims*

The present study aims to uncover and interpret the evolution of shadow education research from 1982 to 2022. The authors have adopted a descriptive bibliometric approach to '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: 3). We mapped and visually represented the developments of shadow education research using metadata extracted from the SCOPUS database by Clarivate over the last 40 years. The SCOPUS database covers more than 21,000 journals in the fields of science, social sciences, humanities, and the arts, and stores more than 74 million records and 1.5 billion cited references published from the 1900s to the present date (Clarivate Analytics, 2019). We identified the core journals and publications, as well as the key authors, institutions, and countries heading the generation and dissemination of research on shadow education. We also examined the patterns of scientific collaboration in shadow education

research between authors, institutions, and countries. Further, the study identifies and elaborates on the main themes, shedding light on the research gaps and the potential agenda ahead.

## *Materials and methods*

The researchers searched the SCOPUS database on 23 March 2022. They retrieved the metadata from the WoS Core Collection because of its wide coverage and central position in most scientific disciplines and fields. Although thousands of researchers have used the WoS as the main database within the last two decades, this search strategy has its own limitations. More precisely, WoS, like other databases such as Scopus, might not cover the academic publications written in languages other than English in the field of Social Sciences (Karakus et al, 2021; Mongeon & Paul-Hus, 2016).

We entered the relevant search terms into the topic field to find them in the titles, abstracts, and keywords of documents. We used the most relevant English search terms in the shadow education literature as well as other common keywords used in different countries and contexts, such as "cram school (Hong Kong)", "juku (Japan)"; "hagwon (South Korea)"; "buxiban (Taiwan)", "parapedia (Greece)", and "repetitorstvo (Russia)", "*durus khususiyya* الدروس الخصوصية (Arabic)", and "影子教育 (Chinese) (Kobakhidze & Suter, 2020). We found 741 documents in the initial search. Our keywords identified results with different numbers of publications (given in parenthesis): "shadow education (252)", "private tutoring (393)", "private tuition (90)", "private supplementary tutoring (82)", "private supplementary tuition (4)", "cram school (94)", "supplementary tutoring (99)" "juku (64)", "hagwon (11)", "buxiban (1)", and "lezioni private (2)". The following keywords did not yield any search results: "parapedia", "repetitorstvo", "*durus khususiyya* الدروس الخصوصية", and "影子教". The editorial materials, notes, and errata were excluded from the search. We examined the relevance of each item to include only the most relevant ones in the analysis. There remained 654 publications (of the 741 found in the initial search) after the exclusion of irrelevant ones. In terms of the document type, 515 articles, 77 book chapters, 29 reviews, 24 conference papers, and 9 books are in the final corpus.

Most of the items in the corpus were published in English (610) but there were other items published in German (12), Japanese (12), Portuguese (5), Spanish (4), Chinese (3), Turkish (3),

Czech (2), Russian (2), French (1). According to the years of publication, the distribution of the items were as follows (with number of publications in parentheses): 1982 (1), 1987 (1), 1989 (1), 1992 (5), 1993 (1), 1994 (1), 1996 (1), 1998 (2), 1999 (4), 2000 (1), 2001 (6), 2002 (4), 2003 (5), 2004 (6), 2005 (4), 2006 (9), 2007 (7), 2008 (12), 2009 (17), 2010 (33), 2011 (17), 2012 (23), 2013 (54), 2014 (40), 2015 (32), 2016 (34), 2017 (41), 2018 (50), 2019 (48), 2020 (78), 2021 (94), 2022 (22). Although we did not set any date limit in our search, this distribution reveals that the first relevant item was published in 1982 and there were limited publication numbers until the last decade. In the last decade, the number of relevant publications increased notably each year, indicating a growing interest in recent years in the field of shadow education.

## Results

### *The most prominent researchers and their collaborative networks*

The bibliographic coupling of authors (Figure 1) shows the most prolific and influential researchers in the field of shadow education. Authors with a minimum of five publications and fifty citations were selected for visualisation. Of 953 authors, 12 met the threshold. Bray, M. was the most prominent author in this field with the highest indicators (35 publications, 966 citations, and a total link strength of 9473). The other productive authors in this area, with their number of publications, citation counts, and total link strengths indicated consecutively in parenthesis, are: Zhang, W. (11, 199, 3636), Liu, J. (12, 187, 3098), Kwo, O. (5, 188, 2762), Entrich, S.R. (7, 81, 2587), Zhang, Y. (8, 132, 2199), Wang, D. (5, 143, 2174), Kobakhidze, M.N. (8, 122, 1896), Yung, K.W.H. (7, 111, 1840), Park, H. (6, 358, 1607), Byun, S.Y. (8, 452, 1545), Guill, K. (7, 52, 1100). Zhang, W. has the second-highest total link strength (3636), Liu, J. has the second-highest number of publications (12), and Byun, S.Y. has the second-highest citation count (452). Figure 1 shows that Guill, K.; Zhang Y.; Yung, K.W.K; and Entrich, S.R. have published most of their work recently and are among the most prominent authors.

*Figure 1. Bibliographic coupling of authors*

*Note. Minimum of 5 publications and 50 citations.*

The co-authorship analysis of authors (Figure 2) depicts the academic collaboration patterns between the most productive researchers in the field of shadow education. This analysis yielded two active research groups. Most of the researchers in the first group were from the University of Hong Kong (HKU), East China Normal University (ECNU), and Education University of Hong Kong (EduHK), led by Bray, M. (HKU – ECNU) and his colleagues (Zhang, W. [ECNU]; Kobakhidze, M. [HKU]; Liu, J. [ECNU]; Wang, D. [HKU]; Kwo, O. [HKU]; and Yung, K.W.H. [EduHK]). The other most productive team is from the USA but mostly worked on East Asian countries, especially South Korea. This group was led by Park, H. (University of Pennsylvania) and Byun, S.Y. [University of North Carolina]).

