



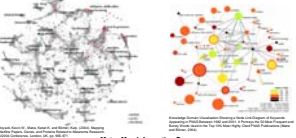
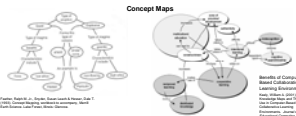
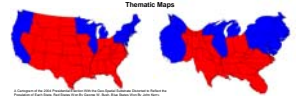
Educational Knowledge Domain Visualizations

Tools to Navigate, Understand, and Internalize the structure of Scholarly Knowledge and Expertise

Hook, Peter A. and Börner, Katy. (in press) Educational Knowledge Domain Visualizations: Tools to Navigate, Understand, and Internalize the Structure of Scholarly Knowledge and Expertise. In Amanda Stone and Charles Cole (eds.), *New Directions in Cognitive Information Retrieval*. Springer-Verlag.

Four Kinds of Maps

Map Type	Advantage of using it	Regional or Global	Labelled	Complexity	Flexibility
Thematic Map	Visualizes spatial patterns	Regional	Yes	Low	High
Concept Map	Shows relationships between concepts	Global	Yes	High	Low
KDV	Integrates spatial and conceptual information	Regional	Yes	High	High
Metro Map	Shows complex relationships in a structured way	Global	Yes	High	High



Educational Benefits of KDV's

"[L]earning best begins with a big picture, a schema, a holistic cognitive structure." [Hook, C. K., Farmer, J. A., and Borner, P. A. (1999). *Intentional Design: Implications from Cognitive Science*. Englewood Cliffs, New Jersey: Prentice Hall.

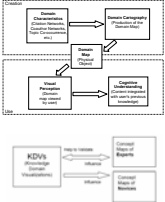
Knowledge Domain Visualizations (KDV's) are a way to provide this Big Picture conceptual overview.

Knowledge domain visualizations are the graphic rendering of bibliometric data designed to provide a global view of a particular domain, the structural details of a domain, the salient characteristics of a domain (its dynamics, most cited authors or papers, bursting concepts, etc.) or all three.

Benefits of Big Picture Visualizations

1. They provide a structure or scaffolding that students may use to organize the details of a particular subject.
2. They allow a student to internalize the framework presented in the visualization and reconcile it with his or her existing framework.
3. They make explicit the connections between conceptual subparts and how they are related to the whole.
4. They help to signal to the student which concepts are most important for them to learn.
5. They take advantage of the dual coding theory of memory: Concepts trigger recall of spatial locations and spatial locations trigger recall of concepts.

Process of KDV Creation and Usage



Six Phases in the Use, Adoption, and Implementation of KDV's

Pre-Bibliometric History - Domain Maps

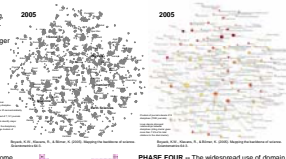
utilizing the distance-similarity metaphor for non-spatial data are created by hand based on the viewpoint and experience of the creator.



PHASE ONE - Bibliometricians realized that they could use bibliographic databases and techniques such as author co-occurrence to provide maps of a particular discipline.



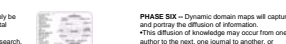
PHASE TWO - The implementation of automated techniques for data harvesting, processing, and information visualization.



PHASE THREE - Domain maps will become widely known outside of Information Science.



PHASE FOUR - The widespread use of domain maps will lead to steps to harmonize and better organize the scholarly data from which they are created.



PHASE FIVE - Domain maps will routinely be used as one of the access options to digital libraries and (DPLA's).



PHASE SIX - Dynamic domain maps will capture and portray the diffusion of information.

