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Knowledge counts: Influential actors in the education for all global monitoring report knowledge network

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ABSTRACT

This paper uses bibliometric methods to examine the knowledge network underpinning the Education for All initiative. Specifically, through an analysis of the references listed in the Education for All Global Monitoring Reports (EFA GMRs) published between 2002 and 2015, this paper focuses on the elite group of 89 authors referenced 10 or more times across the report series, and the underlying patterns of influence wielded by these authors over the EFA GMR knowledge network. This study contributes new insight into global trends in knowledge production and dissemination in this field, and highlights the value of bibliometric approaches in helping us better understand the increasingly complex and interconnected intellectual structure informing and shaping the global education agenda.

1. Introduction

Empirical evidence has a vital role to play in the development of education systems around the globe. It has the potential to improve both the efficiency and effectiveness of education by providing attested information to enhance education policies and the practices they recommend (Livingstone, 2005). This is particularly true In the international development sector, where limited resources combined with an increased culture of accountability have created a demand for evidence-based decision making at all levels (Eyben et al., 2015). Meeting ambitious global targets for high-quality universal education requires not only commonly agreed upon, clearly defined, measurable global education targets (Mundy and Manion, 2015), but also local, national, regional and global resources to monitor and evaluate global progress towards Education for All (EFA). Guidance from on-going monitoring and evaluation is seen as crucial component of achieving EFA, as it is believed that lack of assessment, critical reflection and knowledge exchange over any length of time would hinder implementation and collaboration (Benavot, 2015)

As financial aid plays a decreasingly important role in many national budgets, development agencies are increasingly turning away from project funding, towards supporting 'knowledge building' (Piotrosky, 2014). As a result, in recent years, not only has the world experience a surge in development related data, but it has also been suggested that there has been significant increase in the range of actors both producing and using those data to shape the development agenda through their innovative analysis and advocacy work (Mbabazi et al., 2005; Menashy and Manion, 2016; Piotrosky, 2014). Under the paradigm of evidence-based development, there are no longer clear borders between the realms of knowledge production, policy, and practice (Stone, 2012), however, despite this recognized shift in the knowledge landscape, there has been little research examining the actual trends and patterns of knowledge production and mediation in the field of international education development. In turn, we do not know to what extent, or how these trends and patterns have changed over time.

This paper aims to begin to fill this gap by reporting part of a larger study which utilized bibliometric methods — a quantitative technique used to analyze data from publications in order to identify and track patterns in published literature (Rhen et al., 2014) — to explore the 8271 combined references listed in the 'References' section of the 12 Education for All Global Monitoring Reports (EFA GMRs) published between 2002 and 2015. In total, the study found the EFA GMRs referenced 6833 unique authors, including 6239 individual authors (91.31%), and 594 organizational authors (8.69%). On average, each author was referenced 2.05 times within the dataset (SD 3.25); with organizational authors accounting for 23.29% of all references, while individual authors account for 76.71%.

In any bibliometric study it is expected that there will be a few very frequently referenced authors, amongst a far greater number of authors with low reference rates (Andrés, 2009; De Bellis, 2009; Diodato, 2012). Keeping with this trend, this study found the vast majority (4861 or 71%) of authors referenced within the EFA GMRs were only referenced once within the entire report series. At the other end of the spectrum, this research identified an elite group of 89 individual authors referenced 10 or more times across the 12 reports. The following

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paper focuses on this elite group of authors and the extent of their influence over the structure of the knowledge network which informed and helped to shape the Education for All (EFA) agenda from 2002 to 2015.

The following section provides an overview of the key debates framing the literature related to evidence-based international development, while section three provides an outline of the conceptual framework which informed this study. Taking a bibliometric approach to collecting and analyzing reference data from the 12 EFA GMRs published between 2002 and 2015, I then identify and examine the knowledge network of 89 most highly referenced authors and measure the extent of their influence over the intellectual structure of this network.

This approach sacrifices depth for breadth. While there is much we can learn from this bibliometric data, it is important to remember that the knowledge networks reported here do not represent *social ties* between authors or organizations. Rather, bibliometric analysis focuses on the *intellectual ties* within of a field of knowledge (De Bellis, 2009). Specifically, this paper focuses on how the most frequently referenced authors in the EFA GMRs influence the structure of knowledge network underpinning this report series through an examination of the publishing relationships between the individuals and organizations referenced within the reports. The analysis reported here does not necessarily indicate any actual relationships beyond co-publishing, nor does it address the internal factors which may have impacted the referencing patterns of the EFA GMR team.

However, while this analysis does not provide deeper insight into the social ties which impact what knowledge counts when it comes to the global Education for All agenda, it does provide a better understanding of the nature and extent of knowledge production and mediation in this field. Through the application of traditional bibliometric analysis to the EFA GMRs, this study provides insight into new ways we can empirically map and examine the patterns and trends of knowledge production in international education development beyond the walls of academia. The results of this study not only add to our empirical understanding of the EFA GMR as a tool of evidence-based development in the education sector, but also illuminates broader discussions in the development literature as to what knowledge counts and who gets to decide?

2. Background

As is the case in many areas of academia, there is no single agreed upon definition of knowledge. In the field of international development, a broad definition is considered to be most appropriate, as it is seen as crucial to draw on multiple sources of knowledge to inform policy and practice, as traditional research alone is often ill-equipped to deal with the complex challenges that characterize this sector (Jones et al., 2009). Under this framing, development knowledge is considered to be part of a global public good (Squire, 2000; Stiglitz, 2001), which serves to support the democratization of development by enabling everyone to participate in the production of, as well as mutually benefit from the consumption of development knowledge (Wolfensohn, 1996; Zoellick, 2010).

However, while the field acknowledges that less formal ways of knowing (such as experience and non-Western forms of knowledge production) are undeniably important when considering the realities of practice and policy contexts, international development is founded upon the belief that scientifically based and highly technical knowledge is necessary to reduce poverty and improve quality of life (Truman, 1949). Evidence-based international development moves beyond best practices and success stories and into analysis to provide empirical insight into why some policies and practices work and not others? And under what circumstances? (Stiglitz, 1999). For this reason, evidence-based development is often limited to knowledge, gained through "… any systematic process of critical investigation and evaluation, theory building, data collection, analysis and codification" (Nutley and Davies, 2010, p. 4).

