

Knowledge and learning in virtual communities of practice (VCoPs): theoretical underpinnings

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Abstract

The aim of the paper is to revisit the concepts of knowledge and learning in virtual communities of practice (VCoPs). Despite a great variety of approaches and successful examples of deployment of VCoPs, little research attention is paid to developing models or frameworks conceptualizing knowledge and learning in VCoPs. The review of the selected literature has enabled to propose a multi metaphorical framework of knowledge and a conceptual model of learning in VCoPs. The author uses a metaphoric approach to address the idea of paradigm shift and suggests a non-linear perspective on knowledge evolution affected by technological innovations. The multi metaphorical framework under consideration shows the shifts from behavioral learning to networked learning where VCoPs are located. The definition of VCoPs and their features are paid special attention to in the research. VCoPs are viewed from three overlapping dimensions: Community of practice, virtual domain of technology enhanced learning and discipline-based learning community of practice. Such a view represents a conceptual idea of discipline-based VCoPs which arises when three main components interplay: domain (virtual environment where teacher-student social interaction takes place); the community (the principles of apprenticeship as a learning model); the practice (developing the repertoire to solve problems within the discipline context). Also, the suggested multi metaphorical framework enables viewing learning within VCoP from knowledge- creation metaphor which leads to examination of learning from the perspectives of activity theory. Activity theory is used not as an analytical tool in the research but mainly as a descriptive approach to delineate learning within VCoPs as a technology mediated activity. The knowledge is constructed within the community, but the interaction and learning are mediated via digital artifacts. Applying principles of activity theory, VCoPs can be analyzed as complex systems where subjects interact with the community using technologies. Systems approach is applied to work out a logical model of learning activity in VCoPs consisting of axiological, cognitive, professional-educational, technological, communicative, reflexive components. The proposed model should be considered as a schematically descriptive model of learning within VCoPs because complex systems cannot be perceived using one approach due to their multidimensional and complex nature.

The paper concludes by the discussion of the findings and recommendations for further research. The topic is of interest because better understanding of the concepts of knowledge and subsystems of learning concept in the era of technologies is sure to enhance teaching practice.

Keywords: community of practice, virtual community of practice, metaphor approach, activity theory, concepts of knowledge and learning

1. Introduction: focus of the research

In the era of knowledge-based society and digitization of human activity, the understanding about learning activity and its inherent characteristics has been in the focus of recent research (Geck 2007). The development of computer mediated technologies facilitated the paradigm shift in the culture of communicating, working, and learning. There arises the need to understand how learning and knowledge in virtual communities of practice (VCoPs) have been changing with the paradigm shift. My objectives are to discuss what theoretical approaches underpin the assumptions about knowledge and learning in VCoPs. The topic is of interest for me as a researcher because better understanding of the concepts of knowledge and learning is sure to enhance my teaching practice. First, I will consider the concept of knowledge from a paradigm shift perspective to find out

the dominant epistemologies for VCoPs. Then, I will explore how learning can be viewed from these epistemological perspectives. To conclude, I will propose a conceptual theoretical model representing learning as a technology-mediated activity within VCoPs.

1.2 Research strategy for conducting literature review

To select literature for the review five-step process for designing and conducting a review was applied (Creswell 2013). The key terms for the search were identified as the following: communities of practice, virtual communities, learning in virtual communities, theoretical background. One Search Lancaster Library and Google Scholar were employed in the search process. In addition, Russian data base E-library (<https://elibrary.ru/>) was consulted. The findings in Russian on VCoPs were scarce: the found materials described the fragmented research or individual projects. These results can be explained by the fact that until recently scientific research has concentrated on micro level of small groups and individual projects (Koku 2004). Generally, qualitative or mixed-methods research is conducted to describe different aspects of virtual communities. On the other hand, Russian database provided plenty of sources on activity theory (AT) and systems approaches applied in this research. The preliminary search resulted in more than 800 papers related to the topic. The exclusion criteria helped to narrow the number of the papers for analysis (total number is 85). The papers not related to education were excluded. Besides, only primary sources of literature in English and Russian were included. The main foci in the literature are devoted to either professional practice (25 papers out of 85), whereas only 3 papers are focused on the models and frameworks applicable to VCoPs. Interestingly, pedagogical area related to empirical research and practice sharing dominates the research field (10 papers). Much attention is paid to the ways how to design a VCoP (8 papers). The research has revealed the necessity to address the issues related to conceptualizing and theorizing concepts of learning and knowledge within VCoPs.

