Understanding emerging knowledge spillovers in small-group learning settings, a social network perspective

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There has been a rapid growth in the use of small groups in teaching and technology supported networked learning environments to engage students in active learning (Decuyper, Dochy, & Van den Bossche, 2010; Hurme, Palonen, & Järvelä, 2007; Lindblom-Ylänne, Pihlajamäki, & Kotkas, 2003; Michaelsen, Knight, & Fink, 2002). By implementing a team-based structure teachers aim to convert their classroom in a learning environment where students learn from and together with their fellow team members (Hernandez Nanclares, Rienties, & Van den Bossche, 2012; Hurme, et al., 2007; Katz, Lazer, Arrow, & Contractor, 2004; Lindblom-Ylänne, et al., 2003). Goodyear, Banks, Hodgson, and McConnell (2004) define networked learning as "learning in which information and communication technology is used to promote connections: between one learner and other learners, between learners and tutors; between a learning community and its learning resources" Networked learning and the introduction of teams as basic learning units in the classroom redefine the classroom as learning space; a space in which the different agents in the learning process – teachers, teams and students - are together. They are complementary in their goals, and can and are quite often combined. Literature has recently pointed out that in addition to engaging in internal learning activities, team or network learners must engage in external learning activities. That is, they should also learn from external experiences of the task (Bresman, 2010). This learning activity resembles the sharing model of cross-boundary spanning. The main premise of this understanding of boundary spanning activity is that knowledge is transferred, translated and transformed between (groups of) people working in different spheres of activities (Hsiao, Tsai, & Lee, 2011). Students should be engaged in these activities in order to increase their learning by incorporating the experiences and knowledge of other learners.

Figure 1 Illustration of knowledge spillovers
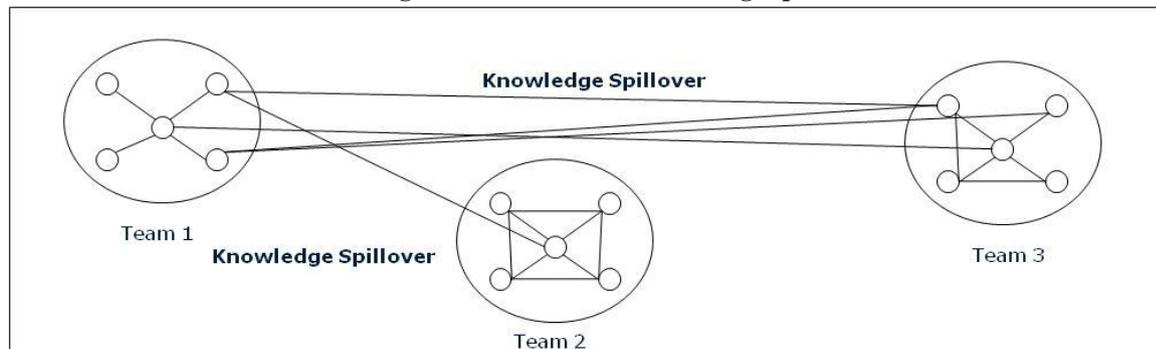
Source: Hernandez-Nanclares, Rienties, Van den Bossche (2012).

Hernandez-Nanclares et al. (2012) refer to cross-boundary activities between learners and teams as knowledge spillovers, which are defined "the positive influence that teams receive in terms of knowledge from other teams in the classroom". Conceptually, the knowledge spillovers between learners and teams are visually illustrated in Figure 1. Although the idea of knowledge spillovers makes intuitive sense and has been verified in organisational science contexts (Bohle Carbonell, Rienties, & Van den Bossche, 2011; Borgatti & Cross, 2003; Héliot & Riley, 2010; Krackhardt & Stern, 1988), sharing knowledge and expertise with other learners is an implicit cost to an individual learner (e.g., spending time and energy to explain another learner/team, sharing a creative solution that other teams can "steal"), while the expected returns of receiving relevant new knowledge and expertise from others are unknown. As a result, some individuals are less willing to share knowledge than

others. In research in Computer-Supported Collaborative learning, a similar trend has been found, whereby not only the willingness of learners to share knowledge within and across teams but also the actual behaviour of learners to share knowledge is substantially skewed and not a given artefact when courses are designed based upon collaborative learning (e.g. De Laat, Lally, Lipponen, & Simons, 2007; Rienties, Tempelaar, Van den Bossche, Gijselaers, & Segers, 2009).

The creation of facilitating an interactive learning environments that can overcome the drawbacks mentioned in the previous section is widely acknowledged as one of the core elements of successful learning (De Laat, et al., 2007; Rienties et al., 2011). Several researchers (Garrison, Anderson, & Archer, 1999; Järvelä & Häkkinen, 2002; Kirschner, Strijbos, Kreijns, & Beers, 2004; Mishra & Koehler, 2006) have addressed that an effective instructional design (using ICT) should involve cognitive, pedagogical, social and technological elements. When students are given an active role in the learning process by teachers (i.e. student-centred learning), students are more engaged, co-construct more knowledge together and learn more than when students are given a passive role in form of knowledge transmission and lecturing by the teacher (i.e. teacher-centred learning). At the same time, learning within teams is by definition a social activity, whereby friendships in- and outside of class develop in a natural manner and have an important impact on how students learn (Baldwin, Bedell, & Johnson, 1997; Hernandez Nanclares, et al., 2012; Wentzel & Caldwell, 1997). In fact, recent research by Hommes et al. (2012) shows that friendship and learning social network relations outside the formal classroom setting were the primary predictors of learning amongst 300 medical students, while the more "classical educational psychology" metrics of motivation, intelligence and academic integration only played a marginal role.

Main Goal of Symposium

This symposium tries to assess whether teams also learn from the experiences of other teams in their class through their friendship relationships within the networks and what the underlying mechanisms for creating these learning spaces are. It will be explored how dynamic Social Network Analysis allows researchers and teachers to capture and understand the complexity of knowledge spillovers occurring inside and outside the classroom. Social Network Analysis (SNA) can be considered as a wide-ranging strategy to explore social structures to uncover the existence of social positions of (sub)groups within the network (Katz, et al., 2004; Krackhardt & Stern, 1988; Rienties, et al., 2009). In a review of Social Network Analysis (SNA) for small groups, Katz et al. (2004) argue that the network perspective can help researchers to identify and explore social network interaction features in teams or networks. The three papers of this symposium, which are situated in small-group settings in Oviedo (Spain), problem-based learning in Maastricht (The Netherlands), and project-based learning in Guildford (UK) all use active learning methods in combination with technology supported networked learning arrangements, whereby students learn and interact in small-group settings but also have several formal and informal activities to share knowledge between students and teams. All three papers use Social Network Analysis (SNA) in their analyses, and together their contributions address three fundamental questions in the symposium

1) How do knowledge spillovers between learners and teams develop (over time)?
2) How do prior friendships enhance or hamper knowledge spillovers in networks?

Answering these questions will create a better theoretical foundation for the design of group based networked learning environments that enhance knowledge spillovers. Analysis of the relation between social network relationships and knowledge spillovers can provide insights into the boundary conditions under which these knowledge spillovers occur. These insights can subsequently be utilized in the design of learning environments and for implementing structures that help to install these boundary conditions in educational institutions

Discussant

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