Limiting what knowledge counts strictly to empirically based knowledge has significant implications. Thus, while some see evidence-based development as global public good, an alternative view suggests that evidence-based development should be seen as part of a North to South power hierarchy in which the Global North (and the individual actors and organizations associated with the Global North) is able to define what counts as legitimate evidence in development. In this conceptualization knowledge-based development is portrayed as a tool of 'paradigm maintenance' (Broad, 2006), which serves to replicate the longstanding global power asymmetries between the Global North and Global South (Broad, 2006; Easterly, 2013; Torres, 2001). This critique is not limited to who produces development knowledge and where that knowledge is produced, but also address what kind of knowledge dominates. Under the paradigm maintenance framing, it is believed that certain types of people (i.e. recognized experts with advanced degrees and highly technical skillsets), from certain institutions (i.e. those with affiliations to Ivy League Universities and powerful multilateral organizations) and certain disciplines (specifically economics) are emphasized, while others are excluded from debate.

In particular, many scholars have raised concerns about the hegemony of economics in framing the development agenda (Carden and Neilson, 2005; King, 2005; Maxwell and Stone, 2005; McNeill, 2005). These scholars are concerned that economics encourages a technocratic approach to development which emphasizes theory over practice, empirical facts over values, and holds a limited regard for context, history, and power (King and McGrath, 2004). As noted by Stone and Maxwell, "put crudely, the argument is that those who count are Northern economists, usually male, and usually working in the World Bank or one of the major bi-lateral agencies" (2005, p. 9). Those who don't have the required background, those that do not speak the languages of the knowledge products and services being produced, and those who envision development beyond the narrow confines of neoliberal economics are effectively and efficiently denied entry. Accordingly, while some envision evidence-based development as a new development paradigm, others frame it as simply the latest iteration of old economic theories and practices.

Despite these critiques, there has been little research examining the actual ways that knowledge flows from the context of research production to the context of research use in development (and even less in the specific field of education for development), and there is a little empirical analysis on how flows of knowledge have changed over time. While several scholars have utilized bibliometric measures to assess publishing trends in the field of Comparative, International, and Development Education (CIDE) (c.f. Cook et al., 2004; Foster et al., 2012; Koehl, 1977; Little, 2000; Rust et al., 1999; Wolhuter, 2008), they did so by taking a traditional approach, with academic journals serving as the key source of data; an approach which provides an incomplete map of the field (Foster et al., 2012). Additionally, this work focuses on debates around the status of CIDE as a distinct academic discipline rather than mapping the actual terrain of knowledge production in the field (ibid). Therefore, while these studies give us some idea of the changing trends in the academic field of CIDE, they provide limited insight into the actors and organizations engaged in informing the global education agenda, the geographical affiliations of these actors/organizations, and the intellectual ties between these actors and organizations.

However, despite the lack of empirical analysis, the literature suggests that the intellectual structure underpinning the development sector has changed significantly in recent years as the economic, political, social and technological transformations which occurred during the latter half of the 20th century (King and McGrath, 2004) created space for new actors to participate in the production and mediation of development knowledge. This study uses bibliometric methods in order to provide empirical insight to help us better understand what capacity

for production and mediation of evidence in the field of international education development currently exist, and where is it located.

3. Conceptual framework

Those that critique evidence-based development as a global public good contend this overly optimistic conceptualization ignores the fact that powerful interests are at stake. Conversely, others argue the paradigm maintenance framework is overly pessimistic, and ignores the power of ideas and the complexity of relationships within the development community (Bøås and McNeill, 2004). I argue that, while it is important to make explicit and critique power imbalances in international development, neither of these conceptualizations provide an operationalizable framework to support the empirical examination of the increasingly complex and interconnected intellectual structure informing the global education agenda. Instead, I look to the work of Diane Stone on knowledge networks and the linked ecologies of global public policy in order to frame this research.

Building off the concept of the agora, or public meeting space or market square which served as the heart of social and intellectual life in ancient Greece, Stone uses the metaphor of the 'Global Agora' in order to situate her work on knowledge-based development (Stone, 2013). In her conceptualization, the global agora is a normatively neutral, imagined social and political space which enables the co-mingling of communities (ibid) and can be studied over time. Stone's framework makes no presumptions about the nature of the transactions which take place in this space. The global agora is a space of disorder and uncertainty where, "…political authority [is] unclear, and dispersed through multiplying institutions and networks" (ibid, p. 17). This is not to say that Stone claims the Agora is a neutral space. Stone recognizes that it is characterized by an uneven distribution of resources and a hierarchy of discourses in which only "those who have the resources, patronage or expertise to enter and traverse the agora" can be public actors (Stone, 2005, p. 89).

Stone's work encourages us not to examine the Agora with preconceived notions as to what the Agora looks like (Stone, 2004). Instead, her conceptualization enables scholars to examine the actual ways that knowledge moves through global public policy networks, epistemic communities, and transnational policy networks by providing an operationalizable framework which revolves around three key components: (1) knowledge actors, or the *individuals* involved in the production and mediation of knowledge; (2) knowledge agents, or the *organizations* involved in the production and mediation of development knowledge; and (3) *knowledge networks*, or the underlying patterns of engagement between the previous two (Stone, 2012).

Stone warns that understanding the influence of individual and organizational knowledge actors in development policy requires a long-range analysis. Influence does not rest solely in the work of significant scholars, but rather in the aggregate contributions of the community as a whole, developing a consensual evidence base over time (ibid). In this research, I focus on the Educational for All Global Monitoring Reports as a Global Agora from which to examine evidence-based international development in the education sector. The references of the EFA GMRs provide the longitudinal dataset necessary to provide meaningful insight into the individual and organizational actors engaged in knowledge production in this sector, and the publishing relationships between these actors provide insight into the underlying knowledge networks.

Although published by The United Nations Educational, Scientific and Cultural Organization (UNESCO), the report is recognized as an independent assessment of the governments, civil society organizations, and bilateral and multilateral donors who have committed to achieving the Education for All (EFA) goals agreed upon at the World Education Forum in Dakar in 2000 (UNESCO, n.d.). Using the most current statistics and analyses on the world's progress towards the EFA targets, the EFA GMRs map trends, identify effective policies and reforms, measure political commitments, raise awareness of challenges and constraints, and promote specific international strategies and co-operation. In addition to providing a general update on the state of EFA, each publication focuses on a different theme and highlights the world's progress in that specific area.