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*Figure 2. Co-authorship Analysis of the Authors*

Note. Minimum of 5 publications and 50 citations.

### *The leading countries and their collaborative networks*

In the bibliographic coupling of countries, 14 out of 85 countries met the threshold of a minimum of five publications and 100 citations (Figure 3). The results showed that the USA, Hong Kong, South Korea, and the People's Republic of China (PRC) have been the most prominent countries in the field of shadow education, followed by Germany, the UK, Japan, Australia, Canada, Taiwan, and Turkey. The rank order of the countries, with their number of publications, citations, and total link strengths consecutively in parentheses, is: USA (109, 2356, 27652), Hong Kong (59, 1085, 24556), South Korea (74, 1030, 22840), PRC (62, 463, 19663), Germany (40, 328, 12298), UK (39, 357, 7021), Japan (46, 229, 6766), Australia (23, 326, 6729), Canada (18, 236, 5909), Taiwan (31, 303, 5337), Turkey (17, 233, 2780), France (9, 181, 2042), Ireland (5, 172, 1363), Greece (5, 112, 826). The findings show that the USA has the highest number of publications (109), citations (2356), and total link strength (27652). Hong Kong has the second-highest citation count (1085) while South Korea has the second-highest publication number (74). Figure 3 also shows that Hong Kong, PRC, South Korea, and Australia have more recent contributions to this research area.
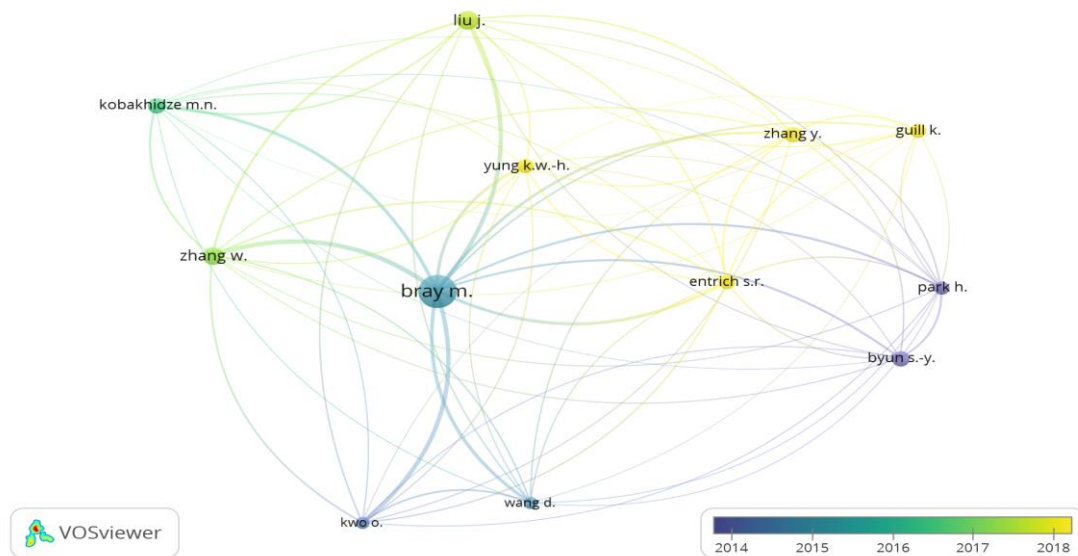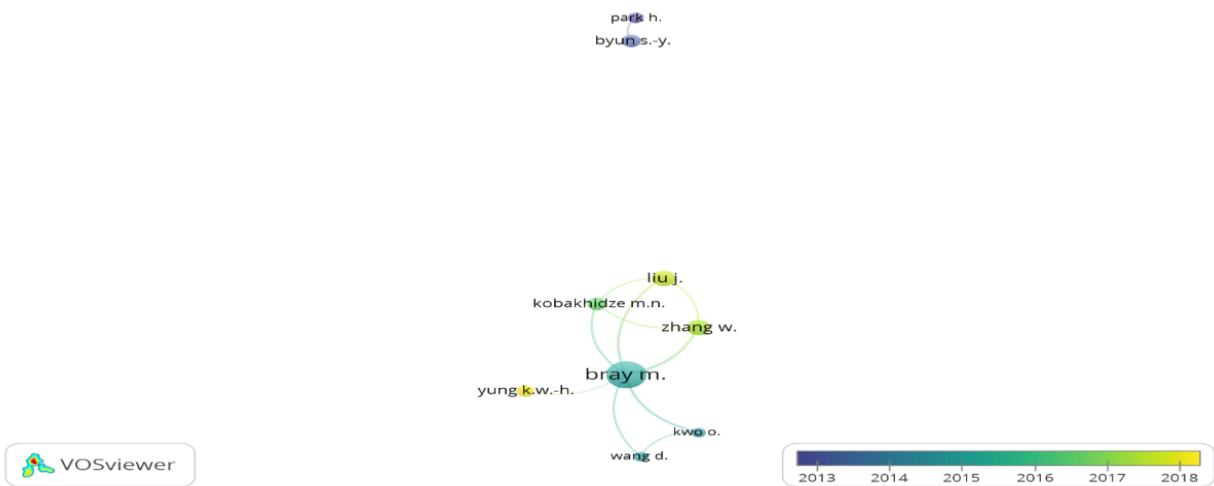
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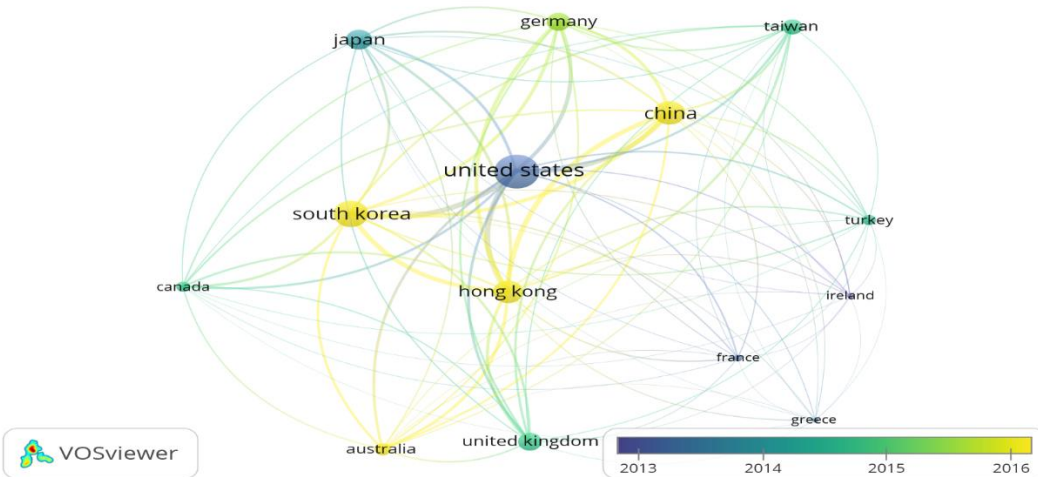
*Figure 3. Bibliographic Coupling of Countries*