2. Theoretical underpinnings of knowledge and learning in VCoPs

2.1 Paradigm shift in epistemologies: multimetaphorical framework

The literature review pointed to the fact that the scientists are talking about a new paradigm shift from traditional teacher centered approaches to online technology enhanced learning models (Camarinha-Matos & Afsarmanesh 2005; Cochrane & Narayan 2013; Harasim 2000). The availability of Internet and myriads of information communication technologies have triggered the paradigm shift making educational process more complex and context-based (Lenning & Ebbers 1999; Jonassen 1991; Harasim 2000). From the traditional teacher - centered instructional perspective knowledge is compared to “food” delivery to students for digesting and consuming (Eckert 1993, cited in Gherardi 2009). The metaphor of acquisition is used to delineate this type of thinking and learning (Sfard 1998). Such way of teaching results in perceiving learning as “irrelevant and boring” (Wenger 1999) or “ephemeral and unmotivating” (Dede 2008). The next stage in evolution of learning is a dialogical perspective proposed as an epistemological alternative to the process of acquiring knowledge. Learning within this paradigm is not static knowledge but it is generated through active social engagement in authentic *in situ* practices (Bruner 1973, Cole 1988, cited in Paaavola & Hakkarainen 2005). The learners are viewed as constructors of their knowledge from social participation and interaction within socio-cultural settings (Bruner and Haste 1987, cited in Gherardi 2009). The learning is perceived through the “participation” metaphoric lens when the learner gains knowledge through participation in community practices and moulds the identity through learning trajectories (James 2007). The learning is generated by becoming a participant of the community where teachers are expert participants and “preservers of practice” and students are peripheral participants, apprentices (Sfard, 1998). This is a dialogical approach to learning with the emphasis on communication skills, participation in social practice, and multiple voices (Bakhtin 1981). The distinction is made between acquisition and participation metaphors signaling the “seismic shifts” between different epistemologies (Sfard 1998; Dede 2008).

The knowledge creation metaphor is proposed as the third concept to delineate knowledge and learning (Sfard 1998). The necessity to introduce a new metaphor is connected with the increased demand for new competences related to the use of technologies in modern knowledge societies (Bereiter 2002; Hakkarainen et al 2004; cited in Paalova 2005). Trialogical learning is supported by technological and pedagogical approaches to enhance collaboration in knowledge practices (Paalova et al 2005). This approach is based on a knowledge creation metaphor (Scardamalia & Bereiter 2003) with the focus on creating and developing something new but not replicating the practices. Trialogical activity cannot easily be taken part in without appropriate technology. The

approach turns out to be sequential to mono/dialogical approaches and is described using the metaphor of hybridization (Hakkorainen 2009). Scientists propose a new learning theory of connectivism as a successor of behaviorism, cognitivism and a social constructivism (Bell 2011; Jones 2015), although it has not attained a status of a mature, well grounded theory (Kop & Hill, 2008 cited in Mattar 2010). There arises the concept of networked learning encompassing the dialogic perspective, principles of CoP, and situatedness of learning within activity systems (Goodyear 2004). Despite the variety and diversity of approaches, all perspectives propose active and meaningful learning which is situated in practice and a community that is different from formal instructional, individualistically-oriented learning approaches.

The evolution of learning is traditionally presented by the movement from behaviorism to cognitivism and, subsequently, to constructivism in the form of progression (Jones 2015). Such a “tripartite scheme” presents a reductionist view of the evolution of learning theories which cannot be presented in a linear manner. To avoid the simplicity of the scheme I would suggest applying an S-curve for paradigm shifts. An S-curve model is used to explain the impact of technological innovations on paradigm shifts and generally accepted to describe evolution of systems. For example, Roger’s diffusion theory states that innovations spread in a society as an S-curve (Kuchanary & De Cui 2011). Although there are other research attempts to present the overview of technological impact on education in a traditional table format (Harasim, 2000), the proposed framework suggests a non-linear perspective viewing the “canon model” (Jones 2015) through a metaphoric lens. The metaphoric approach is used to characterize the changes because metaphors are good to fit small areas of research to understand complex abstract phenomena (Nonaka & Takeuchi 1995; Hart 1998). The chosen S-curve model allows considering other approaches which are sure to emerge at the edges of the paradigm shifts.