The 12 EFA GMRs published between 2002 and 2015 reference both academic and grey literature produced by a wide range of global education stakeholders (such as multilateral and bilateral organizations, leading non-governmental organizations, think-tanks, philanthropic foundations, and private companies), in order to "…inform and to influence education and aid policy through an authoritative, evidence-based review of progress and a balanced analysis of the most critical challenges facing countries" (GEMR, n.d.). In addition to bringing together the voices of diverse stakeholders, the EFA GMRs also provide a starting point for discussions about educational development around the world. While not without critique, these reports are widely considered to be, "…an invaluable series of well-researched documents on the progress towards the goals articulated at Dakar in 2000" (Daniel, 2010). The EFA GMRs have developed a reputation as an authoritative document, one which has become a fulcrum for aid agencies, non-governmental organizations, and developing countries as both a reference for policy and to inform the monitoring and evaluation of their own progress toward the EFA goals (Daniel, 2010; Packer, 2008). Over time, the EFA GMRs have become, "required reading for anyone interested in education for development, as well as for educational policy-makers in developing countries and for donor agencies" (Brown, 2006, p. 480). As such, the EFA GMRs provide an excellent platform from which to begin to examine a global agora in international education development.

Following in line with Stone's framework, the goal of this research is not to simply prove or disprove any pre-existing theory as to the nature of evidence-based development − but rather to accurately describe the field of evidence-based international education development. For this reason, for analytical purposes, this study does not define knowledge per se, but rather limits the term knowledge strictly to the knowledge referenced within the 12 EFA GMRs published between 2002 and 2015. This is not to say that this research excludes experiential, non-Western, or indigenous knowledges; but rather, these forms of knowledge must be meet the above criteria in order to be 'counted' in this research.

4. Methods

The EFA GMRs list a combined 8271 references, making it ideal for bibliometric work which requires datasets of 5000 references or larger for analysis.[1] While it is possible to complete a bibliometric analysis using only the first author and/or publisher of each publication, or by weighting authorship to account for multiple authors, I utilized the whole count method − meaning each author and publisher listed for any given reference was included as a data point and received equal treatment in this study (Andrés, 2009). All references from each report were counted, therefore a publication could be counted more than once if it was referenced in more than one of the EFA GMRs.

As noted previously, while this study identified 6833 unique authors (6239 individual authors and 594 organizational authors) across the 12 reports, this paper focuses on the elite group of 89 individual authors that were referenced 10 or more times across the report series. The following section provides details on the specific methods used to identify the sample of elite authors of focus in this paper.

[1] Bibliometric analysis requires each reference included in the study to be disaggregated into specific bibliometric indicators (or units of analysis). To ensure the relationships between indicators are not weakened and average indicator values are not skewed by single outlier values, bibliometric analysis requires data sets to be larger than 5000 references (Rhen et al., 2014).

Table 1
Types of Organizational Knowledge Actors.

Organizational Type	Definition	Examples from the EFA GMRS
Research Institutes and Universities	Universities, research institutes/centers including both those within and external to academia i.e. think-tanks, academic publishers including university presses and academic journals	• Abdul Latif Jameel Poverty Action Lab • Annual Status of Education Report Centre (ASER) • University of Namibia
Networks and Associations	Membership organizations. Generally, the organizations in this category self-identify as networks or associations.	• Africa Network Campaign on Education for All • Association for the Development of Education in Africa • Global Campaign for Education
Government Ministries and Bi-lateral Aid Agencies	All national, and sub-national governmental agencies such as a national development organization, a national bureau of statistics, or a ministry of education.	• Canada (includes CIDA, Statistics Canada, Government of Canada, etc.) • India (includes Government of the Republic of India, Ministry of Health and Family Welfare, National Council of Educational Research and Training, etc.)
Multilateral Organizations	Three or more national governments working together. This category also includes partnerships between multilateral actors.	• World Bank • UNESCO • Conference of the Ministers of Education of African Member States
Philanthropic Organizations	Private foundations or endowments. Can be linked to an individual or to a private corporation.	• Aga Khan Foundation • Ford Foundation • MasterCard Foundation • Naandi Foundation
Non-Governmental Organizations (NGOs)	This broad category is used to classify all NGOs not currently covered by others. This includes charitable organizations, advocacy organizations, religious organizations, and other civil society organizations. While these organizations may work with, or receive funding from government agencies and multilateral organizations, they are considered to function outside of government. All organizations in this group are either charitable or non-profit organizations.	• Save the Children • Oxfam • Christian Aid • Flour Fortification Initiative • Human Rights Watch • Robin Hood Tax Campaign
Consultancy and Commercial Companies	This category is limited to for-profit organizations, including for-profit consultancy firms and commercial companies.	• Carfax Education • Development Initiatives • ExxonMobil • Pathmark Associates
Research Councils	Research funding agencies, can be both public or non-governmental.	• National Research Council • National Scientific Council on the Developing Child
Media	Includes popular magazines, newspapers and other news media.	• CNN • The Times of India • Katmandu Post • Education Today

4.1. Data collection

All EFA GMR references were systematically and thoroughly cleaned to address inconsistencies in author and publisher names, and to ensure each author and publisher could be uniquely identified within the dataset. This was completed by disaggregating the reference data into the key bibliometric indicators used in this study; authors (including both individual and organizational authors) and publishers.

Organizational actors, including both organizational authors and publishers, were coded by organizational type (see Table 1) based on a typology which inductively built off the partnership typology used by the Institute for Development Studies (IDS) to classify the types of organizational partners they work with (IDS, 2016). In the final stage of data cleaning and preparation, the organizational actors which fall under a larger umbrella organization were recoded under the larger umbrella organization's name. For example, all governmental organizations from the same nation-state were all recoded under the state name (i.e. Statistics Canada, CIDA, etc. were recoded as Canada), while all sub-organizations that fall under the umbrella of a larger organization were recorded using only the umbrella organization's name (i.e. UNESCO Institute of Statistics, UNESCO Institute of Educational Planning, etc. were recoded as UNESCO). The only exception to this rule was the EFA GMR itself, which is considered in this study as distinct from UNESCO despite the fact the EFA GMRs are published by UNESCO.

