



VOSViewer

A Network Mapping Tool
for Analyzing Topics with a
Substantive Knowledge Base

Researchers, practitioners, and policy makers need to be able to identify what works in order to implement evidence-based services to improve outcomes. There is a need for both people and tools that can specialize in summarizing the current research landscape on a particular question of interest. Abt Associates is expert at blending subject matter expertise and modern analytic tools to scan and summarize relevant literature. Our staff process large amounts of information—a task that would be difficult and time-consuming, if not impossible, on many topics with a substantive body of literature (hundreds or thousands of publications). We combine our expertise with state-of-the-art tools to provide for a more empirically based assessment of the literature, as compared with more traditional literature reviews, and can often be a useful first step toward gaining a comprehensive overview of a knowledge base.

One of our preferred tools is **VOSviewer** (<https://www.vosviewer.com/>) which has been successfully used in various research projects, including maps of co-citation patterns in literature related to university-industry cooperation (Mascarenhas et al., 2018) and inequalities in health research (Cash-Gibson et al., 2018), among other applications.

Our experts develop network maps of literature. These network maps can be structured around individual authors or researchers, institutions (e.g., research organizations or universities), journals, or individual publications (e.g., articles). The maps can be based on patterns in co-authorship, citations, or bibliometric information. In addition to developing maps, combined with expert insights and review of key documents uncovered in these maps, we provide thematic analyses of keywords and themes in a body of literature.



Benefits of Using VOSviewer

Abt prefers to blend VOSviewer with other tools, such as Python, which is increasingly popular tool for rapid insights and comes with additional advantages such as:

- **Identifying patterns and themes across publications.** What are the major themes in a body of literature? How are these connected? How have they developed over time? What is the direction of a field of study?
- **Describing the extent to which, and how, communities of scholars and research institutions are interconnected.** Who produces the current knowledge base on a topic? How are these individuals or groups of individuals connected? Who is more/less connected?
- **Revealing gaps that need to be filled in the literature base.** What advances and developments in the knowledge base are needed? What should future research focus on?

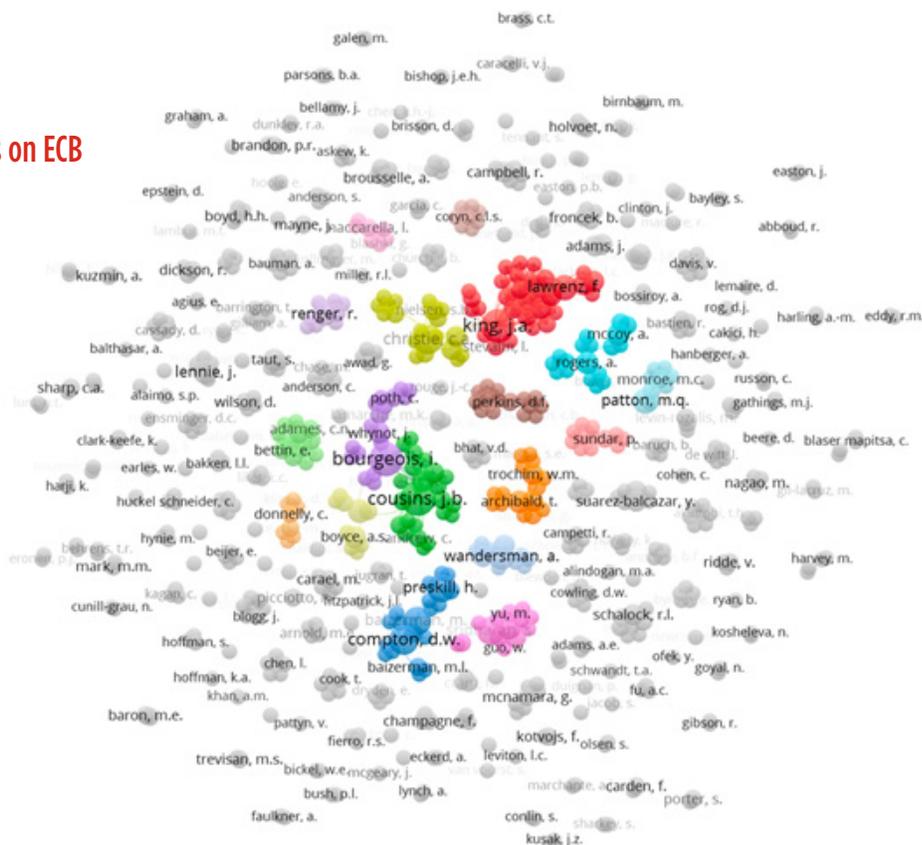
We also understand the importance of visual-based processes and will showcase how we synthesize the literature with an example in the next section.