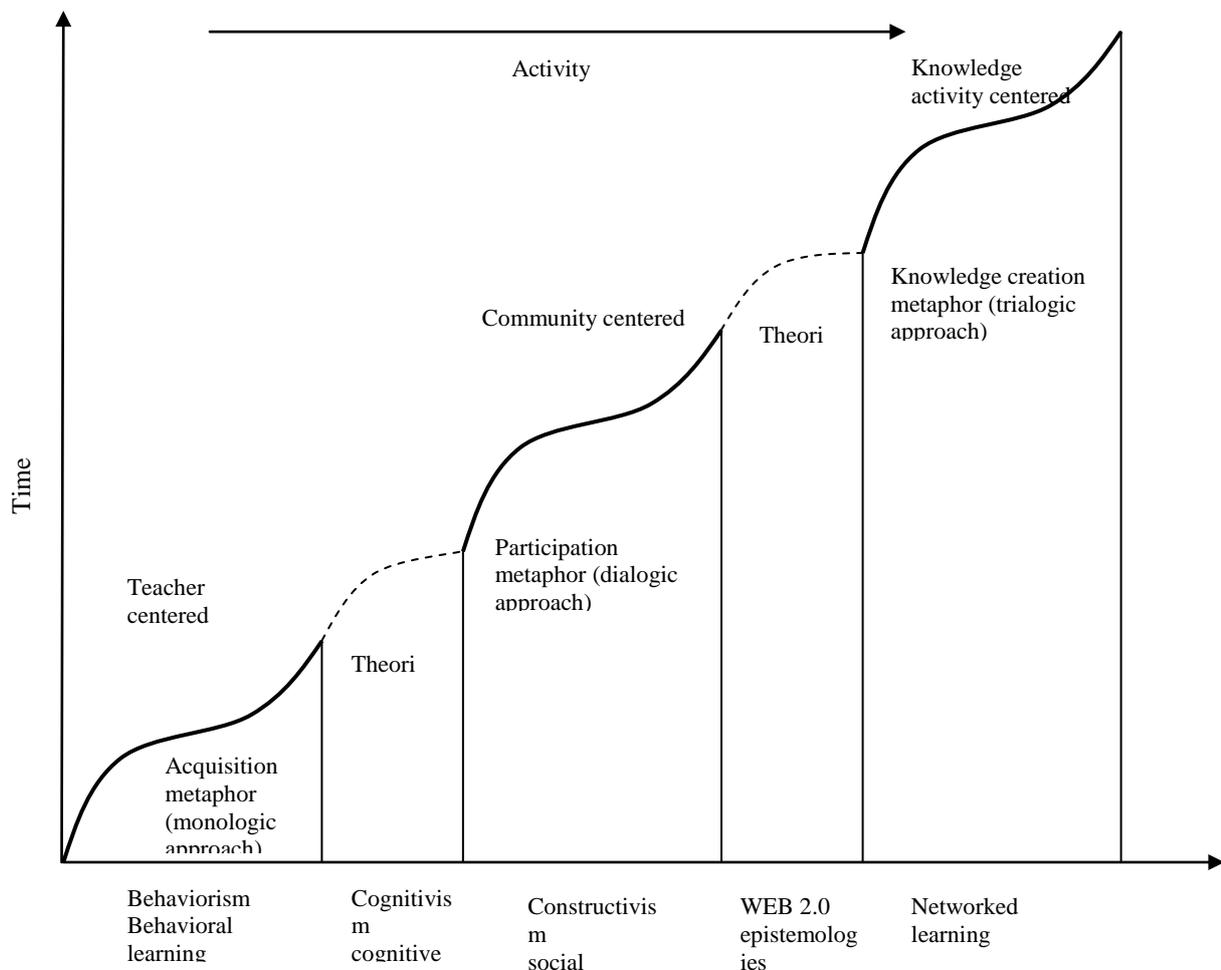


Fig 1. Multi metaphorical framework of knowledge paradigm

2.2. Theoretical underpinnings of Learning in VCoPs.

Learning within CoP is a core concept for social learning theory proposed by Wenger and Lave (Smith 2003). Many researchers delineate virtual learning applying the principles of CoP. From this perspective, learners are actively engaged in the social process and practice to produce the meaning. Following the original definition, a CoP can be characterized using the categories of “mutual engagement”, “joint enterprise”, “shared repertoire” (Wenger 1999). The concept of CoP is socially and historically rooted into philosophical background. Although the phenomenon is known to be age-old, some studies regard it as a relatively recent coinage (Wenger-Trayner, 2015). Similarly, the idea of VCoPs was proposed more than two decades ago (Johnstone & Krauth 1996), but only recently it has been rapidly evolving. Researchers mention the “infant stage” in the development of VCoPs (Camarinha-Matos & Afsarmanesh 2005).