Through the calculation of descriptive statistics, all individual authors which had been referenced 10 or more times across the 12 reports were identified, providing sub-sample of 89 highly referenced authors. All references which included at least one of these elite authors were included in the analysis reported in this paper. This means that the knowledge networks reported here include the 89 most frequently referenced authors, along with their co-authors, and publishers. Data collection was completed in Microsoft Excel, while a combination of Excel, Microsoft Access, UCINET (Borgatti et al., 2002), and Netdraw (Borgatti, 2002) were used for data analysis.

Additional data on each of the most frequently referenced authors was collected from publicly accessible sources online, including educational background and current organizational affiliation. Of the 89 authors referenced ten or more times within the EFA GMRs, 82 of them had publicly accessible biographies or CVs available online. From these sources I determined that 30.48% (n = 25) are female and 69.52% (n = 57) are male.

I was able to access data on where 78 of these highly referenced authors received their most recent degree. While these 78 authors received their highest degrees from a total of 37 universities, 44.87% of the degrees were awarded from just five institutions; specifically, Stanford (9 authors), Harvard (7), University of Sussex (7), Oxford University (6) and MIT (6). The 37 universities represented by these authors span only 9 countries, with the majority of authors having received their highest degree in either the USA (53.84% or 42 authors) or the UK (33.33% or 26 authors). Only two authors (2.56%) received their most recent degree in the Global South.

While these authors came from a range of disciplinary backgrounds including education (25 authors), psychology (4 authors) medicine (3 authors), international development (3 authors) and penology (1 author); the majority (41 authors or 54.67%) have a disciplinary background in economics.

Most (65%) of these elite authors are currently affiliated with a university, serving as a professor or administrator, while the remaining 35% work outside of academia for organizations such as the World

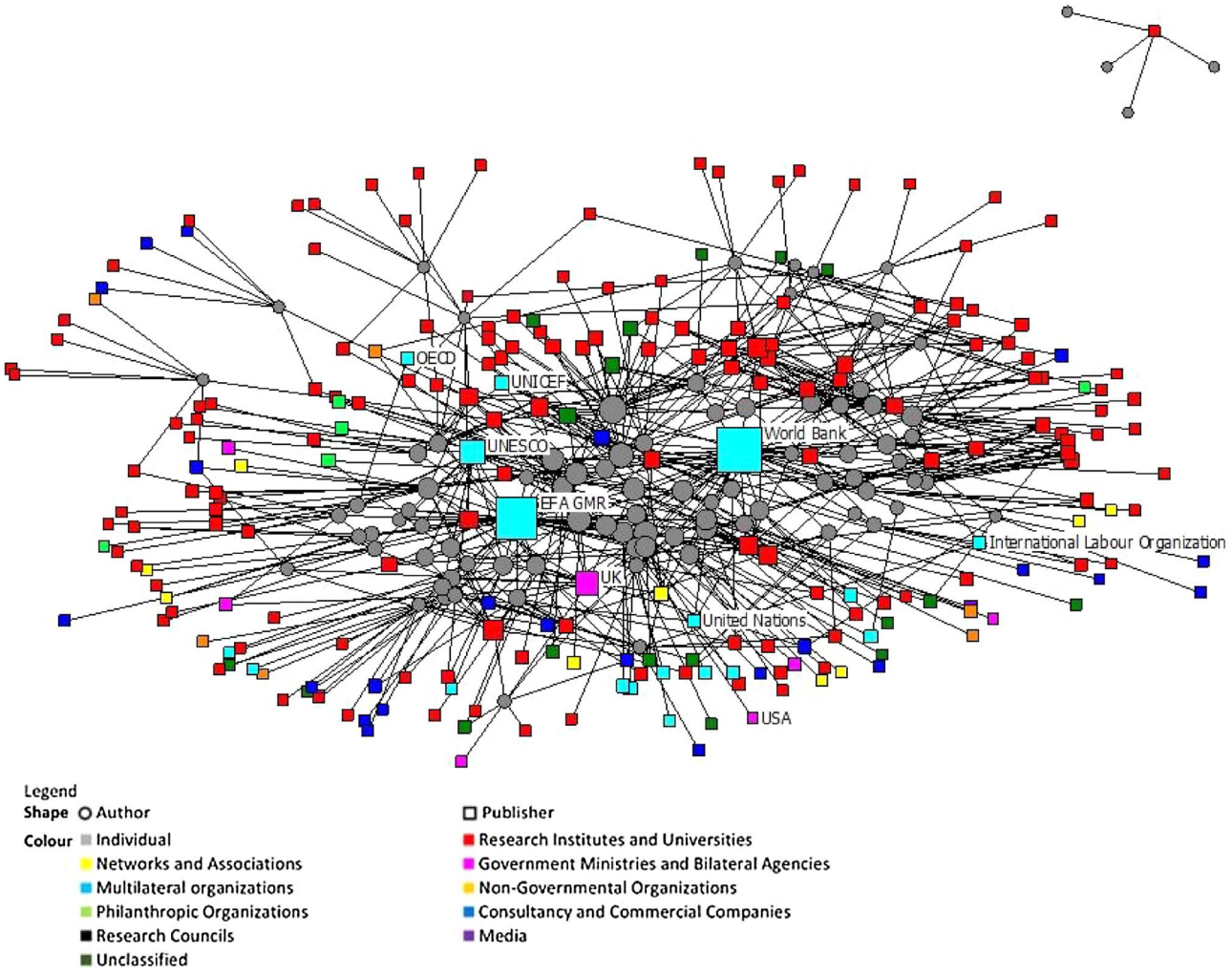

Fig. 1. Top 89 Individual Actors' Knowledge Network.

Bank, the Inter-American Development Bank, a national government, the EFA GMR, or as private consultants. Most of the top authors are currently working at an organization located in the USA (47.19%) or the UK (17.97%). Only five (5.62%) were listed as currently working within an organization located in the Global South at the time of this research.

These findings provide further support to claims in the literature that evidence-based development emphasizes certain types of knowledge. Specifically, these findings support the argument that, in the case of international education development, those that count the most tend to be recognized experts with advanced degrees (primarily from the discipline of economics), and affiliated with prestigious universities and powerful multilateral organizations located in the Global North. However, while this analysis provides empirical insight into the North/South dynamic of knowledge production and mediation in this field, it provides only a partial picture.