*Note. Minimum of 5 publications and 100 citations.*

The co-authorship analysis of the countries (Figure 4) reveals the scientific collaboration patterns between the most prolific countries. Corroborating the bibliographic coupling results, this analysis showed the four most productive countries are the USA, Hong Kong, South Korea, and PRC. They are at the centre of the scientific collaboration patterns between the authors in the field of shadow education. UK, Australia, Germany, and Canada follow.
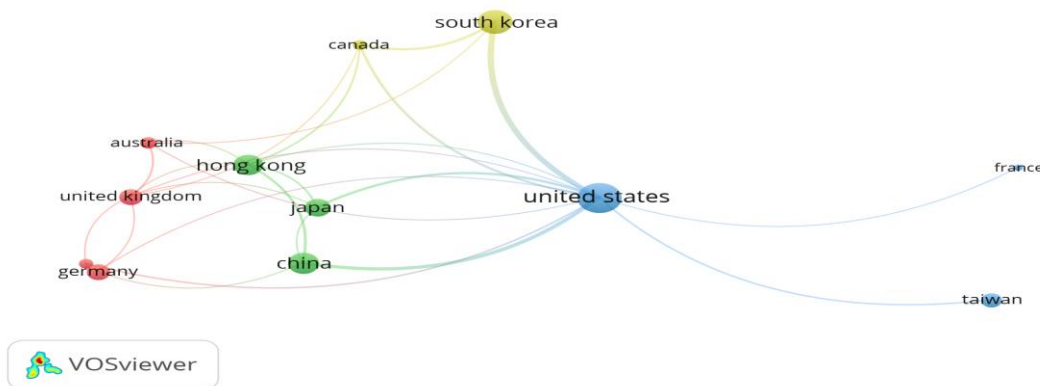


*Figure 4. Co-authorship Analysis of Countries*

*Note. Minimum of 5 publications and 100 citations.*

### The most prominent institutions

Bibliographic coupling of the institutions (Figure 5) visualises the most prominent institutions in the field of shadow education. 8 out of 914 organisations met the threshold of a minimum of 30 citations and 3 publications. The University of Hong Kong (HKU) is the leading university in this field. Interestingly, HKU has been listed under three separate headings (University of Hong Kong, the University of Hong Kong, and Comparative Education Research Centre) in SCOPUS, as shown in Figure 5. We report the sum of these three entries as the total count for HKU. It seems that individual departments can have different entries in SCOPUS, which implies that HKU and the other institutions in the list might have more publications and citations in the current corpus. The order of the institutions, with their number of publications, citation counts, and total link strengths in parentheses, is: HKU (15, 267, 987 [Hong Kong]), University of Postdam (4, 42, 282 [Germany]), Bangladesh Open University (3, 32, 241 [Bangladesh]), East China Normal University (6, 35, 238 [China]), Pennsylvania State University (4, 208, 120 [USA]), and Seoul National University (5, 30, 102 [South Korea]). Figure 5 also shows that the most recent publications in this field are from Bangladesh Open University and East China Normal University.
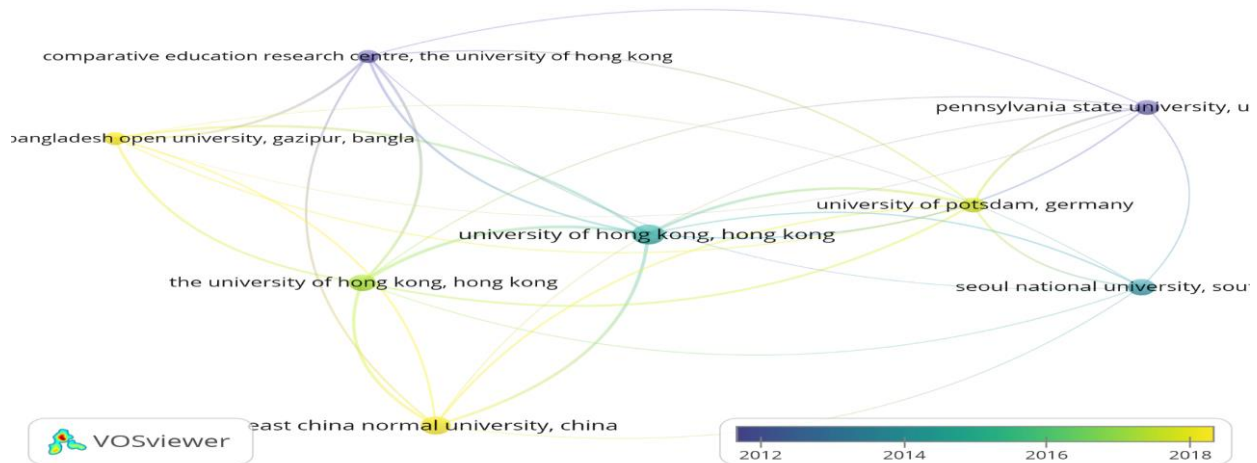


