

Note: this presentation will be updated periodically before the April 2011 presentation

Symposium Proposal for the TICL SIG (Draft version; July 12, 2010)

Title: Knowledge Maps as Tools for Representation of Higher-Order Cognitions – Applications, Methods, Potentials and Limitations from an International Perspective

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Presentation F Title: Measures of group knowledge structure convergence in an online collaborative learning environment

Summary F: Current advances in the automation of knowledge structure assessment allow and necessitate new measures to describe this kind of knowledge. The very terms ‘knowledge structure’ and ‘knowledge map’ connote visualization and bring to mind unfamiliar visual concepts such as conformation, congruence, and convergence. *Purpose:* This presentation describes a partially automated method for measuring knowledge convergence in collaborative online learning using ALA-Reader software to derive group knowledge representations. In particular, based on a graph theory and *network analysis perspective* (see: <http://en.wikipedia.org/wiki/Centrality>), we propose a measure of knowledge structure, degree centrality of a graph, that is a fairly easy to calculate quantitative measure of knowledge structure that ranges from $0 \rightarrow 1$, with 0 representing a ‘linear’ layout and 1 representing a ‘star’ layout (see Figure 1). We will show how to calculate this value during the presentation.

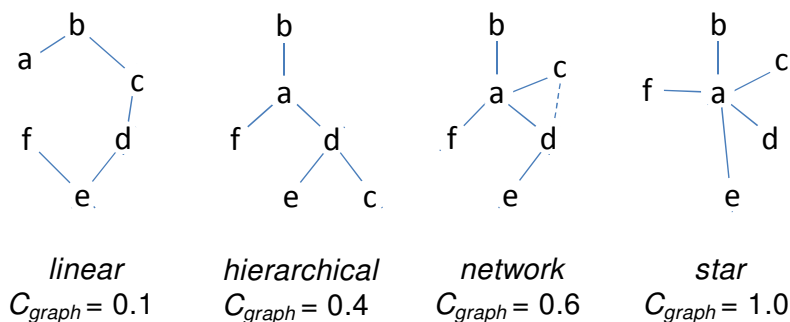


Figure 1. Measures of degree centrality of a graph for several network structures.

Method and Data sources: In a recent dissertation (Draper, 2010), auto sales industry service representatives (N = 121) in an online course over several months worked either alone on a self-paced

module (SP) or on the self-paced module plus participation in an online community of practice (CoP). All participants completed a case-based essay as part of the course final assessment. The essays were quantified into PFNET knowledge maps (i.e., pathfinder network graphs) using ALA-Reader software and then individual data were combined into four group PFNET representations, CoP_{even} , CoP_{odd} , SP_{even} , and SP_{odd} groups. These four group PFNETs were analyzed using a Pathfinder network analysis approach. Results showed that the two CoP group PFNETs were more similar to each other than were the two SP group PFNETs (CoP 66% group overlap vs. 33% group overlap for SP), also the two CoP PFNETs 'looked' more alike. Graph centrality (a quantitative measure of look alikeness) show that the two CoP group PFNETS had a larger centrality ($CoP_{even} C = 0.446$ and $CoP_{odd} C = 0.446$, more star like) compared to the SP groups ($SP_{even} C = 0.249$ and $SP_{odd} C = 0.251$; more linear). In this investigation, these results show that the knowledge structure of the participants in the collaborative online community of practice converged. *Significance of the study:* These findings provide support for using this easy to calculate and understand measure of visual structure method for measuring convergence of knowledge structure representations in other collaborative settings that can be applied not just to essays but to concept maps and other graphical approaches for eliciting knowledge structure.

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