Bibliometric work supports the analysis of geographical affiliations based on the corresponding address or location of their current organizational affiliation. In addition, this analysis has used publicly accessible data to add further insight into the geographical affiliations of the top 89 authors, based on where these authors received their most recent academic degree. However, it is important to acknowledge these geographically affiliations are not necessarily a reflection of the authors' place of birth or nationality. Many scholars from the Global South received their education at an institution is the Global North, and/or work with development organizations based in the Global North. Thus, while the one-dimensional transfer of knowledge from the North to the South has consistently been pointed to as a critical flaw in the development process (Evers et al., 2009), the lines between North and South can be quite blurry. Further investigation is needed in order to better understand the relationship between geographical affiliation and knowledge production in order to provide a more complete map of the increasingly complex and intersecting field of evidence-based development in the education sector.

However, while bibliometric research does not provide the complete picture as to the North/South power dynamics of evidence-based education development, it does clearly demonstrate that not all of the knowledge actors engaged in this field are equivalent. While all authors included in the analysis reported here are frequently referenced, some have more influence over the overall structure of the knowledge network than others. The following section uses network analysis to consider which individual and organizational actors have influence, and to identifies points of leverage which can be used to open space to change the architecture of this network so that is better supports progress towards evidence-based development as a global public good in the education sector.

5. Knowledge networks

As Derek de Solla Price noted in 1963, academic literature forms a vast network (de Solla Price, 1963). However, bibliometric scholars generally ignored this network property until graph theory emerged as a theoretical basis for network analysis in the 1980s (Leydesdorff, 2014). Thanks to the addition of network analysis to the bibliometric

analytical tool belt, we are now able to make explicit some of the underlying relationships that enable and define the production and mediation of development knowledge in the education sector.

The most common approach to network analysis uses graph theory to examine the underlying patterns of connections between actors. Network maps, known as sociograms, are used to visualize the relationships in networks (Ward et al., 2014). The network analysis employed in this study focuses on the relationships between the top 89 individual authors, their co-authors, and publishers as referenced in the EFA GMRs. In light of this, this study utilized a two-mode network approach where both individual knowledge actors (authors) and organizational knowledge actors (in the case of this paper − publishers) were included as distinct entities, or 'nodes' in the study (Borgatti and Everett, 1997; Carolan, 2014), while the references themselves act as the 'edges' or linkages between the authors and publishers.

In the sociogram below (Fig. 1), circular nodes represent authors, while square nodes represent publishers. Publishers have been colour coded according to organizational type (see Table 1). An 'edge' (or line) between a circle and a square node represents the reference that connects an author to a publisher. Due to the high volume of publications referenced for certain authors, edges have not been weighted to reflect the number of times each author has published

with a particular publisher. The most frequently referenced publishers are labeled in all sociograms presented in this paper. Almost all knowledge actors (both individuals and organizations) are joined together in the main component, or largest group of interconnected nodes within the network. Only five nodes, four individuals and one academic publisher, remain disconnected from the main component.

The fact that almost all of the 89 authors included in this knowledge network are interconnected in the main component of this knowledge network is a significant finding. This demonstrates that there is a distinct group of, "elite, mutually interacting, and productive scientists from geographically distant affiliates who exchange information to monitor progress" (Zuccala, 2006, p. 152) in the field of international education development. Although this 'invisible college' (de Solla Price, 1963), has been identified by measuring formal research communications, previous studies demonstrate that invisible colleges also tend to share knowledge through informal patterns of interpersonal communication among researchers (Zuccala, 2006). Unfortunately, while bibliometric analysis is essential in helping us to make invisible colleges visible, bibliometric methods alone are not capable of providing deeper insight into "the social institutions of science" (de Solla Price, 1986, p. 56). However, bibliometric research does provide direction as to which individual and organizational actors are engaged in an invisible college, and through the use of citation network analysis. it is possible to identify those influential actors which are central to the management and promotion of the collegial habits and collaborative interactions which shape the intellectual structure of the field (Zuccala, 2006).

In Fig. 1, all nodes have been sized based on their eigenvector centrality − a measure of influence within a network − with larger nodes representing higher eigenvector scores. Eigenvector centrality assigns a score to each actor within the network to describe their influence within the entire network (Ward et al., 2014). A high eigenvector score is awarded not to those who have the most ties, but rather to those who are connected to others that have a lot of ties within the network (Borgatti et al., 2013). In the case of the EFA GMRs, a high eigenvector score is awarded to those authors who have published with organizations that have been not only been frequently referenced within the EFA GMRs, but have also published with a diverse group of authors. This is demonstrated in Table 2, which includes both those individual authors who have been referenced 20 or more times within the EFA GMRs (shaded in grey), as well other elite individual authors that received an eigenvector score greater than 0.1.

As Table 2 illustrates, the overall influence of an individual author within the EFA GMR knowledge network is, according to eigenvector centrality, more dependant on which organizations you publish with,

Table 2
Eigenvector Centrality Scores for Top Authors Referenced in the EFR GMRs.

Author	# of References	Eigenvector
Hanushek, E A	39	0.241
Wößmann, L	24	0.206
Bennell, P	25	0.194
Al-Samarrai, S	15	0.190
Aslam, M	13	0.181
Lloyd, Cynthia B	18	0.176
Myers, R G	14	0.165
Oxenham, J	20	0.163
Benavot, A	20	0.16
Carr-Hill, R A	17	0.158
Rose, P	32	0.156
Kremer, M	42	0.154
Kingdon, G	28	0.151
Bray, M	13	0.150
Jukes, Matthew C H	14	0.144
Banerji, R	13	0.138
Behrman, J R	30	0.136
Fredriksen, B	10	0.126
Lewin, K M	26	0.126
Leach, F	12	0.125
Linden, Leigh L	14	0.125
Crouch, L	12	0.123
Bundy, D A	14	0.122
Duflo, E	25	0.121
Bhalotra, S	11	0.120
Abadzi, H	13	0.119
Muralidharan, K	13	0.115
Michaelowa, K	20	0.114
Vegas, E	13	0.113
Akyeampong, A K	26	0.108
Mingat, A	21	0.106
Banerjee, A V	12	0.103
Chudgar, A	10	0.103
Das, J	13	0.103
Little, A W	10	0.101
Patrinos, H A	23	0.080
Schady, N	22	0.077
Martin, Michael O	21	0
Mullis, I V S	21	0

rather than how much you are referenced. For example, while M.O. Martin and I.V.S. Mullis have both been referenced 21 times within the EFA GMRs, all of those references list the same publisher − specifically the TIMSS & PIRLS IEA International Study Center at Boston College − resulting in an eigenvector score of zero. These two authors (along with their two co-authors and publisher) can be seen in Fig. 1 as the small disconnected component in the top right corner. As they are disconnected from the main component they have no influence over the overall structure of this knowledge network, and if they were removed it would have zero impact on any other actors within this network.