*Figure 5. Bibliographic Coupling of Institutions*

*With a Minimum of 3 publications and 30 citations.*

### The scientific venues and foundations of shadow education research

In the bibliographic coupling of the sources, eleven journals and a book from a total of 371 sources met the threshold minimum of five publications and 100 citations (Figure 6). The results reveal the leading sources of publications in the field of shadow education as follows (with the number of publications, citations, and total link strengths in parentheses): *Asia Pacific Education Review* (27, 703, 4465), *Asia Pacific Journal of Education* (14, 192, 3161), *International Journal of Educational Development* (27, 423, 2907), *Compare: A Journal of Comparative and International Education* (10, 262, 2241), *KEDI Journal of Educational Policy* (15, 115, 2153), *Private Tutoring Across the Mediterranean: Power Dynamics and Implications for Learning and Equity [book]* (13, 122, 1644), *Comparative Education Review* (6, 122, 1601), *Economics of Education Review* (7, 625, 1467), *Journal of Curriculum Studies* (5, 102, 1360), *Oxford Review of Education* (6, 160, 1180), *Sociology of Education* (6, 539, 960), and *Education Economics* (6, 113, 889).

The *Asia Pacific Education Review* has been the most prominent venue with the highest number of publications (27), citations (703), and total link strength (4465), *International Journal of Educational Development* has the same number of publications (27) and the fourth-highest number of citations (423). However, some of the most impactful outputs were published in the *Economics of Education Review* and *Sociology of Education* within a relatively small number of publications (7 and 6, respectively) but with outstanding citation counts (625 and 539), the second and third highest. This finding indicates the strong sociological and economic foundations of shadow education research. In Figure 6, the scores are weighted and coloured according to their average number of citations. The yellowish nodes show that the *Economics of Education Review* and the *Sociology of Education* have the highest average citation values.
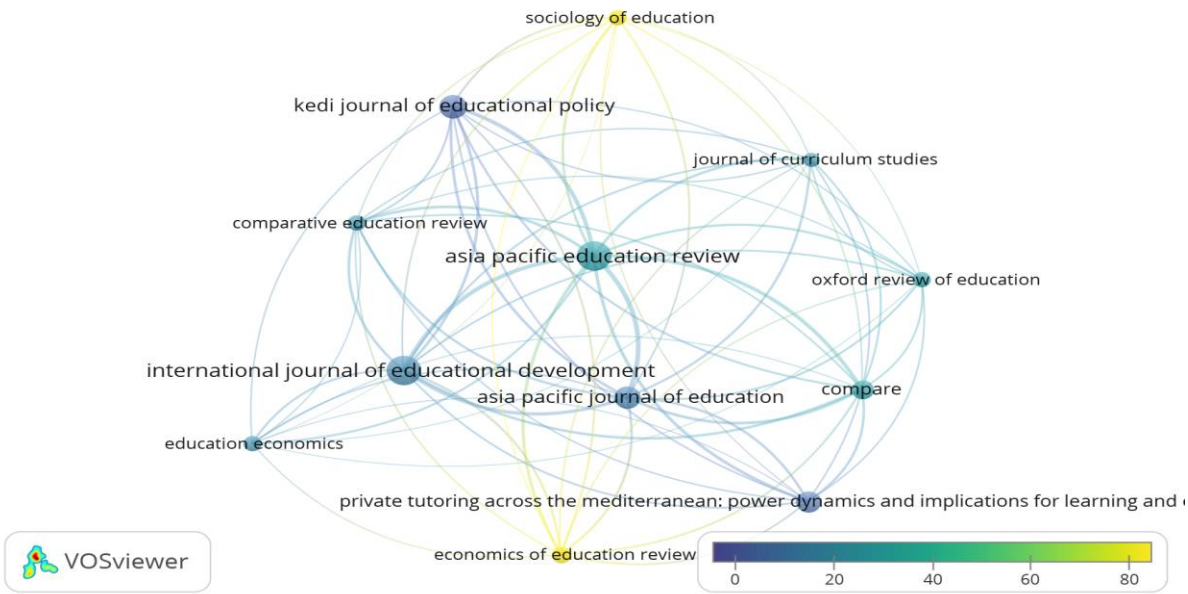
*Figure 6. Bibliographic Coupling of Sources*

*Note. Minimum of 5 publications and 100 citations.*

The co-citation analysis of journals yielded additional information about the disciplines underlying shadow education research. The journals with stronger co-citation links are assumed to be related to each other semantically, and so were grouped in the same cluster. The journals in the same cluster are visualised with the same colour in Figure 7. The red cluster includes education journals from a wide range of disciplines related to higher education, comparative education, curriculum studies, TESOL, and the sociology of education as well as education journals with a wider scope of interests. The blue cluster is mostly made up of sociology journals. The green cluster is mainly composed of educational economics journals but also some with general educational research, educational policy, and educational psychology interests. These findings emphasise the economic and sociological foundations of shadow education research as well as its links to a broad range of areas in the educational sciences.

