Chapter 12

Observing the Evolution of a Learning Community Using Social Network Analysis

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ABSTRACT

During the last decades, social and computer scientists have been focusing their efforts to study the effectiveness of collaboration in both working and learning environments. The main contributions clearly identify the importance of interactivity as the determinant of positive performances in learning communities where the supportive dimension of exchanges is balanced by the interactive one. In this chapter, authors describe a method based on social network metrics to recognize the stages of development of learning communities. The authors found that the evolution of social network metrics - such as density, betweenness centrality, contribution index, core/periphery structure – matched the formal stages of community development, with a clear identification of the forming, norming, and storming phases.

INTRODUCTION

In this contribution we propose an empirical correlation between the stages of development of a learning community and a set of social network metrics. We applied Social Network Analysis (SNA), defined as set of methods and tools to dynamically assess the growth of value derived by social interactions. We used SNA metrics to observe a learning community built around a Master's Program launched by the e-Business Management Section of Scuola Superiore ISUFI, University of Salento, Italy. The program was designed to train talented young students to become "e-Business Solutions Engineers". The program adopted a project-based learning strategy that

required a constant interaction and collaboration between students and tutors, as well as between students and industrial/academic partners. Students were located partly on campus and partly at the partner companies' locations, interacting with their colleagues and tutors via email and via an institutional blog.

This community has the characteristics of a hybrid community in terms of *mode of communication*: its members use both asynchronous and synchronous channels. They also work on individual projects and, at the same time, on team activities sharing tasks and deliverables. The community acted as a team throughout its life, as students where involved every day in research activities in collaboration with internal tutors and external/industrial supervisors. The goal of this study is to observe how the structure of a learning community that is digitally connected changes over time starting from the simple observation of social network metrics. Because of the hybrid nature of the observed community, the literature background covers the main research findings in the area of communities of practice and team structure/development as well as of online learning communities.

After describing the literature background, we introduce the research setting and we present the findings of the data analysis based on email exchanges. Besides studying the level of interaction within and across the community, we monitored the community evolution looking at the level of *satisfaction*, *knowledge acquisition, and perception of individual growth*. In this contribution we use a Social Network approach to address the following research question: *How to detect the stages of development of a learning community based on the application of SNA metrics?*

Most of the traditional methods used to measure the evolution of communities have been criticized for their static nature. They have the limitations to be made ex-post, as they offer a photograph of the knowledge assets based on three dimensions (Bontis, 2001): human capital (know-how, capa-

bilities, skills); structural capital (organizational capabilities, patents, routines, databases); social capital (network of relationships inside and outside the organization). Despite the reference to the network of relationships, these strategic frameworks do not offer a dynamic perspective able to tell how a community is creating and sharing knowledge *over time*. There is a need to build a monitoring system in order to observe communities' evolution in a more dynamic way. The interdisciplinary field of Social Network Analysis represents a valuable contribution to reduce this gap. SNA has been defined as "*the disciplined inquiry into the patterning of relations among social actors, as well as the patterning of relationships among actors at different levels of analysis*" (Breiger, 2004, p. 506).

LITERATURE BACKGROUND

The literature background is focused on the areas of community structure, team dynamics, and online community development. The reason for this broad perspective is the hybrid role of many learning communities today, where students connect to each other with the goal of acquiring new knowledge, skills and competencies through their involvement in real projects. The members of these learning communities work in teams, collaborating with other students and reaching out to external actors. The case discussed in this chapter is an example of learning community working as an extended team. Their approach to learning is project-based as it focuses mostly on a *production model*: students start by defining end-product, identify their audience, research the topic, design the product, do the project management, solve the problems that arise and finish the product followed by a self-evaluation and critical reflection. As students work on projects, they interact through digital media such as email, forums, wiki and blogs. By doing so, these learning communities configure themselves as online communities.

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