Increasing the reference-making capacity of SNA metrics: Incorporation of logistic regression modeling and other innovative methods

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Suggested citation:

Lo, C. O., Alkhalaf, A., Jang, K., & Mathison, S. (2011, November). *Increasing the reference-making capacity of SNA metrics: Incorporation of logistic regression modeling and other innovative methods*. Poster session presented at the annual conference of American Evaluation Association, Anaheim, CA.

Abstract:

In program evaluation, it is critical to understand and be able to describe the complex structure of a system and/or an organization that is being evaluated. SNA has been found to be an effective tool for such purposes; it is a methodology that acquires the structure of an organization beyond the linear presentation of program components as often seen in logic modeling (Durland & Fredricks, 2005). Using SNA, it is possible to capture the nature and dynamics of relationships among program stakeholders (Kochan & Teddlie, 2005), and this reflects the reality of what is actually happening within a program versus what ought to be happening. Also, with a help of sophisticated technologies, the captured dynamics of relationships can be visualized as diagrams.

However, applying social network analysis (SNA) in program evaluation often involves the challenges of explaining the meanings of SNA metrics (e.g., betweenness, closeness, degree) to clients and, further, finding ways for meaningful application of these results in program monitoring and enhancement. The evaluative subject, Working on Walls (WOW), is a professional development program for graduate and post-graduate students in the field of plant biology at the University of British Columbia (UBC). The program aims to extend the students' employability upon graduation through increasing their networks with other students and mentors. Group mentoring and a form of lab placement are being implemented in order to

encourage the formulation of networks. Social network analysis (SNA) has been used to visualize and analyze these networks. This presentation introduces six visually enhanced and creative ways to analyze and present SNA data more in depth in a hope to increase the usefulness and effectiveness of SNA in evaluation contexts. These various ways include: intuitive visualization, group cohesion indices, E-I index, matrix correlations (and the t-tests thereof), regressions (UCINET default), and logistic regressions. The ultimate purpose of these demonstrations is to enhance our clients' understanding of the nature of their social network.

The preliminary findings from the t-test suggested that interactions facilitated by co-supervision and lab-placement did help the development of a denser network. Moreover, a logistic regression was used to elucidate the factors underlying the existence/non-existence of a tie or relationship between actors who were part of the program. A total number of 171 relationships among 19 actors were treated as the dichotomous dependent variable. The preliminary independent variables included: linguistic closeness, years of employment, existence of a mediator, power hierarchy, collegiality, and gender. The statistical results suggested that power hierarchy, collegiality, and co-supervision/lab-placement are significantly important predictors (all ps < .001). Using a formulation included these three predictors, the correct prediction rate of the existence of a tie was boosted from 61% to 89%.

In all, these results contribute to understanding why and how networks develop among colleagues and/or mentors and mentees. It is our hope that this presentation will not only expand the evaluative repertoire for program evaluators by inspiring them to incorporate other statistical analyses with SNA, but also provide an example study whereby they can conduct SNA studies with more inference-making capacity.

References

Durland, M. M., & Fredricks, K. A. (2005). An introduction to social network analysis. *New Directions for Evaluation, 107*, 5-13.

Kochan, S., & Teddlie, C. (2005). An evaluation of communication among high school faculty using network analysis. *New Directions for Evaluations*, *107*, 41-53