The distribution of the publications according to SCOPUS subject areas provides further insights into the wide range of scientific areas underlying shadow education research (with document numbers in parenthesis): Social sciences (557), Arts and Humanities (79), Economics, Econometrics and Finance (58), Psychology (49), Medicine (39), Computer Science (25), Business, Management and Accounting (21), Mathematics (15), Environmental Science (10),

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Decision Sciences (4), Multidisciplinary (4), and Nursing (1). Most publications are classified under social sciences (educational sciences and sociology), arts and humanities (mostly linguistics), economics, and psychology, but the distribution shows a broad range of other disciplines underlying the research in shadow education.
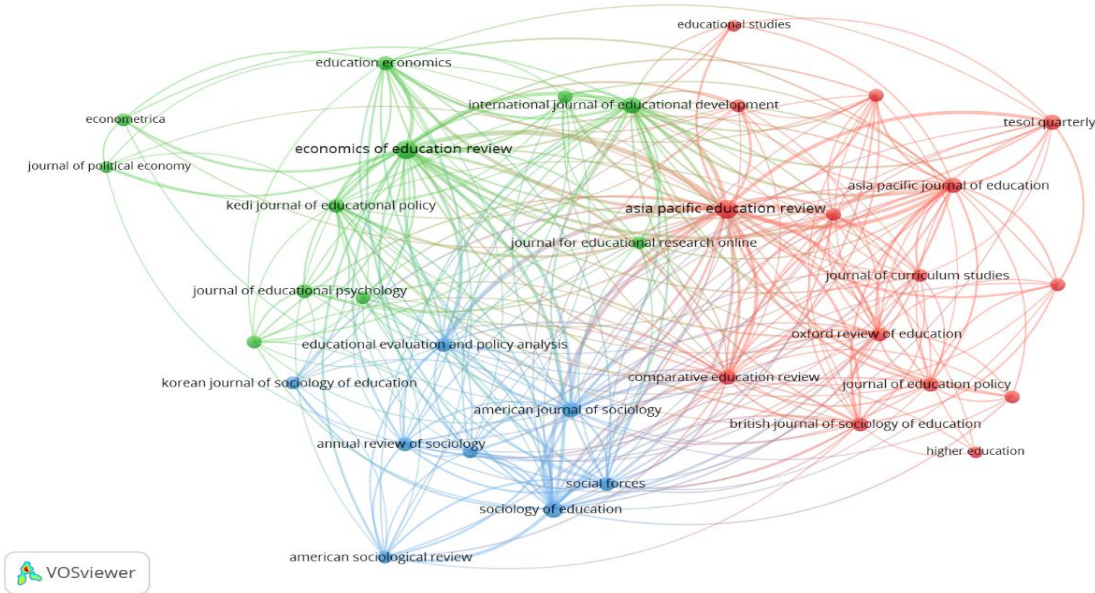


*Figure 7. Co-citation Analysis of Journals*
*(Minimum 50 citations).*

***Topic foci of research in shadow education***

Bibliographic coupling of the author keywords revealed the topic foci of research in shadow education. The network visualisation shows the main topic foci of the research in this field with their appropriate keywords are grouped in different clusters, represented in different colours (Figure 8). The most frequently co-occurring keywords were grouped into clusters according to the broad research topic in each area. First, school choice, human capital, and social inequality topics were identified in the context of their implications for education policy, especially in China, South Korea, and Singapore (red cluster). Second, motivation issues in cram schools, especially private tutoring were the most frequently mentioned concerns in Hong Kong (green cluster). Third, privatisation and tracking were frequently studied concerns in Cambodian and Egyptian private tutoring (blue cluster). Fourth, academic performance, e-learning, demand for schooling, and the

secondary analysis of PISA were the focus of the research in South Korea (yellow cluster). Fifth, academic achievement, cultural capital, and test anxiety were the focus of much Japanese juku research (purple cluster). Sixth, parental involvement at the primary education level attracted the attention of researchers in Bangladesh (turquoise cluster). Seventh, the association between shadow education and inequality of access to higher education was the focus of much research in India (orange cluster).
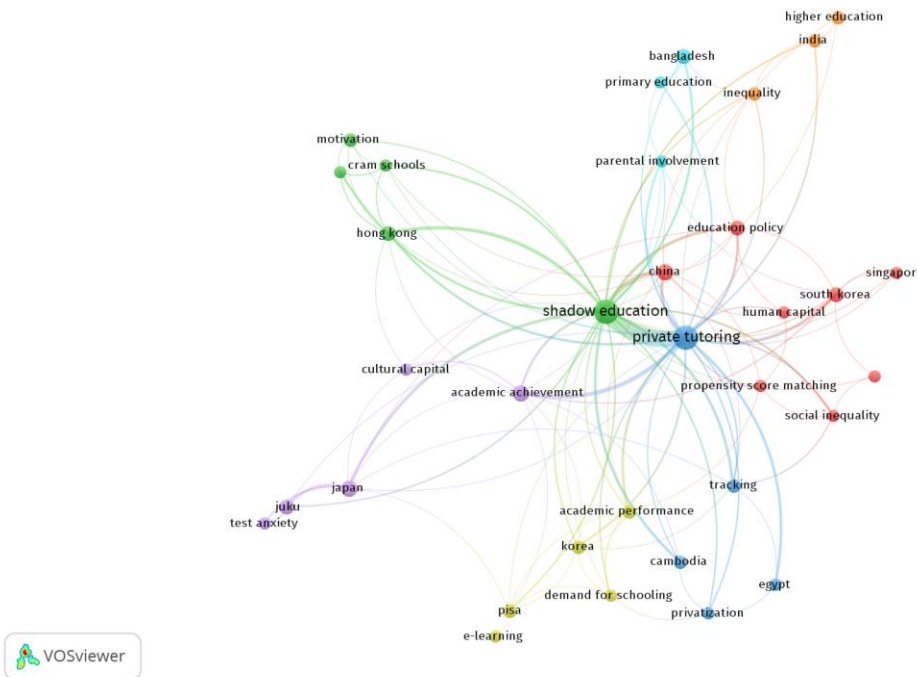


