

Network Analysis of interactivity In online Communities

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Abstract

The purpose of this research is to demonstrate quantitative assessment methods for the quality of interactions in online Communities. We apply three theoretical tools: Social Network Analysis (SNA), Content Analysis and the Social Interdependence of Cooperative Learning Theory to online communities to provide meaningful, quantitative insights into the social dynamics of the communities which are related to the quality of the knowledge construction processes.

We hypothesize that certain social capital structures – in particular cohesion, bridging & triggering roles are related to the design of the communities on the one hand, and to the quality of the knowledge construction on the other hand. To test this hypothesis we analyze various CSCL communities. We test the following assertion: *marked differences in designs of communities is associated with marked distinction in the cohesion and role structures of the communities, which is associated with marked distinction in the levels of constructing shared knowledge.* To test this assertion we analyze Computer Supported Cooperative Learning communities, with various design structures.

We employ Social Network Analysis to the responsiveness relations that developed between the members of the community to gain insight into the buildup of social capital structures. Specifically, we search for *cohesion* and *roles* structures. Cohesion is identified by clique analysis, where a clique is a maximal connected sub-community. Roles are found by role-equivalence algorithm. This algorithm first embeds all members of the community in a certain 36-dimensional role space defined by the distribution of triads in the community network; it then group members of the community into role-

groups by cluster analysis. We provide quantitative means to assess the clique and role structures as well as their development in time.

Content Analysis of the communication transcript is used to assess the quality of the knowledge construction process that is developed in the communities. A five-level knowledge construction process is the basis for this analysis. Communication messages are categorized into these levels, providing insight into the levels of critical thinking reached by the members of the community.

The design of the communities is assessed by the Social Interdependence of Cooperative Learning Theory. The social interdependence parameters that were designed (or not designed) into the operation of the communities are evaluated. This analysis categorizes the communities according to their interdependence-structure level.

Our analysis provides empirical support for the assertion. Thus, Social Network Analysis revealed that highly structured communities developed rich structure of interlinked cliques. Furthermore, in these communities members implicitly undertook roles of *bridges* and *triggers*, without which the ongoing operation might have lead to split communities or gaps in the process of knowledge construction. These structures developed during the earlier stages of the life time of the communities. Content Analysis of the transcripts shows that these communities reached high levels of knowledge construction. On the other hand, less-structured communities did not developed social capital structures, usually reaching low levels of constructed knowledge.

The implication is that Social Network Analysis can be used as a research tool for gaining insight into the dynamics of online communities. Furthermore, if Social Network Analysis tools be embedded into software environment supporting the community it will provide community participants a real time monitoring device for the dynamics developed in the community.