S. Al-Samarrai, on the other hand, was referenced 15 times within the EFA GMRs but received an eigenvector score of 0.190; the fourth highest of all 89 elite authors. This is due to the

fact that Al-Samarrai is connected to nine different publishers, including the World Bank, EFA GMR, and the UK − three of the most frequently referenced publishers within the data set. Authors with the highest eigenvector scores, like Al-Samarrai, are located centrally in the main component. Generally, these actors are situated between three key multilateral organizations, the three nodes in this network with the highest eigenvector scores overall; the World Bank (0.579), UNESCO (0.218), and EFA GMR (0.516). In addition to having the highest eigenvector centrality in this particular network, these three organizational actors were also the most frequently referenced organizations

listed within the EFA GMRs, with the World Bank listed as publisher for 825 references, UNESCO for 709, and the EFA GMR for 653.

While the World Bank has long established its position as a leading producer of development knowledge and expertise (King and McGrath, 2004; Kramarz and Momani, 2013; Stone, 2013); the international community has questioned UNESCO's ability to provide rigorous, reliable technical advice (Burnett, 2011). However, despite these critiques, these findings suggest, that UNESCO is a central actor when it comes to knowledge production related to the international development of education, particularly when you take into consideration the numerous publications being produced by the EFA GMR (now Global Education Monitoring Report). While these organizations, particularly the World Bank, have been critiqued as using evidence-based development as a tool of paradigm maintenance, it is worthwhile to note that the vast majority of their publications are freely and available and publicly accessible online. Thus, while this analysis provides further support for arguments related to the types of knowledge favored in evidence-based development in the education sector, it also recognizes the efforts of these organizations to move towards evidence-based development as a global public good by making the knowledge they produce widely accessible. The high eigenvector scores awarded to these organization in this network suggests that the World Bank and UNESCO are the most ideal organizations to leverage in order to push evidence-based development in the education sector close to the ideal of a global public good, as they are tied to many influential individual actors within the network. However, a closer examination of this elite knowledge network reveals that, despite their centrality in the network, these organizations are actually not the most influential when it comes to the overall structure of the network.

As the sociogram in Fig. 2 makes clear, the removal of the World Bank, UNESCO, and the EFA GMRs from this knowledge network has very little impact on the overall structure of the network. Once these central actors are removed, the main component of this elite knowledge network remains intact, losing only five nodes including four individual authors, and one academic publisher. However, when these publishers are removed, we are able to see the significant role played by academic and academic-type publishers in holding this network together. This is due to the fact that all 89 elite authors have published with academic publishers (shown here in red). In fact, 154 (65%) of the 236 unique publishers listed in the references for these top 89 authors were classified as Research Institutes, Universities, and Academic Journals; including 98 Academic Journals (42% of all publishers associated with the top 89 authors).

This finding has several implications. Firstly, it provides evidence that critiques against the quality of evidence put forth by these multilateral organizations to support their decision making (Banerjee et al., 2006; Broad, 2006; Burnett, 2010; Wilks, 2004), critiques which are often supported by noting the self-citation rates of these organizations, are perhaps misguided. While the EFA GMRs certainly cite a significant amount of work published

by the organization (in particular, the hundreds of background reports which have been commissioned by the EFA GMRs over the years), this research demonstrates that these publications are being produced by well-respected scholars, who, in addition to publishing their work through organizations such as the EFA GMRs, UNESCO, and the World Bank, also publish through traditional academic forums. It seems unreasonable to argue that the work published by these authors though multilateral publishers – publications which are far more accessible, and in turn, far more open to critique – would be of lower quality than the work published by these same authors through peer-reviewed journals.

In a similar vein, while the findings reported here certainly support the argument that the World Bank, the EFA GMRs, and UNESCO have a central role to play in transforming evidence-based development into a global public good, so does academia. In order for evidence-based development to serve as a global public good, the evidence itself must be accessible to the public. Unfortunately, the current academic tenure and promotion system tends to reward those scholars able to publish in peer-reviewed journals with high journal impact rankings – journals which tend to be published in the Global North (particularly in the USA and UK), in the English language, and locked behind paywalls. For the average academic struggling to meet the requirements for tenure and promotion, it is difficult to ignore the rewards that come with publishing in top-tier journals. And for those that do want to 'be the change they wish to see in the world' when it comes to academic publishing, with (as of 2014) over 28,100 active scholarly peer-reviewed English-language journals and 6450 non-English-language journals (Ware and Mabe, 2015, p. 6) to choose from, it is difficult to determine what publishing route will have the most impact.

While calls for an 'Academic Spring' (The Economist, 2012) have pushed forward open access publishing (Anyangwe, 2012), some feel the open access movement will, "radically change the basic way in way academics communicate with each other" (Campbell, 2013, para. 7), and argue that open access could result in, "dire 'unintended consequences' for creativity and freedom" for academia (Boffey, 2013). Since open access publications do not charge the reader, they often require authors to pay to be published to cover their costs. Therefore, as academia moves towards open access, the cost of production falls on universities, giving university administrators greater control over what is ultimately published (ibid), and making it even more difficult for scholars in the Global South to access these forums to disseminate their research.