The concept of VCoPs is widely applied to different contexts: organizational learning (Ardichvili 2008; Borgatti & Foster 2003; Kerno & Mace 2010), public sector (Bekkers 2003; Hildreth & Kimble; 2004), international development to education (Wenger-Trayner 2015). The concept of CoP in virtual environments is so diverse and multifaceted that the researchers cannot agree on the generally accepted definition. There is no umbrella definition, unified theory or a framework that would holistically describe the phenomenon. In literature several different terms are used: virtual CoP (Gannon-Leary & Fontainha 2008), collaborative virtual environments (Redfern & Naughton 2002); virtual community of learners and professionals; collaborative networks (Camarinha-Matos & Afsarmanesh 2005); on-line communities (Potts 2005); network of practice (Brown & Duguid 1991); open-ended learning environments (Land & Hannafin 1996); communities in network (Lewis & Rush 2013). The multiplicity and diversity of types and manifestations is limitless (Camarinha-Matos & Afsarmanesh 2005; Lenning & Ebbers 1999). In this paper I would follow the definition of a VCoP as a network of individuals who share a domain of interest about which they communicate online (Gannon-Leary & Fontainha 2008). A disciplined based VCoP combines the features of a learning community, a community of practice and is mediated via technology to enhance either professional development or knowledge within a particular discipline.

The review of the selected literature on the topic has enabled to identify three broad areas of research and view discipline-based VCoPs from three overlapping dimensions: Community of practice, virtual domain of technology enhanced learning and discipline based learning community of practice. Such a view represents a conceptual idea of discipline-based VCoPs which arises when three main components are combined: domain (virtual environment where teacher-student social interaction and participation take place); the community (the principles of apprenticeship as a learning model); the practice (developing the repertoire to solve problems within the discipline context). The location where three dimensions overlap can be regarded as a discipline based VCoP. Such an assumption can be proposed taking a hermeneutic approach within the interpretivist paradigm (Kaghan & Philips 1998): VCoPs can be understood only with the reference to these three dimensions which are vital for their existence. VCoPs share the features of CoPs but their nature and structure are different from the traditional face-to-face CoPs (Von Wartburg, Rost, & Teichert, 2006). Virtual communities act similarly as traditional CoPs as a “shared repository of knowledge” (Lewis & Rush 2013; Reznik & Adamick 2012). The idea of apprenticeship is applied to describe teacher-student interaction within both types (Wenger 1999). However, such conceptualization cannot fully describe the variety and complexity of VCoPs (James 2007). Some studies report looser and more fluid structure of VCoPs where membership is open and voluntary (Wasko, Tiegland & Faraj 2009; Koku & Wellman 2004). The teachers act as digital stewards making the structure within VCoPs less hierarchical and more flattened (Wenger 2009; Cochrane 2010). Along with the shift from dialogic to triological learning (Hakkarainen & Paavola, 2004), VCoPs are perceived as more complex entities where learning is situated within the technology mediated community. Engeström (1999) states that it is necessary to create digitally mediated environments taking into account their dynamics and complexity. The dialogue is mediated, and the knowledge is constructed and co-constructed via digital technology as a mediating artifact. Learning within VCoPs can be viewed from knowledge-creation metaphor which leads to examination of learning from the perspectives of activity theory considering all the nuances of disciplined based VCoPs.

3.2 Learning models within VCoPs.

3.3 Conceptual model of learning within VCoPs: Activity theory perspective

Activity Theory (AT) is deployed for studying a group that exists "largely in virtual form, its communications mediated largely through electronic and printed texts" (Foot, 2011). AT is rooted in the Soviet psychological activity theory proposed by Vygotsky, Leontiev (1978) and is based on the understanding of the activity having a purposeful and transformative power to develop interaction between actors ("subjects") and the world ("objects") (Roth & Lee 2007). Researchers admit that this theory is considered to be a leading post-cognitivist approach to human-computer interaction (Kaptelin & Nardi 2012). The knowledge is constructed within the community, but the interaction and learning are mediated via digital artifacts. Applying principles of activity theory, VCoPs can be analysed as complex systems where subjects interact with the community using technologies. The possibility of applying the principles of AT to VCoPs are presented in the works of Bødker (1990), Engeström (1987), Kaptelin & Nardi 2010, Nardi (2012).