*Figure 8. Network Visualization of Topic Foci*

*(Minimum of 5 occurrences).*

The overlay visualisation of the author keywords exhibits the topics that attracted the interests of the academic audience (Figure 9). The scores are weighted according to the average citations of publications in which each keyword occurs. While blueish nodes signify the lowest average citations, yellowish nodes represent the highest average values. Cultural capital (63.40), demand for schooling (46.80), parental involvement (36.80), privatization (24.40), academic performance (23), and academic achievement (22.95) have the highest average values.
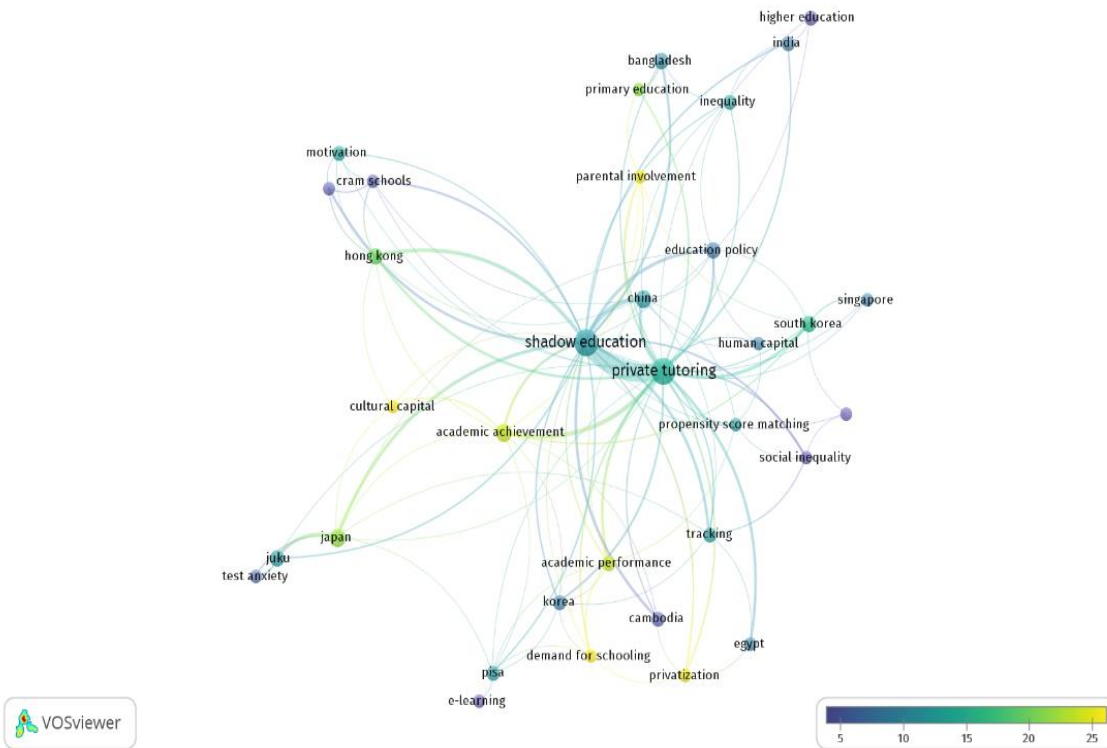
*Figure 9. Overlay Visualization of the Topical Focuses Weighted by Average Citations*

*Note. Minimum number of occurrences: 5.*

### *Review of h-classics*

A citation analysis was performed for a total of 654 publications in the corpus. Up to 23 March 2022, all these publications had received a total of 8449 citations in total. We also calculated the h-index, that is, the number of publications with citation counts of h or more than h (Cancino *et al*., 2017). The h-index was 44, meaning that there were 44 publications that received 44 or more citations in the corpus. These 44 publications are also referred to as the h-classics, the highest quality scientific outputs in this area. The following table summarises the samples, methodologies, countries of origin, and the number of citations of half the h-classics in the field of shadow education i.e., 22 publications, due to the space constraint.

Table 1. *Information on the h-classics*

| Author(s) | Citations | Sample | Method | Country of origin |
|---|---|---|---|---|
| Buchmann, Condron & Roscigno (2010) | 196 | 8,820 American students in their senior year of high school | Quantitative | United States |
| Baker, Akiba, Le Tendre & Wiseman (2001) | 174 | Seventh and eighth-grade students from 41 countries using data from the TIMSS | Quantitative | 41 countries |
| Bray & Kwok (2003) | 152 | Survey: 630 pupils (secondary 1-7). Interviews: 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 | Mixed methods | Hong Kong |
| Tansel, & Bircan, (2006) | 139 | 4279 households in Turkey | Quantitative | Turkey |
| Park, Byun & Kim (2011) | 132 | First-year students in middle schools (i.e., 7th graders) from the Korea Education Longitudinal Study (KELS) conducted by the Korean Educational Development Institute | Quantitative | South Korea |
| Bray (2006) | 127 | ------------ | Literature review | ------------ |
| Kim & Lee (2010) | 126 | The first data set has 6,804 observations, and the second has 19,786 observations. The sample included households that had children in kindergarten, a primary school, a middle school, and a high school | Quantitative | South Korea |
| Dang (2007) | 126 | 6000 households from all areas of Vietnam | Quantitative | Vietnam |