A Real-World Application

The following provides illustrative examples of the types of maps and visuals that can be produced by our team. The maps are based on 395 peer-reviewed articles identified as part of a comprehensive review of literature on Evaluation Capacity Building (ECB). The primary aim of the review was to identify and describe the communities of evaluation scholars contributing to the literature on ECB.

The map in **Exhibit 1** is based on co-authorship patterns across the ECB literature. Each author is indicated by a circle and labeled according to the last name of the author. The size of the circle and label reflects the relative importance of an author in the network, as indicated by the number of co-authorship connections with other authors in the network. The map also uses color codes to indicate the most dominant clusters of authors. In this way, the map provides a useful overview of the different communities of scholars publishing on ECB. Authors included in gray have published on the topic of ECB, but without co-authorship connections to the main communities.

Exhibit 1.
High-level map of
communities of scholars on ECB



Static visuals are (in general) a poor way to explore these maps which are meant to be viewed in a dynamic fashion. We prefer tools that have zoom function that allows the user to produce more-fine-grained maps. Another static example is provided in **Exhibit 2**. The map shows the key authors and how these are connected within and across communities. The distance between two authors in the network approximately indicates the connectedness of the authors in terms of co-authorship connections. In general, the closer two authors are located to each other, the stronger their connectedness. The co-authorship connections between authors are represented by lines. Here we see two communities of investigator teams centered on two researchers with very few cross collaborations between these two groups; our team would take these results and partition out ideas across these teams to determine if there were consensus among non-collaborating researchers or if their conclusions diverged in ways that were important to policy creation or describing the state of the literature. These maps alone are only a representation of author connectedness, they do not tell us the state of the evidence at the moment, but they can give us insights into whether there is growing consensus and what issues may still linger in evidence-based fact-finding.