In this research AT is not used as an analytical tool but mainly as a descriptive approach to delineate learning within VCoP. If Engeström (1999b) viewed learning as an ideal typical cycle of seven learning actions, I propose to delineate it as an outcome of activity of the subject within VCoPs. The complexity of learning within VCoPs allows using a systems approach (Bertalanffy 1972). There are recent studies proving the validity of using the systems approach to analyze VCoPs (Watkins et al. 2017). In this research a logical multidimensional model of human activity proposed by Zeer (2003) will be elaborated and presented as a possible conceptual model to visualize technology mediated learning within a discipline based VCoP. The original model does not comprise a technological constituent in its structure. To expand the model, I suggest including this component because learning in VCoPs is mediated via technology. The model represents a cyclical nature of knowledge within the community and connectedness of the constituents of the system (Winn 1993; Gannon-Leary & Fontainha 2008). The research proposes an extended logical model of learning activity in VCoP. The proposed model is of cyclical structure and consists of axiological, cognitive, professional-educational, technological, communicative, reflexive components. The model should be considered as an internal description which is "structural as it tries to describe the system's behavior in terms of variables and their interdependence" (Bertalanffy 1972, p 420).

There are different views on understanding the variables within the constituents. The axiological component can be presented by such psychological categories as motivation, identity, values, ethical norms. The cognitive constituent can include cognition, knowledge, skills, abilities and assessment (Zeer 2003). The professional educational constituent includes the professional context of a discipline based VCoP. The technological aspect is presented by two dimensions: mediation technology which is used to launch a VCoP (e-platform/ e-mail/blogs/forums/ social networking site etc) and pedagogical approaches that are employed by the teacher. The technological component is intertwined with the communicative constituent which is, in its turn, related to communication and social nature of learning. The reflexive component of learning is vital for self-assessment and self-regulation within professional activity. The importance of the reflexive component for any type of learning is underlined by Derkach (2003).

The proposed model should be considered as a schematically descriptive model of learning within VCoP because complex systems cannot be perceived using one approach due to their multidimensional and complex nature (Blauberg, Sadovsky, V. N., & Yudin 1977). Each of the constituents of the model can be separately investigated and expanded showing multiplicity of interpretations. The findings show that much attention is paid to technological aspect of VCoPs (42.5% out of all selected papers) and axiological and cognitive issues (30% from psychological perspective), although professional/educational (10% from discipline-based perspective) and reflexive aspects (5%) need more research attention. It is necessary to note that eliminations of core components (for example, exclusion of cognitive or axiological ones) could lead to distortions within the stability of the system because of interdependence and interconnectedness between the constituents. On the other hand, sophistication of the constituents and their variables can lead to further development of the system as a whole (Korolev 1959).

These findings can be of practical value for both the researchers wishing to address the gaps in this field of research and the teachers willing to meet the challenge of complexity of learning within VCoPs. The conceptual model can deepen the understanding of constructs and their interplay within the system of learning: what intrinsic and extrinsic constructs should be taken into account when teaching within VCoPs. Such a model can be considered as an attempt to look at learning holistically considering pedagogical, technological and contextual dimensions.

4. Conclusion

The theoretical analysis conducted within this small-scale research has revealed the ontological and epistemological characteristics of knowledge and learning within VCoPs. The proposed models can theoretically delineate learning within VCoPs, but more research should be considered to validate the proposed framework and the model. The results of the research can be of practical value for the educators wishing to better understand the underlying theoretical principles which underpin learning processes within VCoPs. Learning within VCoPs is a social construct where knowledge is co constructed in the collaborative activity. Teachers should be aware of the complexity of this collaboration based on intrinsic factors within axiological, cognitive, reflexive subsystems, whereas professional educational, technological and communicative systems relate more to extrinsic variables affecting the management of learning processes (Dillenbourg 2013).

The research is based on the review of selected literature on the topic, presents a theoretical diagram of epistemologies shifts within paradigms. Specifically, the research proposes the model of technology mediated learning as an activity system within VCoPs. The proposed frameworks emphasize the importance of analyzing the theoretical grounds of knowledge and learning within VCoPs for successful deployment of this technology. It has offered one of the theoretical perspectives without denying a great variety of other theoretical paths. Such a diversity of views and complexity of the phenomena under consideration constitute a research locus for further critical exploration.

7. References

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