A Semantic Based Approach for Knowledge Capitalization in Communities of Practice of E-Learning

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ABSTRACT

Communities of Practice of E-learning (CoPEs) are considered as a virtual framework for exchanging and sharing techno-pedagogic knowledge and know-how between actors of e-learning. However, after analyzing knowledge management modalities in some CoPEs, the authors noticed that knowledge is often represented in a way that does not facilitate its access and reuse. Accordingly, this paper focuses on knowledge capitalization in CoPEs and proposes an ontology-based framework aiming to facilitate knowledge sharing and reuse. This framework is structured into three layers: (1) the ontology layer, (2) the semantic annotation layer, and (3) the asset layer. It provides respectively, a common vocabulary within a CoPE aiming to enable a shared understanding between its members, a semantic support to annotate its knowledge assets facilitating their retrieval and reuse, and a means of storage and indexing its different assets. The paper is illustrated with a case study related to a semantic adaptive wiki, a service proposed for a CoPE made up of a teaching staff in computer science at the USTHB University in Algeria.

Keywords: Communities of Practice of E-learning (CoPEs), Community of Practice of E-Learning (CoP of E-Learning), Knowledge Capitalization, Ontology-Based Framework, Semantic Annotation, Semantic Organizational Memory

1. INTRODUCTION

One of the most important concepts in social or situated learning theory is the notion of a community of practice (CoP). According to Wenger, McDermott, and Snyder (2002), CoPs are “groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis.” CoPs have been recognized as effective environments to support learning among professionals,
organizations and educational institutions. They play an important role in the management of the tacit knowledge that the community members own (Wenger, 2004; Kimble & Hildreth, 2004). Therefore a CoP has become associated with knowledge management (KM), in particular as a way of transferring tacit knowledge.

By applying the concepts of CoPs to the domain of e-learning, the authors considered in Berkani (2007) and Chikh, Berkani, and Sarirete (2007). CoPs of e-learning (CoPEs) as a virtual framework for exchanging and sharing technopedagogic knowledge and know-how between actors of e-learning. In a CoPE, members can collaborate and discuss their problems and experiences, related to the development and use of online learning systems. The interactions are conducive to developing new knowledge, stimulating innovation, or sharing existing tacit and/or explicit knowledge between e-learning actors. However, after analyzing of KM modalities in some CoPEs, we noticed that knowledge is often represented in a way that does not facilitate its access and reuse. Due to the informal character of learning within a CoPE, most of the knowledge is mainly tacit, based on direct communication between members, and then needs to be elicited and represented in a formal way to be capitalized and further exploited. Moreover, explicit knowledge needs to be more highlighted, enriched with information related to feedback use, validity and assessment, so as to improve access, sharing and reuse of this knowledge.

In this paper, we focus on the problem of capitalization of knowledge in a way that facilitates its access and reuse. We propose an ontology-based framework as the backbone for capitalizing knowledge for reuse in CoPEs. The framework provides: (1) a common vocabulary to enable a shared understanding between the CoPE’s members and to facilitate exchanges between the CoPE environment and the e-learning platforms; (2) a semantic support to annotate the CoPE’s knowledge assets in order to facilitate their retrieval and reuse; and (3) a means of storage and indexing the different assets in the community memory.

This paper is organized as follows: the next section presents some related works about KM and capitalization in CoPs and CoPEs. The following section proposes an ontology-based framework for capitalizing knowledge in CoPEs. The different steps of the capitalization process using the framework are discussed through the dynamic capitalization approach proposed by Oladejo, Odumuyiwa, and David (2010). A case study illustrates the work through an adaptive semantic wiki dedicated for a CoPE including members from the higher education context. Finally the paper is concluded with some discussion and future work.

2. RELATED WORK

Considerable research has been conducted concerning KM and capitalization within CoPs. Numerous publications present KM practice/tool/technology frameworks through CoPs (De Liddo, Concilio, & Buckingham Shum, 2007; Guizzardi, Perini, & Dignum, 2003, 2004; Pettenati & Ranieri, 2006) and from both theoretical and empirical perspectives (Bourdon & Kimble, 2008; Correia, Paulos, & Mesquita, 2010). Moreover, a lot of works were proposed as parts of research projects such as Daele, Deschryver, Gorga, and Künzel (2007; Evangelou, Karacapilidis, & Tzagarakis, 2006; Evangelou, Karacapilidis, Gkotsis, Tzagarakis, & Karousos, 2006; Gkotsis, Evangelou, Karacapilidis, & Tzagarakis, 2006) carried out within the PALETTE European IST project (Le Dantec, 2006). In this former project, several services were proposed to support the KM and learning processes within CoPs. The proposed services rely on a semantic web-based approach using ontologies (Tifous, El Ghali, Dieng-Kuntz, Giboin, Evangelou, & Vidou, 2007), for annotating knowledge in order to facilitate its transfer and sharing.

The review of the KM literature within CoPs provides a comprehensive overview of the topic and related work but shows that the process of knowledge discovery still has major shortcomings. Indeed it’s difficult to
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