| Author(s) | Citations | Sample | Method | Country of origin |
| --- | --- | --- | --- | --- |
| Dang & Rogers (2008) | 119 | ----------- | Literature review | ----------- |
| Yamamoto & Brinton (2010) | 115 | 578 Japanese individuals (724 men and 854 women) aged between 37-50 | Quantitative | Japan |
| Dawson (2010) | 111 | --------- | Literature review | Japan, South Korea, and Cambodia |
| Brahimi & Sarirete (2015) | 110 | 310 Saudi students | Quantitative | Saudi Arabia |
| Byun & Park (2012) | 110 | 9760 American students who had taken or planned to take the SAT or in 12th grade | Quantitative | United States |
| Byun, Schofer & Kim (2012) | 103 | 4,982 Korean (15-year-old) students from PISA 2000 | Quantitative | South Korea |
| Liu (2012) | 94 | 13,978 Cram school students from Taiwan Education Panel Survey of 2001 | Quantitative | Taiwan |
| Mori & Baker (2010) | 93 | ------------- | Literature review | -------------- |
| Hamid, Sussex & Khan (2009) | 88 | 228 tenth-grade Bangladeshi students (15–16-year-olds) in the quantitative part and 14 students in the qualitative part | A mixed method approach | Bangladesh |

| Author(s) | Citations | Sample | Method | Country of origin |
|---|---|---|---|---|
| Davies (2004) | 88 | 514 Canadian parents | Quantitative | Canada |
| Park, Buchmann Choi, & Merry (2016) | 87 | ------------ | Literature review | ------------ |
| Zhang (2013) | 79 | University entrants taking the National College Entrance Exam (NCEE) of China in 2010 | Quantitative | China |
| Lynch & Moran (2006) | 75 | ------------ | Literature review | ------------ |
| Silova (2010) | 72 | The data sets collected from various groups of students, parents, and teachers through cross-national studies of private tutoring in 12 countries | Quantitative | Eastern Europe & Central Asia |

## Discussion

The authors used the SCOPUS database to retrieve all the publications in the shadow education literature and used bibliometric analysis and visuals to map the corpus between 1982 and 2022. We found that the first relevant source was published by M. Matthews in 1982: *Self-regulation in the private tuition sector — will it work?* However, Bray and Hajar (2022) pointed out that several sources concerned with shadow education or private tutoring were published before this date in languages other than English such as Arabic (Egypt, 1947; Kuwait, 1962), and that some authors quoted publications that referred to the private tutoring received by students in other countries towards the end of the 19th century. Some of these publications were in Greek (Tsiloglu, 2005), Japanese (Sato, 2012), and Russian (Mikhaylova, 2019).

To reveal the most prolific and impactful figures in the field of shadow education, bibliographic coupling analyses of countries, journals, institutions, authors, and author keywords, co-citation analysis of journals, and co-authorship analyses of authors' countries were performed. The bibliographic coupling of authors revealed the most prominent scholars in shadow education and co-authorship analysis showed their scientific collaboration patterns. The most prolific and impactful author has been Bray, M. (HKU – ECNU). Bray, M. also led the most prominent research team with scholars from HKU (Hong Kong), ECNU (PRC), and EduHK (Hong Kong). The second most influential group of researchers were from the USA: Park, H. (University of Pennsylvania) and Byun, S.Y. (University of North Carolina), who mainly focused on the shadow education issues of East Asian countries, especially South Korea.

This finding concerning the expansion of private tutoring in East Asian societies may be partly due to deeply rooted Confucian traditions of learning outside and beyond formal settings and the practice of using examination systems (Kobakhidze & Suter, 2020). Also, this study's bibliometric analysis showed that the most prominent scholars in the field of shadow education are affiliated with universities in Asia and hence their published work has largely focused on Asian students' participation in shadow education. More specifically, the bibliographic coupling of the institutions showed that HKU has been the leading institution in shadow education research. This finding corroborates the results of the bibliographic coupling of authors that showed the leading scholar (Bray, M.) and most of the members of his team (Kobakhidze, M.; Wang, D.; Kwo, O.), the most influential team in this area, are linked to HKU. Most of the leading institutions as well as the leading authors in the field of shadow education are based in Southeast or East Asian countries. This confirms the central position of this part of the world in this field.

Related to this, the bibliographic coupling of countries showed that the USA, Hong Kong, South Korea, and PRC have been the source of the most influential scientific outputs and are at the centre of the scientific collaboration patterns in the worldwide shadow education literature. As shown in Table 1, of the 22 h-classics, 7 papers focused on private tutoring in East Asia (Mainland China, Hong Kong, Japan, South Korea and Taiwan), 7 papers reviewed the main concepts related to private tutoring across different countries, 2 papers concerned the United States and Bangladesh, Canada, Eastern Europe and Central Asia, Saudi Arabia, Turkey and Vietnam were each the geographical area of one paper.

Co-citation analysis and the bibliographic coupling of sources showed the most prominent journals and scientific foundations of shadow education literature. The *Asia Pacific Education Review* has been the most preferred journal for publication in this area, followed by the *International Journal of Educational Development*. However, some of the works with the greatest impact were published in the *Economics of Education Review* and the *Sociology of Education*. The economic, sociological, psychological, and linguistic foundations of this research area and its links to disciplines within the educational sciences appeared in the network visualisation of co-citation analysis and the distribution of items by the SCOPUS subject areas. As shadow education is multifaceted, Manzon and Areepattamannil (2014: 389) were probably the first authors to recognise the 'multiple forms and positions [of shadow educations] across educational systems and levels'. In a similar vein, Bray (2021c: 2) referred to 'the lenses of physical, political, economic, cultural, and pedagogical geography' to illustrate a broader, contemporary understanding of the nature of shadow education.

Concerning *physical geography*, Bray (2021c) indicates that while most governments around the world consider it is their responsibility to establish schools in remote areas as part of citizens' rights, the situation is different for shadow education. The private tutoring market is largely controlled by entrepreneurs and informal providers, interested in providing their services to wealthy families residing in crowded cities for financial gain. The *political geography* includes what policymakers, particularly those at various levels of government, should do about the expansion of private tutoring (Bray, 2021c). Although private tutoring has proliferated, some policymakers take a *laissez-faire* attitude whereby education outside mainstream school hours is not seen as under the government's purview (e.g., in Angola, Lebanon, Liberia, Namibia, Somalia, United Kingdom, and Yemen). In Angola, for example, Chionga (2018: 86) pointed out that 'the education authorities remain silent' on the phenomenon of shadow education.