Exhibit 2.
Fine-grained map of authors within and across communities

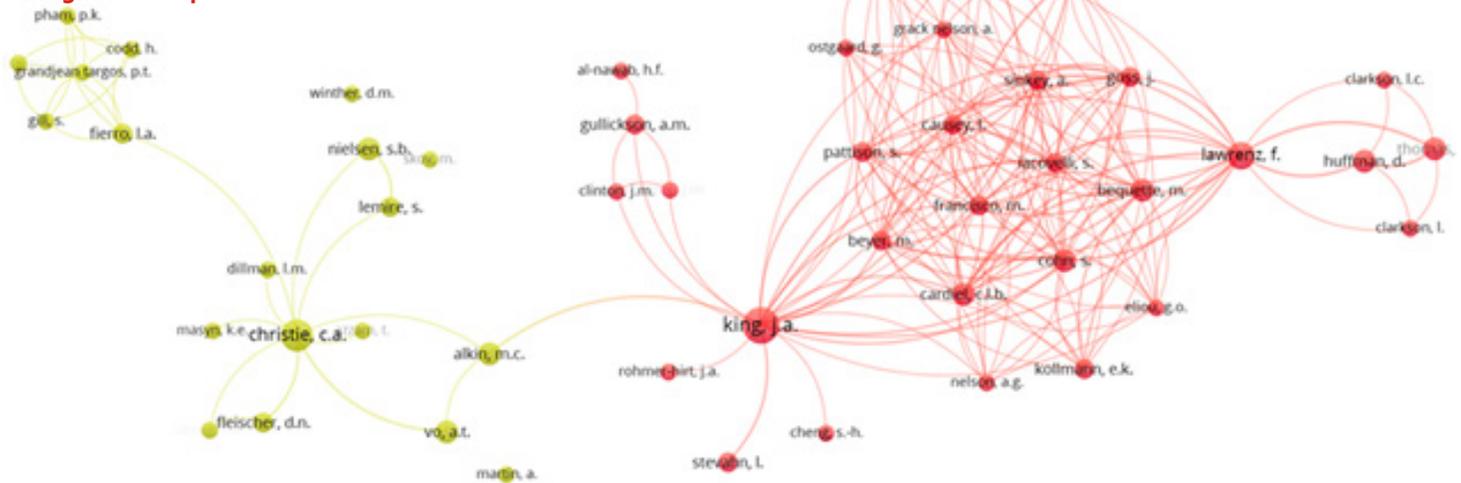
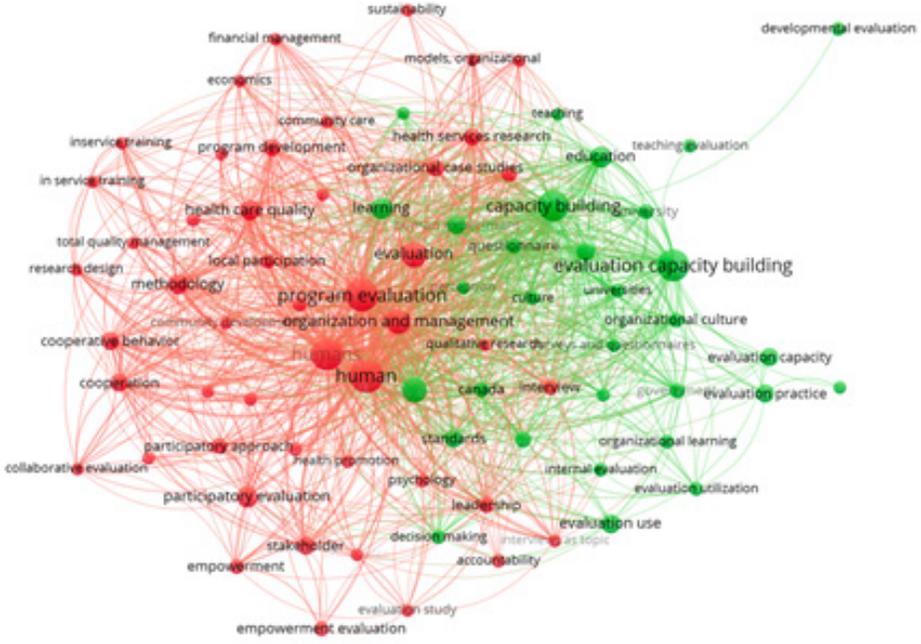


Exhibit 3. Map of keywords in ECB literature

Our team digs deeper into the data and identify keywords and themes in a body of literature.

Exhibit 3 provides a word map based on co-occurrence of keywords in the ECB literature. In this map, keywords co-occurring with a broad range of keywords are situated at the center of the map. The font size of the keyword reflects the number of co-occurrences. The map uses color-coding to indicate clusters of related keywords. The zoom function facilitates more-detailed examination of the keyword co-occurrence patterns in the map.



From here we see that the teams previously shaded in red and green have some similar language use in their writings but we can see some distinct differences as one team tends to use language related to organizations and the other tends to look at individual factors such as participation. That language use provides perspective regarding a research team’s focal point and allows us to see how different groups approach the same problem from various angles.

Conclusions

Large scale synthesis and systematic review of active research can be very challenging. Traditional methods require experts to read and condense many articles and contextualize insights without having useful tools to deliver such results at speed and scale. Abt uses 21st century digital and analytic tools, along with subject matter insights, to determine where the current literature is at, who is saying what, how interconnected those voices are, and whether there is consensus via common language. These tools are critical to providing actionable insights and data driven decision making. Future opportunities with VOSviewer should include a focus on mapping the literature, authorship, institutions, and connections as they relate to race and equity. Particularly in fields such as child welfare, this may illuminate where support for new research and researchers may be targeted to advance the goal of bringing new voices and perspectives into the field's literature and evidence base.



References

- Mascarenhas, C., Ferreira, J.J., & Marques, C. (2018). University-industry cooperation: A systematic literature review and research agenda. *Science and Public Policy*, 45(5), p. 708-718.
- Cash-Gibson, L., Rojas-Gualdrón, D. F., Pericàs, J. M., & Benach, J. (2018). Inequalities in global health inequalities research: A 50-year bibliometric analysis (1966-2015). *PLOS ONE*, 13(1), e0191901.



**BOLD
THINKERS
DRIVING
REAL-WORLD
IMPACT**

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Pursuing Equity. Looking for the Intersections. Driving Real-World Impact.

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