Although academics often critique the role of multilateral organizations in evidence-based development, these organizations may well be an ideal partner for helping academia gain ground towards the ideal of evidence-based development as a global public good. It is far easier for a large, well-resourced multilateral organizations to have a significant impact in making emipirically-based knowledge more accessible to all. For this reason it is the United Nations led initiatives, such as the World Health Organization's Hinari, the Food and Agriculture Organization's Agora, The UN Environmental Programme's Online Access to Research in the Environment (OARE), and the World Intellectual Property Organization's Access to Research for Development and Innovation (ARDI), which have made the greatest strides in opening access to subscription journals to researchers, policymakers and practitioners in the Global South. The findings of this research suggest that the World Bank and UNESCO would make ideal partners for developing a similar initiative in the education sector.

While organizational actors have an important role in shaping the overall structure of the knowledge network underpinning evidence-based international education development, individual actors also have a significant role to play. The network analysis completed on the top 89 authors identified in this study serves to demonstrate this fact. As noted previously, when the three most central organizational actors (specifically the World Bank, UNESCO, and the EFA GMR) were removed from the network, the main component of the network remained intact. Fig. 3 shows the network of top 89 authors with the top three authors based on the frequency referenced (E. Hanushek, M. Kremer, and P. Rose) removed from the network, juxtaposed against the same network with the three individual authors with the highest eigenvector scores removed (E. Hanushek, L. Wößmann, and P. Bennell). In the case where the top three by frequency referenced are removed, the main component of the network remains relatively intact, losing only 13 additional nodes; all of which are organizational actors. On the other hand, when the three individuals with the highest eigenvector score are removed, 51 additional nodes become disconnected from the main component of the network, including seven individuals and 44 organizational actors.

This finding demonstrates that influence in a knowledge network is not solely an issue of how many times an individual or organization is referenced, but rather is dependent on the diversity of organizations and co-authors an individual works with. Individual actors have the potential to grow and shape the EFA GMR knowledge network, and

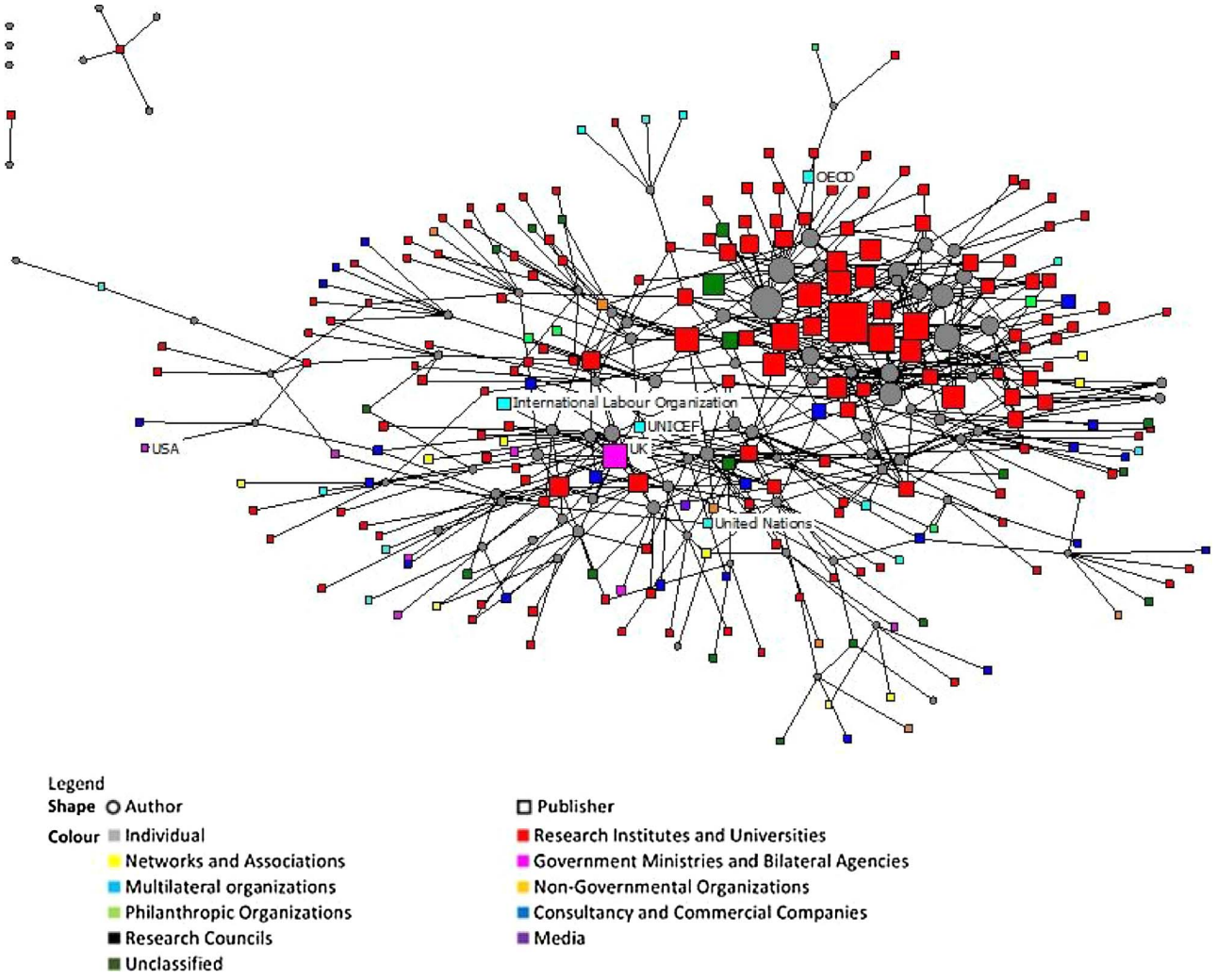

Fig. 2. Top 89 Individual Actors' Knowledge Network With Top 3 Publishers Removed.

could push this network closer to the ideal of knowledge as a global public good by choosing to publish with more and more types of publishers – particularly those that support open access to knowledge. Similarly, by co-authoring with a diverse range of collaborators, individual authors have the potential to bring new players into the network, opening up a new range of potential connections and the opportunity to change the shape of the intellectual structure underpinning the global education agenda.

