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Communities of practice in academia: Testing a quantitative model

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ABSTRACT

Up to now, the relationships among the fundamental notions of communities of practice (CoPs), i.e. knowledge, participation, identity, and artifact development have been based mainly on results from qualitative studies; they are not yet sufficiently based on quantitative evidence. Starting from a literature review, we formulate a quantitative, causal model of CoPs that describes these variables in the context of academic communities, and aim to validate this model in two academic CoPs with a total of N = 208 participants. A cluster analysis classifies the participants into clusters that are in line with the core-periphery structure known from previous qualitative studies. A regression analysis provides evidence for the hypothesized model on the basis of quantitative data. Suggested directions for future research are to focus on factors that determine CoP participants' contributions to artifact development and on approaches to automated monitoring of virtual CoPs.

1. Introduction

Communities of practice (CoPs) are groups of people sharing goals, activities, and experiences in the context of a given practice (Lave & Wenger, 1991; Wenger, 1999). Participation in CoPs is assumed to lead to the accumulation of experience, stimulation of the social construction of knowledge, and the development of expertise (Bereiter, 2002; Boylan, 2010; Engeström & Sannino, 2010; Fuller, Unwin, Felstead, Jewson, & Kakavelakis, 2007; Lave & Wenger, 1991; Paavola, Lipponen, & Hakkarainen, 2004; Tobbell, O'Donnell, & Zammit, 2010; Wenger, 1999). In contrast to the norm for schools, observable teaching (e.g., lecturing) in CoPs is rare. Nevertheless, the basic phenomenon in CoPs appears to be learning, and the potential curriculum is defined by the community practice (Lave & Wenger, 1991, p. 92).

The theory of situated learning is primarily founded on examples that best serve to illustrate the meaning of the notions of community and practice. A prominent example is that of Mayan midwives from Yucatan, who allow younger women to observe their activities when they are attending a laboring mother (Jordan, 1989; Lave & Wenger, 1991, p. 67). In a further example, teachers, together with pupils and pupils' parents, carry out the daily activities of a Canadian village school and at the same time prevent the school from being closed due to organizational difficulties (Roth & Lee, 2006). Of a similar nature – and of particular relevance for this study – are the numerous communities founded in schools (e.g., Bonsen & Rolff, 2006), universities (e.g., Brown, 2001; Rovai, 2002; Thompson & MacDonald, 2005; Tobbell et al., 2010; Visscher & Witziers, 2004) and research institutions (Kienle & Wessner, 2006). By examining these examples, we observe that CoP literature is based mainly on qualitative research, with few quantitative studies about learning and development in this context (e.g., Kienle & Wessner, 2006; Stewart, 2010; Visscher & Witziers, 2004). In particular, the relationships among the fundamental notions of CoPs are mainly based on qualitative studies and not sufficiently backed up with quantitative evidence. Therefore, the aim of this paper is to propose a quantitative model of CoPs that describes the relationships

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among the main notions (knowledge and experience, participation, expert status, and cultural artifact development). We begin with an examination of research literature to define the central variables and to integrate them into a causal model. Then we verify this model empirically in the context of academic CoPs.

2. The central variables of CoPs

2.1. Expertise in CoPs

Etienne Wenger (1999, p. 4) builds the theory of situated learning starting from the premise that "knowledge is a matter of competence with respect to valued enterprises — such as singing in tune, discovering scientific facts, fixing machines, writing poetry, being convivial, growing up as a boy or a girl, and so forth". So far, Wenger's view of knowledge corresponds to the generally accepted definition of expertise as advanced and reproducible knowledge and skills in a specific domain. Also, Wenger's view of learning by experience ("competence may drive experience; experience may drive competence"; Wenger, 1999, p. 138) implies that experience is correlated with domain knowledge and both have an impact on participation.

In this sense, expertise is fundamentally an individual characteristic of the expert. This view is endorsed by the possibility of having objective criteria that define the expert and expertise. A second view on expertise, discussed in Section 2.3, "expert status", implies the existence of a social context in which experts are recognized as such. In the following discussion, we regard the social recognition of experts as a (direct or indirect) consequence of their expertise.

In an attempt to formulate a quantitative model of CoPs, we regard expertise in the sense mentioned above: an independent variable with the components domain knowledge and experience. Expertise is often acquired in the CoP, as Lave and Wenger (1991) claim, but it can be brought from outside as well, such as by expert newcomers (Fuller, 2007). Further, we regard expertise as a determinant of participation in CoPs.

2.2. Participation

Wenger (1999, p. 4) defines participation as a notion that "refers not just to local events of engagement in certain activities with certain people, but to a more encompassing process of being active participants in the practices of social communities and constructing identities in relation to these communities. Participating in a playground clique or in a work team, for instance, is both a kind of action and a form of belonging. Such participation shapes not only what we do, but also who we are and how we interpret what we do." This definition is complemented by the numerous examples of CoPs described in the research literature (e.g., Bonsen & Rolff, 2006; Brown, 2001; Jordan, 1989; Kienle & Wessner, 2006; Lave & Wenger, 1991; Rovai, 2002; Thompson & MacDonald, 2005), which reveal also differences in the intensity of participation, depending on the members' individual levels of expertise. Members with higher expertise are involved in more activities, including those with a higher degree of difficulty and responsibility. "A newcomer's tasks are short and simple, the costs of errors are small, the apprentice has little responsibility for the activity as a whole. A newcomer's task tends to be positioned at the ends of branches of work processes, rather than in the middle of linked work segments" (Lave & Wenger, 1991, p. 110). In the examples of academic CoPs mentioned above, experts, such as university professors, participate in all activities of complex research projects concentrating on the most difficult parts, whereas novices, such as students, usually take over parts of a lesser extent and difficulty, such as a literature search or statistical data analysis.

Participation is the way in which CoP members gain experience with the community practice, and thereby construct knowledge. In some cases, knowledge is an access requirement to a CoP. In many academic communities, such as universities (Brown, 2001; Rovai, 2002; Thompson & MacDonald, 2005; Tobbell et al., 2010) or schools (Roth & Lee, 2006), participation is possible only with a certain minimum of domain knowledge. In some CoPs with more traditional characters, however, such as Indian midwives (Jordan, 1989; Lave & Wenger, 1991, p. 67), new members may be full novices and have no previous domain knowledge. In any case, interest and personal involvement (e.g., Lave & Wenger, 1991, p. 79) are considered essential.

In this sense, we build our quantitative model by regarding participation as an indicator of expert status.

2.3. Expert status

Identity in CoPs can then be described by various grades of expertise, which can be placed on a continuum from novice to expert, with the so-called regular members (Lave & Wenger, 1991; Wenger, 1999) in between. Changing identity from beginner to old-timer, and respectively from novice to expert, is an organic aspect of learning in CoPs.

As Wenger asserts (1999, p. 145), "the concept of identity serves as a pivot between the social and the individual". In this sense, identity in the CoP has an individual component, defined by a member's expertise, and a social component, defined by the social interactions in which the CoP member is engaged. A full member possesses superior knowledge and skills, that is to say expertise, and his or her identity also has been negotiated in the CoP to an expert status, so that the full CoP member has access to all the community activities and resources and interacts from a central position with the other CoP members (Tobbell et al., 2010). Because a community practice usually integrates multiple activities (e.g., scientific versus administrative activities in an academic CoP), the negotiation of the individual expert status will depend on the type of activity that the individual CoP member carries on (i.e., a scholar will reach a higher expert status than a secretary).