Other policymakers (e.g., in Cambodia, Eritrea, Kenya, Kuwait, Iraq, Myanmar and Zimbabwe) have taken an extreme approach to the growing prevalence of shadow education by prohibiting it, but this approach is not effective and not recommended. In Iraq, for example, the government prohibits serving teachers from offering fee-charging private tutoring but is unable to enforce the prohibition (Bray and Hajar, 2022). Meanwhile, a few government bodies (e.g., India, Mainland China, Qatar and the United Arab Emirates) have been more proactive in regulating tutorial centres

by introducing codes of practice. In Mainland China, for instance, tutorial companies are prohibited from covering the official school curriculum in advance, to protect schools and take the pressure off students from disadvantaged backgrounds who are unable to participate in fee-charging private tutoring to catch up with their counterparts (Zhang, 2021). In order to licence a tutorial centre in Qatar, certain conditions have to be fulfilled, including clearly displaying prices at the headquarters and only employing tutors with a higher qualification in their field of specialisation (Bray and Hajar, 2022).

Regarding *the cultural aspect* of shadow education, Bray (2021b) points out that shadow education has long been prominent in East Asian societies influenced by Confucian-heritage cultures which can also be observed in Asian immigrants living in Western countries. This was echoed in the findings of some of the h-classics articles in Table 1. In the United States, for instance, Byun and Park (2012) reported that American East Asian students sought SAT test preparation courses and other modes of fee-charging private tutoring more than any other ethnic group of students, including other Asian American students.

The influence of *economic geography* may emerge in the cost of private tutoring sessions (Bray, 2021b). In one of the h-classics articles listed in Table 1, Silova (2010) reported how private tutoring can create a financial burden on many families and so the playing field is not level, since 'imperfect legislation, lack of implementation mechanisms, and absence of legal enforcement' describes the private tutoring market in central Asian countries. Similarly, Hajar and Abenova (2021) discovered why some first-year Kazakhstani undergraduate students had sought paid private tutoring within the previous two years. They found that 72% of their participants regarded private tutoring as an enrichment strategy to help them achieve higher scores in high-stakes examinations and so secure a place at an elite university in Kazakhstan or abroad. The issue of expenditure on private tutoring as a financial burden was reported in Hajar and Abenova's (2021) study as well as in other studies, for instance, Kirby (2016) in England and Kim and Lee (2010) in South Korea, showing shadow education can increase social inequality because capable students from disadvantaged backgrounds may fail to secure places at highly selective schools or universities not because of their academic ability, but because they cannot afford the private tutoring to prepare them for high-stakes examinations. Zhang and Bray (2020: 331), therefore, highlight the importance of strengthening the partnership between the authorities and 'schools,

teachers' unions, other government branches, community bodies, and the media' to develop a regulatory policy. Zhang and Bray (2020) point out how an online tutoring company in the United States, emphasising grades and admission to higher education, provides free tutoring to military families funded by the US Department of Defense and the Coast Guard Mutual Assistance.

The study revealed that almost all h-classics studies shown in Table 1 have associated the effectiveness of shadow education with its tangible benefits in terms of measurable educational outcomes for students. These benefits include keeping up with the school curriculum, achieving high – or at least adequate – scores in school examinations and obtaining the required scores needed to secure a place at a prestigious university. This finding is largely attributed to the overemphasis on high-stakes examinations as the principal gate-keeping mechanism, the lack of empirical studies conducted from students' perspectives and the over-dependence on questionnaires as the primary, if not sole, method of data collection in research on shadow education (Bray & Kwo, 2014; Hajar, 2018). In this regard, Hajar (2018) points out that there has been little detailed evidence available about the intangible gains of having private tutoring and their significance on students' overall achievements. The intangible, soft benefits of shadow education, as Hajar (2018) indicates, go beyond mainstream attainment and improved examination results and look at students' personal growth in terms of boosting their confidence and self-awareness together with their attitudes to learning. Therefore, further research on the impact of the intangible benefits of shadow education on students' overall achievement needs to be conducted (see Hajar, 2018; 2020).

**Conclusion**

This study provides an overview of the evolution and current state of research into shadow education based on the data available in the SCOPUS database. The results show that shadow education research is an emergent field of study whose interest has grown exponentially over the previous decade. The scientific output in this emerging area is interdisciplinary in nature, and scholars from different perspectives and disciplines continue its development, the progress of which has been due primarily to a small group of scholars working in Asian countries, in particular,

having built strong collaborative connections nationally and with nearby countries, and to a lesser extent with other countries.

As stated earlier, no bibliometric review can provide a perfect picture of the development and current status of the field. Specifically, the data were extracted from the SCOPUS database and did not cover the grey literature, theses, and all other scientific outputs that are not indexed in SCOPUS. The publications that are not included in this study might contain additional citations to the items in the current corpus, which could change the impact indicators of the countries, authors, institutions, and journals. The researchers are advised to include other types of scientific outputs and databases (e.g., Web of Science, ERIC, PsycInfo, Proquest, PubMed) to map out the existing body of relevant evidence more comprehensively. *In addition*, SCOPUS mainly includes scientific sources originating in Western countries (e.g., USA, Canada, European countries) and in English. It does not cover the shadow education literature written in other languages (e.g., Chinese, Arabic, French, German, Italian, Portuguese, Spanish, Russian), which could contain valuable information for the development of shadow education literature. Therefore, the publications from the Global South, especially South America, the CIS region, Africa, and the Middle East are underrepresented in the current corpus. Researchers in the field of shadow education are advised to do scoping reviews and scientific mapping studies on the shadow education research published in other languages and originating in other geographical parts of the world.

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