When it comes down to it, development work is done by individual people working with/through organizations. In the case of the EFA GMRs, just 6239 individuals and 1642 organizational actors were involved in producing the knowledge base referenced within these reports for the purpose of to push the EFA agenda forward. These people/organizations are generally not elected officials charged with representing their constituents, but rather academics, researchers, policymakers and practitioners all using empirical evidence in a collaborative effort to finally achieve education for all – each for their own reasons. Thus, this study reminds us that while it is useful to continue to monitor and evaluate key organizational actors engaged in the production and dissemination of knowledge in the field (i.e. the World Bank, UNESCO, and the EFA GMRs), it is also important that all researchers and technical experts in the field continue to look inward and critically examine and evaluate our own role in shaping the terrain of evidence-based development. If we are to critique others for serving as a tool of paradigm maintenance, then we must work harder to ensure our own work is not perpetuating these same outdated models of development which reinforce the asymmetrical power relations between the Global North and South. Academics must work harder to ensure those from the Global South are better represented in the main components of the knowledge networks informing the EFA agenda; not just as sources of data, but as equal partners in the context of research production and mediation.

6. Conclusion

There are conflicting claims on the nature of evidence-based development, with some arguing that evidence-based development serves as a tool of paradigm maintenance which reinforces and perpetuates the asymmetrical relationship between the Global North and Global South, while others argue that evidence-based development serves as a global public good which is open and accessible to all. Despite the significant implications of this controversy, there is a lack of empirical evidence to either support or refute these claims.

Through the use of bibliometric methods, this study contributes a baseline description of the knowledge production and mediation landscape of evidence-based development in the education sector. Furthermore, through the application of network analysis, this study identifies the most central individual and organizational knowledge actors, and points to key actors which have significant influence over the structure of the knowledge network which serves to inform and shape the global education agenda. However, while the study reported here addresses some critical questions regarding the types of key

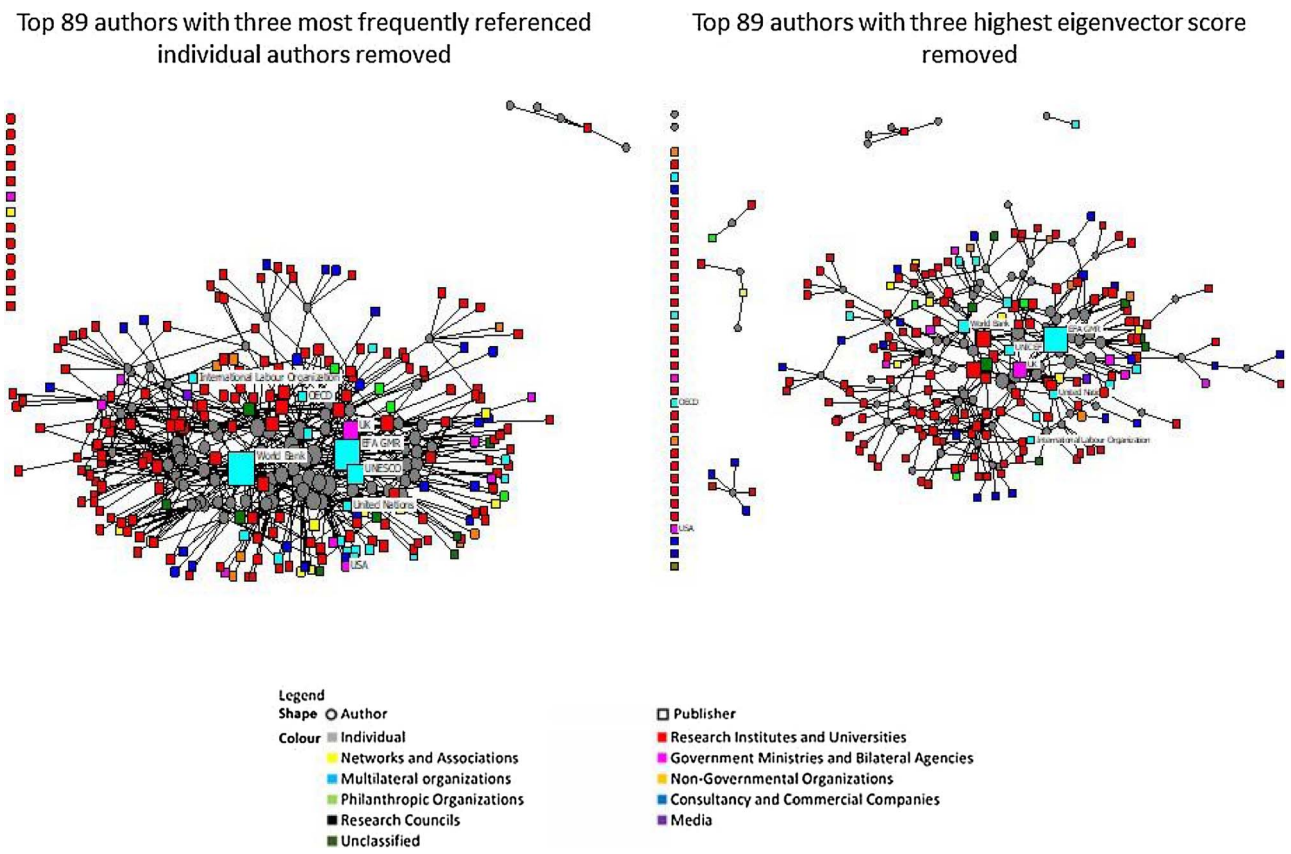

Fig. 3. Exploring influence based on frequency referenced vs. eigenvector centrality.

individual and collective actors engaged in knowledge production in international education development and provides a sense of the underlying mechanisms at play, many questions still need to be answered before we will truly understand whose knowledge counts and why.

While bibliometric techniques and network analysis provide the means necessary to map the landscape of evidence-based international education development, they only provide a partial picture. These methods do not provide any insight as to how the EFA GMR teams became aware of the evidence referenced within the reports, or why they chose to reference these particular pieces of evidence. A qualitative examination which seeks to better understand what factors, including policies and practices of the EFA GMR teams, will help us better understand and explain the findings from the bibliometric analysis reported on here.

Additionally, there are other global agoras in this field which could also provide useful insight into the intellectual architecture which helps to shape the global education agenda. In order to develop a more complete picture of how knowledge is mobilized to support the international development of education, it is necessary to explore these other sites, such as the various World Education Forums and the many stakeholder consultations and meetings, where knowledge is shared. The application of network analysis on these forums will help us identify additional leverage points which can be used to help change the structure of the knowledge network supporting the field of international education development in order to move closer to the ideal of evidence-based development as a global public good.

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